Reflections on and outlook for Higher Education in Latin America

Tuning A Latina INGL.indd 3 19/7/07 10:44:32

Reflections on and outlook for Higher Education in Latin America

Final Report – Tuning Latin America Project 2004-2007

Edited by
Pablo Beneitone (Argentina)
César Esquetini (Ecuador)
Julia González (Spain)
Maida Marty Maletá (Cuba)
Gabriela Siufi (Argentina)
Robert Wagenaar (Netherlands)

2007
University of Deusto
University of Groningen

Tuning websites

Tuning – Latin America:
http://tuning.unideusto.org/tuningal
www.rug.nl/let/tuningal

Tuning Europe:
http://tuning.unideusto.org/tuningeu
www.rug.nl/let/tuningeu

Financial support

The Tuning project is subsidised by the European Commission within the framework of the ALFA Programme.

ISBN:
Legal Deposit: BI -

Printed in Spain/Impreso en España

Contents

Acknowledgements

This book is the result of the effort and dedication of many people with a commitment to higher education. From the outset it has been clear that the Tuning Latin America Project is both a project and an experience. It is a project that has brought together leading representatives of higher education to discuss the most significant aspects of university systems with the ultimate aim of bringing about improvements through the sharing of good practices. Because of this way of seeking consensus, the Tuning project has also been a positive and intense experience of dialogue, both among the Latin American countries, which have developed a greater capacity for mutual understanding through taking into account each participant's point of view, and between Europe and Latin America, with the establishment of flexible channels of communication that allow a greater understanding of the two different contexts.

We would first like to thank the European Commission, which through its ALFA Programme has offered us the support that has made this project possible. We also want to thank all the participating institutions of higher education, who through their representatives have offered us their time, energy and support to help meet our goals. The project and this rich experience have been made possible by the dedicated effort of all the universities and official representations from the higher education authorities involved. We would once again like to thank them and particularly the general coordinators of the 12 working areas, who have guided each group, steered it and ensured that it achieved the results set out from the beginning.

We would also like to highlight the important role played by the National Tuning Centres which successfully accompanied the debate in the universities, with a deep respect for diversity of opinion and a strong commitment to the task assigned. They have managed to ensure that the project was known beyond the participating universities, and have taken from their university systems proposals that have helped enrich the debate.

This project means dreaming - imagining ways in which current practices can be transformed and improved. But it means not only dreaming of this future, but of getting down to the work of making it a reality. In doing this, we have enjoyed the help of the Latin American universities that organised the General Meetings, the National University of La Plata (Argentina), the Federal University of Minas Gerais (Brazil), the University of Costa Rica (Costa Rica) and the Autonomous Metropolitan University (Mexico). These institutions, through their authorities and in particular the representatives in the project, Maria Rosa Depetris, Marlucy Paraíso, Leda Badilla and María José Arroyo Panigua respectively, have worked intensely for the success of these meetings.

We would also like to highlight the important contribution made at each General Meeting by the secretaries, by the people who spoke about their experiences at the plenary sessions, the academics who produced discussion documents, those who revised them and the experts in statistics from the University of Deusto, Jon Paul Laka and José Luis Narvaiza who analysed the data and presented the results.

Although we have spoken primarily about the Latin American universities, we should not ignore the sincere and respectful help from representatives of European universities who formed part of the project. We would also like to thank Arlene Gilpin, who kindly offered us her time and experience in revising this book. Finally, we would like to acknowledge the work of Margarethe Macke whose care and dedication has contributed significantly to the project.

1

Introduction

The Tuning Latin America Project was created within a context of deep reflection on higher education, at both a regional and an international level. Until late 2004, the Tuning experience was exclusive to Europe, an achievement by over 175 European universities, which, since 2001[1] had worked intensively for the creation of the European Area of Higher Education as a response to the challenge set out in the Bologna Declaration[2].

Tuning in Europe posed a major challenge for higher education institutions, since it allowed for the creation of a working environment in which European academics could build points of reference, understanding and convergence. According to the definition of Tuning given in[3] the Final Report of Phase 2 of the European project: «*To "tune" means to synchronise a radio on the desired frequency; it also means "tuning" the various instruments in an orchestra, so that music can be played without unwanted dissonance*».

An area was created to allow the programmes offered in the educational structures to be «agreed», «tempered» and «tuned» so that they could be understood, compared and recognised in the common European area. Tuning seeks to reflect that idea of seeking points of agreement, convergence and mutual understanding in order to facilitate an understanding of educational structures. These identified features of reference are needed to help build bridges towards course recognition.

In theoretical terms, the Latin America Tuning Project implicitly refers back to a reflective/critical framework which is the product of a certain multi-referentiality in terms of teaching and disciplines, in order to make its lines of action

---

[1] Tuning is now in its fourth phase in Europe (2006-2008).

[2] See the official website of the Bologna process: *http://www.dfes.gov.uk/bologna/*

[3] González, Julia and Wagenaar, Robert, eds. *Tuning Educational Structures in Europe. Final Report. Phase 2 Universities' contribution to the Bologna process*, Bilbao, 2006, 423 pp.

mutually compatible. The project cannot be seen as a «recipe», but rather an approach, whose purpose is to incorporate the different aspects of the diversity of the countries involved (and interacting) in it.

Today Tuning[4]is more than just a project; it has become an internationally recognised, methodology[5] a tool built by universities for universities, an instrument which gives us confidence that the European Area of Higher Education may be an increasingly close reality. Europe is on the path towards integration and Tuning has helped facilitate part of that process.

Given this context, perhaps the first question that arises is why a Tuning Latin America Project should be necessary. There are many different answers. The best approach is to look at the nub of the issues facing European universities at this time and compare it with those faced by Latin American universities. Firstly, the idea of compatibility, comparability and competitiveness in higher education is not an exclusively European aspiration. One of the features of the current process of globalisation is the increasing mobility of students, and this requires reliable and objective information on the educational programmes available. In addition, we also need to take into account the mobility of personnel. Current and future employees, inside and outside Latin America, will need to have reliable information on what a given qualification or course actually means in practice. Finally, at the current stage of internationalisation, the university as a social actor faces challenges and responsibilities regardless of whereabouts in the world it is located. Institutions of higher education must assume a leading role in the different processes that are being built in society, and that role is all the more crucial in the case of reforms in higher education.

In order to occupy a place in the knowledge society it is of vital importance to train human resources, and to tailor programmes to the needs of societies at both local and global levels. For this reason, a systemised effort to think and rethink the academic horizon together (recognition by the academic community) and the professional horizon (recognition by professional associations and groups) is one of the central planks of the Tuning project. Keeping universities in constant dialogue with society, which is always an open door to the future, is important in any situation, although a sensitivity and ability to adapt to different contexts is naturally a basic requirement and one that is central to the Tuning Latin America Project.

Another of the reasons for extending the Tuning project to Latin America involves co-operation. Both sides of the Atlantic in common with all the other regions of the planet are called upon to work together. The need to co-operate is not a new one, but it is ever more pressing and more possible. From the outset, the concept of cooperation that underlies this initiative disqualified any form of imposition. The Tuning Latin America Project is based on a collaboration that is meant to have a real importance in the following terms:

[4] Throughout the document, the word «Tuning» on its own refers to the Tuning methodology, whereas the project is referred to as the Tuning Latin America Project project.

[5] Appendix I describes the Tuning methodology in detail.

— The offering in this collaboration is now well consolidated, having been worked on by many academic and professional colleagues. The work that has been carried out is valuable because it is backed by over two hundred teams.
— Each team, each country, is called on to work from the specific circumstances of its own context. Respecting variety is just as important as reaching consensus. The 19 Latin American countries that have joined the Tuning programme have thus done so from their own respective contexts, from their natural base.
— The project is open to ongoing debate and is always permeable to the incorporation of new countries which will enrich and change the original proposal. Cooperation in Tuning means being open to dialogue and mutual learning.
— Tuning is destined to have a major impact on the systems of academic recognition, an important feature in the context of global mobility. But one might wonder whether it is possible to have global mechanisms that will allow a clear understanding of difference and whether these can extend and ensure dialogue between the different systems. It would be possible and advisable to channel efforts for the construction of mechanisms understood and prepared by the majority that are open enough to allow a space for all, but defined in such a way that the crucial elements of programmes could be understood and «recognised» in the different educational systems.

In other words, the Tuning Latin America Project is a shared project which looks for and builds languages and mechanisms for reciprocal understanding of systems of higher education, which will aid transnational and transregional processes of recognition. It has been conceived as **a space of reflection for agents committed to higher education, which through a search for consensus, will contribute to advancing the articulated development of easily comparable and understandable qualifications in Latin America.**

The idea of applying the Tuning project to Latin America arose in Europe, but it was raised by Latin Americans. During the Fourth Progress Meeting of the Common Area of Higher Education of the European Union, Latin America and the Caribbean (UEALC/ALCUE), held in the city of Cordoba (Spain) in October 2002[6], the Latin American representatives at the meeting, having heard the presentation of the results of the first phase of Tuning - Europe, became interested in the possibility of developing an experience in this framework with Latin America. From that moment on work began to prepare the project which was presented to the European Commission's ALFA Programme[7], by a group of European and Latin American universities in late October 2003. The eight Latin

[6] http://www.aneca.es/present/uealc.html
[7] http://ec.europa.eu/europeaid/projects/alfa/index_es.htm

American universities who presented the proposal were: Universidad Nacional de La Plata (Argentina), Universidad Estadual de Campinas (Brazil), Universidad de Chile (Chile), Pontificia Universidad Javeriana (Colombia), Universidad de Costa Rica (Costa Rica), Universidad Rafael Landívar (Guatemala), Universidad de Guanajuato (Mexico) and Universidad Católica Andrés Bello (Venezuela). The seven European universities were: Technische Universität Braunschweig (Germany), Universidad de Deusto (Spain), Université Paris IX - Dauphine (France), Università di Pisa (Italy), University of Groningen (Netherlands), Universidad de Coimbra (Portugal) and the University of Bristol (United Kingdom).

The Tuning proposal for Latin America can be said to be an intercontinental idea, a project which has fed off the contribution of academics in Europe and most particularly in Latin America. The idea of seeking consensus is the same; it is unique and universal. What changes are the actors and the impact of every particular situation.

Having received acceptance for the proposal from the European Commission during July and August of 2004, 18 Latin American countries were visited by the general coordinators to explain, discuss and fine-tune the proposal with Ministries of Education, Conferences of Rectors and higher education decision-making bodies in the different countries. The suggestions received were noted and incorporated into the project, which formally began in October 2004.

Another important justification behind the Tuning Latin America Project was the interest among European universities in learning of the conclusions of their Latin American counterparts. There was and is a great desire to know the level of correlation between the results achieved in Europe and those obtained in Latin America. These results will go further in informing the debate and will make it possible in the future to discuss international points of agreement on qualifications in both Europe and Latin America.

What does the Tuning Latin America Project involve?

The project sought to spark a debate whose goal was to identify and exchange information and improve collaboration between higher education institutions, for the development of quality, effectiveness and transparency. Protection of the rich diversity of Latin American higher education was essential to the project, as is university autonomy. Thus, a basic pillar of the project was that the debate took into account the particular positions of the different institutions and different countries. One of its central purposes is to contribute to the development of easily comparable and understandable qualifications «from within», based on the objectives set for the degree, from the profiles sought by the graduates, offering elements that will make it possible to extend the articulation among systems of higher education in Latin American countries. By means of the search for perspectives that can facilitate the mobility of holders of university qualifications and professionals in Latin America and perhaps also in Europe, the goals of the project are to promote consensus at a regional level on the way of understanding qualifications from the point of view of the competences that the holders of these qualifications would be capable of achieving. The project thus begins with a search for common points of reference centring on **competences**.

The decision to use common points of reference rather than definitions of subjects (programmes, subjects) marks a clear position: if we want to foster professional and academic mobility amongst our countries, university education in each one must contain a certain level of consensus on commonly agreed and recognised points of reference within each of the specific areas and disciplines. Furthermore, the use of points of reference respects diversity, freedom and autonomy.

Following its own methodology, the Tuning Latin America Project has had **four major lines or strands of work**:

1) **competences (generic and subject specific);**
2) **approaches to teaching, learning and assessment of these competences;**
3) **academic credits;**
4) **quality of programmes.**

In the **first line**, we set out to identify the basic competences that perhaps should be developed in any programme, and which are considered important by society. For example, competences such as the capacity to learn and update learning constantly, the capacity for abstraction, analysis and synthesis, etc. are common to all or nearly all degrees. In societies in transformation, where demands are constantly being reformulated, such generic competences are very important

This first line analyses, as well as generic competences those that are specific to subject areas. The latter are linked to a discipline and give a specific programme its identity and consistency.

Subject specific competences vary from discipline to discipline. For Tuning, it is necessary to develop more transparent and comparable programmes at a Latin American level, in order to ensure equivalent learning results and competences for each degree. Defining these competences is the responsibility of academics, in consultation with other stakeholders. In defining competences and learning results agreed points of reference are developed that lay the foundations for ensuring quality and contributing with processes of national and international assessment.

The **second line** prepared a series of materials that made it possible to share the most effective **methods of teaching, learning and assessment** for achieving the learning results and competences identified. This meant in some cases developing a novel combination of approaches to teaching and learning, in order to stimulate —or allow the development of— the competences designed in the profile. Changes in approaches and objectives of teaching and learning also imply changes to the methods and criteria of assessment, according not only to the content but also abilities, skills and values. All students must experiment with a variety of approaches and have access to different learning contexts, whatever their area of study. Naturally, transparency and comparability of methods and criteria for assessing the achievement of competences are essential if we are to contribute to an improvement in quality. While the first line of the project seeks to define generic and specific competences, the second looks for the best way of learning, teaching and assessing them.

The **third line** begins a reflection on the impact and relationship of this system of competences with the student's workload, and its connection with the resulting time measured in **academic credits**. The aim is also to stress their relationship with approaches to teaching, learning and assessment. The Tuning process requires a clear definition of the concepts associated with credits, and of the goals, objectives and results of learning. For all of these reasons, we need to achieve greater clarity and a better understanding of the following areas: the role of credits, the allocation of credits to courses, the overall design of the study programme, the way credits are calculated on the basis of the student's workload, the relationship between the student's workload, the teaching methods and the learning results.

This line was not initially included in the project, but during the preliminary visits to the Ministries of Education, Boards of Higher Education and Conferences of Rectors of Latin America, some countries saw this issue as one of emerging relevance which it was important to integrate into the project's deliberations, since they felt that it facilitated academic co-operation.

Finally, the **fourth line** of the project highlights the fact that quality is an integrating part of the design of the competence-based curriculum, essential in articulating the three previous lines. If a group of academics wishes to prepare a study programme, or redefine one, they need a set of elements that will contribute to its **quality**. Mobility and recognition of studies requires a climate of trust and transparency and also a proven correspondence among the fundamental elements of education, in the different systems of higher education. Therefore a basic foundation for mutual trust among higher education institutions and recognition of the degrees they confer is a common and tried and tested methodology for assessing quality..

Serious and articulated work on the four proposed lines will encourage transparency of professional and academic profiles of the degrees and study programmes and will foster ever-greater emphasis on results. The idea that students acquire more specific competences encourages greater clarity in setting the objectives for a specific programme. This will be achieved by adding indicators that can be accurately measured, while it is established that those objectives must be dynamic and more in accordance with the needs of society and the job market. These changes could transform the approach of educational activities, favouring systematic student participation, individually or in groups, in preparation of relevant assignments, presentations, etc.

The interest in the development of competences in the programmes matches an approach to education that centres primarily on the student and his or her capacity to learn, requiring greater self directed learning and higher levels of commitment, given that it is the student who has to develop the competences. Likewise, facilities are provided for innovation through the preparation of new teaching materials that will benefit students and teachers; and, the process of teaching, learning and assessment as a whole.

How was the Tuning Latin America Project implemented?

Thus far, we have looked at the central core of the Tuning methodology, as transferred to the area of Latin America. We now need to look at the way in which the project was actually carried out. Firstly, we need to stress that this is a project by universities for universities. They are the central actors in the debate and it is they who set the pace of the process.

The task began with 62 Latin American universities debating in **4 work groups**: **Business Administration, Education, History and Mathematics**. In a second phase, given the impact of the activities carried out within the framework of the project and in response to a demand from Latin American countries, 120 more universities joined in **8 further subjects: Architecture, Law, Nursing, Physics, Geology, Civil Engineering, Medicine and Chemistry**. The **182 universities**, from **18 Latin American countries (Argentina, Brazil, Bolivia, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela)** then formed twelve theme-based working groups. **The Dominican Republic**, which was not considered eligible in the Call for the ALFA Programme, and therefore not included in the initial group of 18 Latin American countries, formally applied to join the project, paying entirely for the costs of its participation. The project therefore covers **19 countries and 190 Latin American universities** committed to the work.

Participating universities were selected by the Ministries of Education, Boards of Higher Education and/or Conferences of Rectors in each of the countries, based on the following criteria: national excellence in the area they represent, capacity for dialogue with people from other institutions working in the same field, significant weight within the system (size of the institution, academic authority and history), so that an important part of the country's higher education system would be represented with the participation of each of the chosen institutions.

The operation of the project was backed by the ALFA Programme, and the organisation and execution of the work meetings, travel and expenses of the participants, preparation of discussion documents and publication of results were financed directly by the European Commission. Participating institutions from Latin America and the European Union contribute the time spent by their representatives to the project under a system of co-financing.

The operating structure of the project is flexible: there is one management committee representing the twelve work groups, one for each of the theme areas and 19 Tuning National Centres working together. During the project five general meetings were held (Buenos Aires, March 2005; Belo Horizonte, August 2005; San José, Costa Rica, February 2006; Brussels, June 2006 and Mexico D.F., February 2007) in addition to two preparatory meetings —one of the Management Committee and the other of the National Tuning Centres (both in Bilbao, November 2004)—.

The representatives of the universities and National Tuning Centres participated at the general meetings. Each of which had a similar format: three intensive days of work, with most of the time given over to the work of each of the groups and also with plenary meetings to share results and concerns. For each meeting a working document was prepared containing the agenda, agreements reached at previous meetings and materials for debate and reflection for the current meeting. These documents were divided into material printed on white paper (agreed documents) and material on green paper (documents to be discussed and agreed on). The purpose of each meeting was to turn the green documents into white ones through debate and agreement.

From the outset, a web-page **(http://tuning.unideusto.org/tuningal/)** was set up where the working documents, interim results and key materials were posted. The site includes an Intranet, which is available to participants and which has allowed virtual communities to be set up to continue discussions beyond the meetings.

What differences are there between the Tuning Europe and Tuning Latin America Projects?

We have now set out the practical and operating aspects of the project; the final question that needs to be answered is what differentiates the Tuning project in Europe and the one in Latin America? Perhaps the most important difference is related to the different political situations at this time in Europe and Latin America. After years of debate, Europe has defined a common project. The European Union —ever broader, more diverse and more multicultural— is advancing in a process of integration, and a date has been set for the integration of higher education into a common area. EU ministers of education have undertaken to achieve the dream of a United Europe in the field of higher education by 2010. Latin America is currently moving towards integration in different processes, but at regional or sub regional levels operating at different paces.

Europe has needed several decades to consolidate its process of integration. While Latin America has advanced greatly over recent years, there is a need to consolidate even further its achievement and progress. There are projects which are moving towards integration in higher education at transnational levels. The interest in Latin America is not backed by the supranational framework of the European Union, and the result is that each of the two Tuning projects has its own particular features.

In Tuning Europe the guidelines set by «Bologna» and the commitments made have given the project a precise framework. Over 175 European universities are participating in Tuning Europe, but the context of the commitment to Bologna by all European countries means that other higher education institutions are bound to discuss, consider and rethink the results. The universities of Europe are part of a process which from 2010 to a single area of Higher Education, and has led to a greater awareness and a strong internal commitment at both a national and a supranational level. European higher education institutions have accepted the challenge of Bologna and have committed themselves to the changes that need to be made to implement it.

Latin America has not set itself a date for building a higher education area, nor does it have a clearly agreed political framework such as that which exists in Europe. The Tuning Latin America Project does not seek to create such an area, but would like to offer elements that will facilitate reflection in order to reach certain basic agreements within the framework of higher education. The authority of the debate will continue to lie with the universities, but the project has tried to offer a separate space parallel to the discussions and contributions arising with the framework of the leading referents of the university systems of each country. These moments of joint reflection may help to overcome obstacles, to find points of contact, to identify positive aspects in others, to resolve and to agree —but above all, to foster dialogue; to understand the other and with the other, to try to build something in common—. It is proposed to link the project to those responsible for university policy in 19 Latin American countries, to debate the potential for collaborating beyond national frontiers. These reflections and the agreements reached among the academics in the project's work groups can foster a rapprochement between the peoples of the region and find pathways that will place the regional system in a better position.

As a result, in The Tuning Latin America Project and in the universities, a second key actor was proposed: the **National Tuning Centres (NTCs)**. Each country in Latin America participates equally in the project through these NTCs. Part of the Tuning spirit is that it should be open to all voices, and that all countries should be included. The 19 countries all participate in the project, contributing to the development of the methodology in Latin America. The Tuning Latin America Project is led by the universities, who are the key actors in this process but the NTCs accompany the institutions in this task, in some cases reinforcing their work and bringing in contributions from all the actors making up their national system. Their role is to act as the interlocutor for their system in the project. They listen to and transmit these messages, acting as a nexus between the project and the country.

The NTCs have been important in executing and disseminating the project in the different countries. The work carried out and the commitment and participation of those responsible for university policy have been milestones in developing research projects like Tuning. Without doubt, impact of the Project on the Latin American system is due both to the work of the universities, the backbone of the initiative, and to the accompaniment of the university policy makers, represented by the NTCs.

We have now completed two years of intense work in the Tuning Latin America Project and an area of dialogue has been established that will help create an education system that is more sensitive to new challenges, where central aspects, such as the definition of profiles through competences, have been discussed in depth.

This debate has provided inputs that will facilitate the processes of change and improvement in the institutions and in the system as a whole. The progress made at national level will depend on national policies and the correlation between them and the Tuning project. The participants in the project, with the experience they have gained, will be able to transfer the debate to their own institutions and to other national bodies. There is a firm belief that once the process is complete educational structures, analysed within the framework of this project, will be more comprehensible and the processes of cooperation between the participating institutions will be more dynamic, favouring mobility and encounters within Latin America and, in turn, building new bridges with Europe and other regions of the world. The contribution and richness of the experiences of Latin American academics and institutions will contribute significantly to creating common languages that will help to evaluate and recognise what is really significant and what can help improve us all as a society.

This final report is intended to offer an account of the immense work carried out over the two years of the Tuning Latin America Project. The effort, dedication and commitment of the over 200 academics involved, as well as the support and conviction of political representatives, have made Tuning a reference point for deliberation on higher education. The next chapter sets the context of the project in Latin America, a continent facing crucial challenges in university matters, many of which are similar to those faced by other regions. The following chapters evaluate the key results in each of the lines. Here it is important to stress that neither the specific nor the general conclusions are intended to be prescriptive, but instead reflect consensus and the result of an ongoing process.

March 2007

2

The Context

This collective debate and reflection on higher education has been carried out within the framework of the vision and methodology of the Tuning Latin America Project. It has enjoyed participation from by over 200 academics, and many others who contributed through virtual communities. The project covers nineteen countries —Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the Dominican Republic, Uruguay and Venezuela— with a population of over five hundred million and more than fifteen million enrolled in the university system.

In general, the university seeks to be a centre of thought, debate, culture and innovation, and at the same time, it is convinced of the need to be in tune with the real situation of its setting and the new paradigms of higher education. The Latin American university accepts the new global trends in higher education. These include the following:

a) Current economic and social development is characterised by the incorporation of a new production factor, based on knowledge and proper use of information. The intensity, diversity and speed with which new knowledge is being created is clear and this means that societies must prepare and structure themselves to apply these advances effectively and innovatively to their technological processes.

This circumstance means that universities must accept a continuous upgrading of the content of their academic programmes, and must creatively foster harmonisation among studies. In other words, through flexible study programmes they must provide students with novel opportunities for learning which will allow them to achieve their aims including by non-traditional means.

Given the rapid and constant changes in the labour market, we need to accept that knowledge soon becomes obsolete. Students therefore need to incorporate into their learning a range of competences that will offer them the capacity for constant adaptation to change, but which at the same time will enable them to be committed citizens.

b) Undoubtedly, new information and communication technology (ICT) is another other factor that has speeded up and changed the processes for managing information and communications. Developing ICT related competences requires profound changes in education, new approaches and other forms of learning and teaching, with changes even in the traditional role of the teacher and the student.

The incorporation of ICT into higher education is expected to contribute to improving the quality of education, galvanising educational processes and accelerating the processes that seek to develop teaching and methodological alternatives that will replace or at least enrich traditional educational practices. ICT helps advance improvements in the quality of education, with resources and tools to back the teaching process. Nonetheless, we run the risk of approaching this activity from a purely technological perspective, forgetting that the problem of education, in all its complexity and its multifaceted reality, is not just technological, but pedagogical.

True integration of ICT in the university area will come when it is seen to be successfully applied in teacher training; student learning; monitoring of academic performance and in the improvement of the teacher student relationship within the framework of normal educational activities in all areas of university life.

c) Another feature that needs to be taken into account in this process of transformation in higher education is the new concept of the professional profile, which is a consequence of advances in existing knowledge and tools. Based on innovative and more complex conceptual support, with greater concentration of knowledge than in the past, it is essential not only for new degree programmes to be created and others removed, but for the professional profile of remaining ones to be redefined. Society requires professionals with critical thinking, with a profound knowledge of local and global realities, who, in addition to having a capacity to adapt to change, have made an ethical commitment to society.

It is beneficial that student learning be multi- and interdisciplinary in approach at a system level, and for student tasks and activities to benefit from group work, developing collaborative learning at course level. If knowledge and reality are systemic and complex, it makes little sense if they are treated as unconnected packages, broken up into separate parts for study.

The profiles of university professionals must not only satisfy the requirements of society, but also project them, in accordance with the specific needs of regions and of the country. It therefore seems sensible that they should be defined through competences. Competences represent a combination of attributes with regard to knowing and understanding (theoretical knowledge of an academic field); savoir-faire (practical and operative application based on knowledge); and *savoir-être* (values as an integral part of the way of seeing others and of living in a context). This new approach, as well as not focusing exclusively on the theoretical content of an area of knowledge, has the additional advantage that it determines the goals in a professional's education, (i.e. «what» is to be achieved) and give a free hand on the «how», an aspect which is of prime importance for academic autonomy.

d) In current practices in higher education the paradigm has shifted from teacher to student. Teaching must concede centre stage to student learning. In other words, it is necessary to move from teaching centred education to learning-centred education.

The student thus has to take an active part in building his or her own learning, turning the teacher into the facilitator, the one who helps to provide the resources (information, methods, tools), creates environments and accompanies them, offering assistance throughout the process, thus raising student motivation, commitment and liking for learning, and for understanding the usefulness of learning. The figure of the motivating teacher must become more widespread, facilitating processes of human development and acting as a scientific and methodological advisor. This is the new proposal, in which students' work is fundamental for their learning and for defining their personalities, an area in which ICT can be very useful in carrying out everyday educational activities.

e) Finally, it is also important to mention the global scale of human activity, now more intense and widespread than ever before. Within the area of higher education, it is not uncommon for universities to share degree courses, study programmes and curricula with other universities, and offer twin degrees, or to have mobility programmes for teachers and students and joint research projects. It is reasonable, therefore, to imagine that globalisation will transform academic offerings, research programmes and particularly assessment and accreditation. In other words, firm steps are being taken towards the globalisation of higher education.

Globalisation can have a number of effects: in some cases, it can mean the incorporation of foreign models, but, in the right situation, it can offer referents for improving internal practices and reaffirming the relevance to a local and global vision, which are both necessary and complementary. This situation, as well as promoting exchange of information, experiences, teachers and students, with all the undeniable benefits this brings, also favours equality in terms of access to university programmes, because, thanks to the extraordinary development of new technologies, students from different continents and countries can register and study in distant locations. Advances in the development of the model of international university co-operation are the corollary of this process of globalisation.

In order to meet these new challenges, universities must have a flexible structure and organisation, using new information and communication technology and, above all, incorporating systems of quality assurance.

Using the information received at meetings of the NTCs and information provided by representatives from the countries in the Tuning Latin America project (enclosed in Appendix 2), we set out some of the features that might characterise higher education in Latin America. An initial look at the characteristics of higher education systems in Latin America offers a range of information which is particularly useful for any analysis:

1. In the last quarter of the twentieth century, as in the rest of the world, Latin America saw considerable growth and diversification in the number of students accessing higher education. There are now over fifteen million students enrolled at this level, representing 31.5% of the eligible population (20 to 24 year olds).

Table of population and higher level registration in Latin America

Country	Total population	Population aged 20-24	Total enrolled
Argentina	39,301,753	3,309,598	1,527,310
Bolivia	9,427,219	855,044	343,492
Brazil	187,597,423	18,048,898	4,732,778
Chile	16,267,278	1,322,128	583,952
Colombia	46,039,144	4,104,798	
Costa Rica	4,321,717	410,773	175,284
Cuba	11,369,170	742,502	704,090
Ecuador	13,215,089	1,226,894	346,997
El Salvador	6,874,926	643,743	122,431
Guatemala	12,699,780	1,180,264	250,000
Honduras	7,346,532	716,480	139,976
Mexico	106,147,386	9,675,326	2,538,256
Nicaragua	5,483,447	576,100	119,789
Panama	3,228,186	278,839	146,415
Paraguay	6,215,948	597,505	217,411
Peru	27,946,774	2,589,690	925,512
Dominican Republic	9,100,184	879,297	301,553
Uruguay	3,455,127	252,911	97,461
Venezuela	26,577,423	2,460,836	1,154,845
Total	**542,614,506**	**49,871,626**	**15,729,280**

Sources: CEPAL: Boletín Demográfico Año 2005.
UNESCO - IESALC: Informe Educación Superior en América Latina y el Caribe 2000-2005.
Tuning – Latin America Project. Forms.

2. Alongside the expansion in enrolment, there has been a major increase in the proportion of female students and an exponential growth in the number of private institutions, although it should be said that most students in higher education are still studying in state-sector institutions.

This continuous growth in higher education is a response to ever greater demand. However, if this increase in university-admissions is not addressed with suitable planning it could lead to a deterioration in quality.

3. The teaching staff of the Latin American universities normally hold only a first degree. The proportion of lecturers holding a doctorate is still low in some countries. The terms of staff employment with the university in some countries it that it is more common for lecturers to he employed on an hourly contract than employed full-time.

4. The most frequent division of the academic year is for there to be two academic semesters. However, there are cycles of one year (as in the case of Uruguay), or up to four terms a year, (in Honduras, Mexico and Nicaragua). Academic years generally begin in January, March or September.

Admission criteria are different in every country, ranging from a national exam, plus average marks at secondary school and the performance of specific tests related to the degree to be studied to the case of universities whose only demand is a *bachiller* qualification.

To graduate, students generally have to pass the course subjects and submit and defend a thesis. In some cases, practical work and/or the performance of social services are also required.

5. The grade scale used in Latin American universities varies greatly. In some cases, the definition is determined by each university and in many cases even varies within the same university. The minimum pass mark is based on an evaluation by percentages or a value on a scale, either numerical or in letters, and in some cases the scale or pass percentage can vary within a single university.

6. In most countries higher education is regulated in the national constitution, and these principles are developed in basic or general acts of government. Higher education is often the responsibility of the Ministry of Education. In other countries Boards of Higher Education exist, some of which are autonomous while in others they answer to the Ministry of Education, giving different degrees of power in this area. There are also countries in which this responsibility has been entrusted to a public university (Uruguay, Honduras, Guatemala). In the case of the private universities, in some countries special supervisory and regulatory bodies have been created.

Practically all countries have official assessment and accreditation bodies. Nonetheless, in some countries these bodies have yet to start operating. Progress in this area is not uniform, but it is sustained, with the emergence of processes of internal assessment prior to accreditation. The legal nature of the assessment and accreditation bodies also varies. Some of them are autonomous, others are units or dependencies of the Ministry of Education and some are private agencies. There are also major differences as to whether application of the assessment and accreditation processes is compulsory. In some countries it is mandatory and in others it is optional. There are also some mixed situations, where certain types of assessments and accreditations are compulsory and others have a level of autonomy.

7. There has been a proliferation in the offering of distance higher education programme, characterised by a minimum face to face contact between the teacher with students, in which educational dialogue is pursued through traditional communication media or over the Internet. These systems are known by different names: semi-contact, distance, on-line, virtual, open learning, etc. [*modalidad semi-presencial, a distancia, en línea, virtual, aprendizaje abierto*] These alternatives are providing adults with a second chance for higher education and are helping those who have limitations in terms of time, distance, work or physical restrictions, to keep abreast of developments in the knowledge required for their work. Nonetheless, there is a major concern over the quality of some of these programmes, in general because of the lack of state control and the lack of specific legislation regulating this type of education system.

8. The process of globalisation, which encompasses, inter alia, advances in technology and information, demands for change in vocational education and trans-national education, has had an impact on universities. An example can be seen in the current alliances and the role they play in global networks.

9. One ongoing debate of great importance in Latin America defends the concept of education in general and of higher education in particular as a public asset. This is reflected in some founding charters, multilateral agreements and positions of international bodies. This discussion has become even more topical with the inclusion of higher education as one of the twelve services that are subject to trade agreements, under the rules of the World Trade Organisation —General Agreement on Trade in Services (GATS)[8]— and the inclusion of this area in negotiations on bilateral trade treaties between some Latin American countries and the US.

There is a fear that, because higher education has been included as a service, subject to market rules, its basic nature as a «public asset» may become eroded and it may be seen as being little more than merchandise, affecting national sovereignty, the preservation of cultures, university autonomy and the quality of education.

World educational organisations such as UNESCO, UDUAL, OUI, etc. have alerted Latin American countries to the danger of signing this type of treaty with specific proposals to allow negotiations on education as a service. Statements to this effect have also been made by several dignitaries and heads of state, who, speaking in sub regional forums such as MERCOSUR, have stressed the social nature of education: «*The heads of state emphasise the social dimension of education, defined as a social asset and one under public responsibility, whose internationalisation and international cooperation must be grounded on aca-*

---

8 http://www.wto.org/english/tratop_e/serv_e/serv_sectors_e.htm

demic and cultural values. Any negotiation on the liberalisation of world trade in services must particularly take into account these principles»[9]

10. In the Latin American context areas of integration in the area of higher education are being developed, particularly within the framework of government-coordinated multilateral integration agreements. This has been confirmed by the various Ibero-American summit meetings dealing with aspects of integration in higher education between our countries which have published a number of documents, including the declaration of the Madrid Summit, held in May 2002, which recommends «development and promotion of the 2002-2004 action plan[10], to build a Common Area of Higher Education between the European Union, Latin America and the Caribbean». Another example of political support can be seen in the parliamentary meetings, as is the case of the Sao Paulo Declaration of the Latin American Parliament, which in 2004, clearly inspired by the objectives of the Bologna process, called for the democratisation and integration of teaching in Latin America.

Within the same framework we find the process of integration of Mercosur, which includes strategy plans for integration in the educational area, the latest of which covers the period 2006-2010. Among other objectives, this includes academic and professional mobility among member states and associates, and inter-institutional co-operation. The Andean Community of Nations, in its expressed concern to achieve agreements that will allow recognition of studies and qualifications; and, in Central America, the figure of the Central American Higher University Council (*Consejo Superior Universitario Centroamericano*, CSUCA), in its desire to stimulate the universities in the sub-region are other examples. Other Latin American countries are working through bilateral agreements to allow direct recognition of academic qualifications and degrees, and multilateral efforts are being made to ensure the application of the Andrés Bello Agreement, one of whose principles involves automatic academic recognition of qualifications for pursuing studies.

Beyond a recognition of the strategic importance of establishing nexuses of cooperation in the area of higher education among countries in Latin America, it is also important to stress that the initiatives that have arisen within the framework of these areas of integration are still in a process of consolidation.

11. In recent years, in terms of international co-operation, increasing importance has been placed on functional multilateralism, especially through the general use of flexible instruments of cooperation such as networks, and strategic alliances between agents. This is expressed in the heterogeneity of international and regional inter-institutional associations created over recent decades. Most of them constitute forums that analyse aspects of higher education and foster

---

[9] This paragraph is taken from the minutes of the 26th Meeting of Ministers of Education of countries of MERCOSUR, Bolivia and Chile (RME) 10 June 2004. Ciudad Autónoma de Buenos Aires, Argentina, as a request to be included in the joint declaration of the presidents of MERCOSUR, Bolivia and Chile.

[10] http://www.aneca.es/present/docs/plan_accion_0204.pdf

technical assistance on issues of university organisation and management. In some cases, programmes of mobility for students and teachers and joint research projects are organised.

The positive impact of these organisations depends on the achievement of their goals, the number of members they have, the institutional commitment of their members and the suitability of the instruments they use. Examples include the Association of Universities of the Montevideo Group (AUGM), the ARCAM University Network (ARCA-MERCOSUR), the Council of Rectors for the integration of the Mid-Western sub-region of South America (CRISCOS), the Union of Universities of Latin America (UDUAL), the Ibero-American Postgraduate University Association (AUIP), the Interamerican University Organisation (OUI), the Network of Macrouniversities of Latin America and the Caribbean, the Association of Amazonian Universities (UNAMAZ) and the Association of Universities of Latin America and the Caribbean for Integration (AUALCPI). In many cases, these different associations apply for funding from international bodies such as the OEI, UNESCO, or private groups such as UNIVERSIA (Santander Group), to achieve their aims, especially in the area of mobility.

12. Many Latin American countries have encouraged reviews or reformulations of their higher education systems because of their importance in the knowledge society. Various countries are currently involved in processes of reform, amending legislation drafted in the 1990s. New challenges in the area of university reforms include the debate on relevance, social responsibility and the role universities have to play in consolidating equitable growth. In this context, the Tuning project is offered as an alternative for Latin American universities, which seeks, through joint work, to contribute to improving teaching and learning, respecting the autonomy and diversity of each region and academic culture. It pursues the recognition and validation of common regional features, a rapprochement and an understanding of differences, in order to collaborate on solving problems, harnessing and sharing successful elements.

The Tuning project can be seen as a support tool to be incorporated into new theme networks that allow common reflection in order to develop specific subjects of great importance for the region.

In this process of transformation, the Tuning project is intended to articulate joint challenges and potential from a local perspective. As a result, the experience of the project has thrown up certain guidelines and reflections on issues of common interest, such as:

- A student-centred and competence-based system.
- New paradigms in the educational field.
- The recognition of degrees among Latin American countries.
- Joint construction of a space for dialogue on higher education, centring on quality and seeking specific and accessible solutions to shared problems.

3

Generic competences

Introduction

Since its origins, the university has been a forum for the creation and transmission of knowledge. Fulfilling this mission has involved the continuous generating of processes to ensure both the production and the comprehension of this knowledge. With the passing of time, this innate and fundamental mission has become more complex. On the one hand, because systems of knowledge production have diversified and been transformed, even the scientific/disciplinary knowledge and its applications have seen dynamic exponential and multiplying growth. On the other hand, the traditional «cloistered» university has opened up more, optimising its relations of association and articulation with its social environment.

This opening up is in turn related to another no less relevant aspect: the growing demand for compatibility between the educational programmes of different universities, both within the same country and in different countries, to favour the mobility and exchange of teachers and students at both undergraduate and postgraduate level. The complexity and dynamism of these processes, together with other related phenomena, such as the diversity of the sources and systems of information and new systems of accumulation of power related to the mastery of technology, requires from the educational system a constant review and reworking of educational provision.[11]

It is a well-known fact that today's world is marked by an accelerated rate of change. A series of general factors, such as globalisation, the impact of ICT, the administration of knowledge and the need to sponsor and manage diversity, all

---

[11] Input has been taken from *Una Aproximación a la Educación Basada en Competencias en la Formación Universitaria* by Professors Estela María Zalba and Norma Beatriz Gutiérrez. Universidad Nacional De Cuyo - Mendoza, Argentina, 2006.

require a significantly different educational environment and require the university to rethink its traditional missions, functions and responsibilities.

In the Latin American context there is clear evidence from social, economic and political movements that our societies need culturally and intellectually educated citizens to face up to the challenges of the present and future, to direct their own destinies wisely and satisfactorily, and to assume the role they need to play in the development of their countries. Given their role in society, universities are the best-equipped organisations to play a key function in designing and implementing suitable strategies for achieving these goals. They have the mission, and, above all, the basic responsibility to use their knowledge, their tradition and their capacity for innovation to prepare the future of Latin America.

Universities must educate their students within a perspective in which learning is a lifelong task for their careers and to prepare them for citizenship. Universities must be increasingly aware that their mission is constantly changing, their vision is in constantly ebullition, and their leadership —in the field of creation and transmission of the knowledge— requires a new sensitivity to social change. As a result it is essential to ensure regular contact and exchange of opinions with other interested players from the academic world and other sectors, such as employers, representatives of civil society and governments. Education encourages society to advance, but at the same time, it has to respond and anticipate society's requirements, preparing strategies to match study programmes for educating future workers and citizens.

The framework of action for change and development in higher education was debated and agreed internationally in 1998 at the *World Conference on Higher Education*[12]. Among the priority areas proposed was «improved staff development, skills-based training, enhancement and preservation of quality in teaching, research and services, relevance of programmes, employability of graduates, establishment of efficient co-operation agreements and equitable access to the benefits of international co-operation. It establishes the missions and functions of higher education as being, *inter alia*, «to provide [...] relevant expertise to assist societies in cultural, social and economic development». With regard to shaping a new vision, «the concern is to provide access to both broad general education and targeted, career-specific education, often interdisciplinary, focusing on skills and aptitudes, both of which equip individuals to live in a variety of changing settings, and to be able to change occupations. In the article dealing with innovative educational approaches, it recommends facilitating «the acquisition of skills, competences and abilities for communication, creative and critical analysis, independent thinking and team work in multicultural contexts». It also states that «regional and international normative instruments for the recognition of studies should be ratified and implemented, including certification of the skills, competences and abilities of graduates, making it easier for

[12] *Conferencia Mundial sobre Educación Superior*. *Higher Education in the Twenty-first Century: Vision and Action,* 5 to 9 October 1998, UNESCO, Paris.

students to change courses, in order to facilitate mobility within and between national systems».

The concept of the competence

Defining the term «competence» is no easy task. It implicates notions such as the means of producing and transmitting knowledge, the relationship between education and society, the mission and values of the education system, the practices of teacher training and assessment and the activities and performance of the students.

A broad definition of the concept of competence might define it as including the capacities that all humans need to resolve the situations that arise in their lives effectively and autonomously. It is grounded on a deep knowledge —not only knowing what and how, but knowing how to *be* a person in a complex, changing and competitive world—.[13]

Another definition suggests that competences are «complex integrated capacities, in different degrees, in which education must train individuals so that can they can operate as responsible subjects in different situations and contexts of their social and personal life, knowing how to see, do, act and enjoy properly, assessing alternatives, choosing appropriate strategies and taking responsibility for the decisions taken»[14].

The teaching model involved in competence-based education seeks to overcome the barriers between the place of formal learning and everyday family life, work and the community, establishing a thread running between everyday knowledge, academic knowledge and scientific knowledge. By merging the three, it offers comprehensive education encompassing knowledge (cognitive capacity), abilities (sensory-motor capacity), skills, attitudes and values. In other words: knowing, know-how (*savoir-faire*) in life and for life, *savoir-être*, knowing how to be enterprising, while at the same time knowing how to live in the community and how to work in a team. Breaking down the borders between formally and non-formally acquired knowledge enables the recognition the value of multiple sources of knowledge, such as personal experience, prior learning in different areas of each person's life, imagination, art and creativity.[15]

---

[13] Documento de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.3. Competencias (Prof. Dra. Rita Laura Wattíez Franco, Prof. Dra. Celsa Quiñonez de Bernal, Prof. Lic. Magdalena Gamarra de Sánchez)

[14] Cullen, Carlos (1996), «El debate epistemológico de fin de siglo y su incidencia en la determinación de las competencias científico tecnológicas en los diferentes niveles de la educación formal. Parte II». In *Novedades Educativas* N.º 62, Buenos Aires.

[15] Mockus, A. y col., «Epílogo El debilitamiento de las fronteras de la escuela». En *Las Fronteras de la Escuela.* 1st edition. Santafé de Bogotá, Cooperativa Editorial Magisterio, 1997. 75-81 (quoted in Documento de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.2. Las competencias en la educación superior. (Análida Elizabeth Pinilla Roa).

Howard Gardner[16] speaking on the notion of multiple intelligences, argues that competences are neither innate nor predetermined. No one is born destined to develop a specific competence. People, with their intelligence, are capable of preparing constructions, based on the demands from their surroundings, which provide them with multiple different stimuli. They can thus manage to develop specific capacities.

The concept of competence in education sits within a broad conceptual map of the comprehensive education of the citizen, including new approaches, such as significant learning in different areas: cognitive (knowing), psychomotor (know-how, skills), emotional (*savoir-être*), attitudes and values. In this regard, competence cannot be reduced to simple professional performance, nor to the mere apprehension of knowledge to know how to do, but instead encompasses a whole set of capacities, which are developed through processes that lead a responsible person to be capable of performing multiple actions (social, cognitive, cultural, sentimental, professional, productive), through which they project and display their capacity to resolve a given problem, within a specific and changing context. Competences develop gradually through different levels of complexity, in different types: basic or fundamental, generic or common, specific or targeted and career-oriented[17]. Competence is not an innate capacity, but instead can be developed and built up from each person's internal motivations-motivations which must be communicated to the work group. The integration of these two areas makes up the life option for the development of an individual's potential, vis-à-vis their environment, based on their interests and aspirations.[18]

Similarly, the definition of competences given by Tuning Europe,[19] is as follows: competences represent a dynamic combination of knowledge, understanding, skills and abilities. Fostering these competences is the object of educational programmes. Competences are formed in various course units and assessed at different stages. They may be divided in subject-area related competences (specific to a field of study) and generic competences (common to any degree course).

---

[16] Gardner, Howard, *Inteligencias múltiples. La teoría en la práctica.* Barcelona, Paidós, 1995, p. 33 quoted in Documento de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.2.Las competencias en la educación superior. (Análida Elizabeth Pinilla Roa)

[17] Documento de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.2.Las competencias en la educación superior. (Análida Elizabeth Pinilla Roa)

[18] Documento de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.2.Las competencias en la educación superior. (Análida Elizabeth Pinilla Roa)

[19] González, Julia and Wagenaar, Robert, eds., *Tuning Educational Structures in Europe. Final Report - Pilot Project Phase 2, Universities' Contribution to the Bologna process,* Bilbao, 2006.

Generic competences and specific competences[20]

As these definitions show, generic competences identify shared elements, common to any degree, such as the capacity to learn, to make decisions, to design projects, interpersonal abilities, etc. They are complemented by subject related competences, crucial for any degree, which relate to the specific circumstances of a given field of study. Specifically, this involves *Line 1 of the Tuning methodology,* which seeks to analyse both the generic competences and the specific ones related to each subject area. The subject specific competences will be analysed in the following chapter.

In a changing society, where requirements are often in a constant state of flux, those generic competences and skills are of great importance. Choosing teaching based on a concept of competence as a dynamic and improvable reference point, holds out many advantages for education, such as:

a) **Identifying the professional and academic profiles of degrees and study programmes.** In the reflection on academic and professional profiles, competences can be seen as a guiding principle for selecting the kind of knowledge that may be suitable for specific objectives. The emphasis on students acquiring certain competences can positively affect the transparency and quality of educational programmes. They constitute important advantages for accessing the labour market and a responsible exercise of the citizenship.
b) **Developing a new educational paradigm, primarily focused on the student and the need for channelling towards knowledge management.** A change is taking place in university teaching and learning which is increasingly demonstrating the importance of learner-centred education. The interest in developing competences in educational programmes matches an approach to education centred primarily on the student and on his or her capacity to learn, which requires greater self directed learning and effective commitment given that students themselves must develop the capacity to manage original information, find it, compare it, select it and assess it, using different systems (library, consulting teachers, exchange with peers, Internet, etc). Knowledge and understanding must translate into effective practice.
c) **Responding to growing demands from society for lifelong learning and greater flexibility in the organisation of education**. The «knowledge society» is also the «learning society». People need to be able to use knowledge, upgrade it, select what is most suitable for a given context, learn continuously, understand what they have learned, so that they can adapt to new and changing situations. The proliferation of different systems of education (full-time, part time, etc.), of changing contexts and

[20] GONZÁLEZ, Julia and WAGENAAR, Robert, eds., *Tuning Educational Structures in Europe. Final Report - Pilot Project Phase 1.* Bilbao, 2003.

diversity, also affect the pace at which individuals or groups get involved in the education process. This affects not only the form and structure of the delivery of programmes, but the overall approach to the way learning is organised, which involves less rigid structures and a more flexible delivery of knowledge, with the provision of greater guidance and support.

d) **Contributing to the search for greater levels of employability and citizenship.** The reflection on competences seeks to find a better way of predicting productive performance in the workplace. This emphasis on workplace performance continues to be vitally important. In this context, competences and skills can be better related and can help graduates resolve crucial problems at certain occupational levels, in a constantly changing economy. Consulting society and constantly listening to the different agents involved should feed analysis and reflection in creating new programmes.

e) **Fostering the construction and consolidation of the Latin America, Caribbean and European Union Area of Higher Education (UEALC/ALCUE).** This is recognised as a strategic element for strengthening bilateral and multilateral relations between member states, as well as among universities and other higher education institutions, making an effective contribution to the processes of continuous improvement in the quality of national education systems. The statement issued by the Second Meeting of Ministers of Education of Latin America, the Caribbean and the European Union[21], reaffirmed their commitment to strengthening universities and other higher education institutions, public and private, which must promote academic excellence for the comprehensive development of peoples and regions. By 2015, among others goals, the area seeks to build effective mechanisms of comparability that will enable recognition of studies, qualifications and competences based on national systems of assessment and the accreditation of educational programmes with mutual recognition, on codes of good practice and on mutual trust among higher education institutions. They will also consolidate programmes that encourage effective student and teacher mobility; and seek sources of financing for implementing programmes.

f) **Taking into consideration the agreements signed at the last Ibero-American Conference on Education[22].** The Ministers of Education agreed to promote the efforts and actions that the governments and regional networks of higher education institutions are developing, for the construction of common multilateral spaces, and the formation of networks of academic cooperation and exchange as an effective medium for building the Ibero-American Knowledge Area (IKA).

---

[21] Held in Mexico City in April 2005.

[22] The 26th Ibero-American Education Conference was held in Montevideo, Uruguay, on 12 and 13 July 2006. Its conclusions were included in the Montevideo Declaration made at the 26th Summit of Heads of State and Government, Montevideo, Uruguay, from 3 to 5 November 2006.

g) **Encouraging agreements for the definition of a common language that will facilitate exchange and dialogue among the different stakeholders**. The change and variety of contexts requires ongoing investigation of social demands in order to prepare academic and professional profiles. This underlines the need to constantly exchange and review information as to what is viable and suitable. Because the language of competences comes from outside academia, it might be considered more suitable for exchange and dialogue with groups that are not directly involved in academic life, but who can offer necessary reflections for developing new degrees and creating a permanent system for ensuring that existing ones are kept up to date. New programmes must be guided by academic and professional profiles. These profiles may be expressed in terms of competences and must respond to social demands, encouraging employment and service to society. Social consultation is therefore one of the essential features of this process of curricular construction.

To sum up, competences might be said to be integrating elements capable of selecting the most suitable forms of knowledge for certain objectives from amongst a wide range of possibilities. The move towards a «learning society» has been widely accepted and consolidated for a number of years. Some of the defining elements of this change are student-centred education, the changing role of the educator, a new definition of objectives, the change in the approach of educational activities and in the organisation and results of learning.

Contributions of a competence-based education for different agents

Historically, in designing a study plan or developing a curriculum there has been a tendency to start from the notion of building an ideal student. The problem we have been faced with in recent decades consists of the distance between that constructed «average» student and real students, between imagined or projected expectations and real ones. In effect we can see today that a large number of students enter higher education without having acquired the basic skills of reading and writing complex texts, skills for logical mathematical reasoning, capacity for analysis and synthesis, capacity for argument, etc. as well as the disciplinary contents they have not learnt. University lecturers generally assume these competences to have been acquired and fully exercised at secondary level, and the reality creates immense frustration for students and teachers alike. Recognising the real situation is the first step in establishing appropriate educational strategies which will make it possible to tackle the obstacles to learning and, more importantly, to anticipate them[23].

[23] Araujo, Javier (2006), *Articulación Universidad-Escuela Media. Política para la definición de competencias para el acceso a la educación superior.* Documento CPRES - Secretaria de Políticas Universitarias, Ministerio de Educación, Ciencia y Tecnología, Argentina.

Strategies need to be adopted that comprehensively take into account the problems. Competence-based teaching is a step in that direction, in that it proposes the resolution of complex, contextualized situations, in which knowledge, skills, abilities and rules all interact.

At the same time, students' traditional certainty as to their employability has been eaten away and nobody is now guaranteed «professional success». Furthermore, the availability of jobs and effective occupation in any country is always reduced in situations of economic crisis, and this is all the worse in countries that already have a high rate of unemployment.

Professional fields are transformed, generating new job niches and, at the same time, removing or reducing possibilities of work in other areas. Most recent studies suggest that a person will change jobs several times during their active working life. As a result, versatility has increasingly become a fundamental characteristic to be developed in vocational education. In other words, mental flexibility, the capacity to adapt to new challenges, knowing how to resolve problems and problematic situations, preparation for uncertainty —these are the mental skills that will be required of tomorrow's professionals and for which we should educate them—. We need to back education that will allow for constant adjustments, offer balance in the face of changes and a capacity to introduce citizens into contexts of democratic life.

Design and development of competence-based curricula is a facilitating model which holds out multiple benefits for different agents:

— For higher education institutions:

  - It promotes the creation of a university that is constantly helping students to learn and also teaching them to unlearn.
  - It involves transparency in defining the objectives set for a given programme.
  - It incorporates the relevance of the programmes, as indicators of quality, and dialogue with society.

— For teachers:

  - It encourages staff development related to teaching and learning.
  - It helps in the preparation of the objectives, content and forms of assessment for study plans, incorporating new features.
  - It allows constant knowledge and monitoring of the student, leading to better assessment.

— For students and graduates:

  - It offers access to a curriculum drawn from the real context, which takes into account their needs and interests and offers greater flexibility.
  - It allows autonomous performance, working with basics, interpreting situations, problem-solving, and performing innovative actions.
  - To involves the need to develop a range of competences such as logical thinking, the capacity to investigate, strategic thinking, verbal

communication, mastery of other languages, creativity, empathy and ethical conduct.
- It contributes to increasing the importance of self directed learning, the use of communication and language.
- It prepares students for solving problems in their careers, in a society in permanent transformation.
- It prioritises the capacity for judgement, which includes and goes beyond understanding and know how.
- Includes a stimulus for qualities which are not specific to one discipline, or even characteristics that are specific to each discipline, which will be useful in a more general context, such as in access to employment and in the exercise of responsible citizenship.

— For employers:

- It combines the educational ideal of the university with the real demands of society and the production sector.
- It provides graduates who are qualified in the use of new computer and communication technologies, with potential to work creatively in different scientific, technical, economic, social and ethical fields.

— For national education systems:

- It allows them to bring compatibility to study plans, regardless of the specific curricular circumstances, i.e. the distribution and number of subjects allocated in each plan.
- It works on the level of development of the different competences relevant to an area of education, which means achieving consensus on the competences for entering the area in question.
- It makes it more possible to design and articulate with systems that take into account each student's real working time.

— For society:

- It encourages the potential for citizen participation, offering each person the capacity to be a main player in the constitution of civil society.

Difficulties and prejudices regarding the concept of competences

Competence-based programme planning is not without its difficulties. Various institutions that have taken steps in this report that the issue of a competence based curriculum is not a simple one, because it generates resistance to change, because of the conflict of private interests, and because of the many different approaches of different disciplines.

Traditionally, universities have seen their task as being limited only to the preparation and transmission of the knowledge of the different disciplines; this explains why many academics are not used to viewing teaching and learning methodologies as a common and shared practice and they are not familiar with the vocabulary and the conceptual framework used to describe and classify such methods.

We also need to remember that the concept of competences has frequently been associated with a utilitarianism and an efficiency driven agenda, perspectives that tend to lead to programmed teaching and the subordination of education to industry. There is therefore a risk of focusing solely on employment aspects, rather than considering personal development and the complete education of the person, as an emotional, social, political and cultural subject.

It is essential to stress, as often as is necessary, that comparability of curricula, methods of learning and assessment, *is not the same as uniformity, and that diversity is NOT a drawback in academic and professional profiles; rather it is an advantage*.

At the same time, the fact that the language of competences can be understood by professional organisations and other groups and representatives of society interested in education should be highlighted as an advantage and not seen as an indication that the resulting education is driven by market demands and requirements. On the contrary, change and a variety of contexts require constant exploration of social demands, in order to design professional and academic profiles, and necessitate constant consultation and debate with all agents involved in educating workers.

Further, a competence-based curriculum should be complemented with a flexible and recurrent concept of a curriculum which is offered cyclically throughout a person's working life and addresses undergraduate education as an initial cycle which prepares the subject for lifelong learning.

It is necessary to emphasise the need to have institutional support and decision to promote the concept of participative education, to stimulate curricular redesign and changes in the system of assessment, to prioritise teacher training and educational investigation, and for ongoing supervision and advice on the transformation process.

Definition of generic competences for Latin America, within the framework of the Tuning – Latin America project

The Tuning Latin America Project began at the end of 2004. Among its first tasks was to define generic competences for Latin America. Each NTC was asked to submit a list of the generic competences considered to be relevant in their country. As a starting point for preparing this list, they were given the 30 generic competences identified in Europe[24], and a range of contributions from different participants in the project[25].

---

24 See list of generic competences agreed by Europe on the website of the Tuning Europe project: http://tuning.unideusto.org/tuningeu/

25 Documento Nro. 2. de Buenos Aires. Documentos sobre algunos aportes al concepto de competencias desde la perspectiva de América Latina A.1. Nociones sobre el concepto de

Each NTC identified the best procedure for preparing their list, for which purpose they consulted universities, national experts and any other sources they considered relevant. In countries which had universities on the Management Committee, NTCs were encouraged to articulate the procedure with them.

Once the work at country level was complete, each NTC submitted a list of the generic competences it considered essential to the technical core of the project. This made it possible to draw up a consolidated list, with the contributions from the 18 participating countries, resulting in a list of 85 generic competences.

At the first General Project Meeting, held in Buenos Aires in March 2005, the compilation of the 85 generic competences proposed by the 18 countries was presented in draft form, as part of the working documents. The competences were grouped into categories to facilitate reflection, definition and the final drawing up of an agreed proposal. This task was carried out in the five groups working at that time (the four theme areas: Business Administration, Education, History and Mathematics and the group of NTCs) and on the last day of meeting, in a plenary session, it was decided to present a definitive list of **27 generic competences** and define the characteristics of further consultation: who should be consulted, how many agents should be consulted and the way in which the process should be carried out. It was further agreed that the 62 participating universities with the support of the NTCs, should perform the consultation on generic competences, through the areas of the project on which they were working. The agreed questionnaire included a final «other» option, to allow those consulted to include generic competences that had not been included in the original list.

List of generic competences agreed for Latin America

1) Capacity for abstraction, analysis, and synthesis.
2) Ability to apply knowledge in practice.
3) Ability to organise and plan time.
4) Knowledge regarding the area of study and related professions.
5) Social responsibility and commitment to citizenship.
6) Capacity for oral and written communication.
7) Ability to communicate in a second language.
8) Ability to use information and communication technology.
9) Capacity for investigation.
10) Ability to learn and update learning.
11) Ability to search for, process, and analyse information from a variety of sources.

---

competencias (Leda Badilla) A.2.Las competencias en la educación superior. (Análida Elizabeth Pinilla Roa) A.3. Competencias (Prof. Dra. Rita Laura Wattíez Franco, Prof. Dra. Celsa Quiñonez de Bernal, Prof. Lic. Magdalena Gamarra de Sánchez)

12) Critical and self-critical abilities.
13) Ability to react to new situations.
14) Creative skills.
15) Ability to identify, pose, and solve problems.
16) Ability to make decisions.
17) Ability to work as part of a team.
18) Interpersonal skills.
19) Ability to motivate and work towards common goals.
20) Commitment to look after the environment.
21) Commitment to socio-cultural environment.
22) Value and respect for diversity and multiculturality.
23) Ability to work in international contexts.
24) Ability to work autonomously.
25) Ability to formulate and manage projects.
26) Ethical commitment.
27) Commitment to quality.

If we compare the lists drawn up in the European project and in the Latin American project, we can see that there is a high degree of similarity in the definition of the main generic competences. There are **22 convergent competences**, which are easily comparable, identified in both projects, which in the Latin American list are defined with even greater precision. There are also 5 competences from the European list which were regrouped and redefined as 2 competences by the Latin American project. Finally, the Latin American project incorporates **3 new competences**: **social responsibility and commitment to citizenship, commitment to look after the environment and commitment to socio-cultural environment**; three competences from the European project were not included in the Latin American version (understanding of cultures and customs of other countries, initiative and entrepreneurial spirit and will to succeed).

Methodology and design of the sample

It was decided to use a system of cluster sampling, given that the people surveyed are grouped in the universities themselves. It may not be valid to presume random sampling, given that the people surveyed are not strictly independent of each other. At the same time, the universities have a certain clustering effect at the level of each country.

Cluster designs are widely used in research[26] and do not represent a source of partiality. Cluster sampling can affect the error rate of sampling of the study

[26] Bryk, A.S. and Raudenbusch, S.W. (1992), *Hierarchical Linear Models: Applications and Data Analysis Methods.* Sage Publications.

Draper, D. (1995), «Inference and hierarchical modelling in the social sciences». *Journal of Education and Behavioral Statistics 20*, 115-147.

of any calculation generated. The sampling error increases depending on the differences in the questions measured between conglomerates.

The design effect due to cluster sampling has to be calculated using an intraclass correlation. A high intraclass correlation indicates that differences among the conglomerates are high and, therefore, increases the sampling error in the research. It should be noted that a low interclass correlation in any question, i.e close to zero, indicates that a simple random sample would have given similar results.

All the calculations and conclusions take into account the nature of data clusters, at both university and country level, using multi-level models. This model was considered to be the most suitable, because it takes into account the structure of data clustering (e.g., it does not assume that the observations are independent as they are in a random sample). These models have been extensively used in educational research since the segmented structure is nearly always present.

At the same time, multi-level models allow for simultaneous appreciation of individual differences and conglomerates, giving suitable calculations of typical errors and making any deduction at an individual and conglomerate level (countries/universities) appropriate.

In this context, the conglomerates are not seen as a fixed number of categories of an explanatory variable (e.g., the list of the universities selected as a fixed number of categories), but rather it is considered that the selected conglomerate belongs to a totality of conglomerates. At the same time, it provides better calculations at an individual level for groups with a small number of observations.

With regard to the variables to be considered, it was decided to consult subjects on:

— the degree of **IMPORTANCE**: the relevance of the competence, in their opinion, for work in their profession,
— the level of **ACHIEVEMENT**: the achievement of this competence as a result of having taken this university degree.

To evaluate these two variables, the interviewer had to use a scale: 1 = none; 2 = weak; 3 = considerable; 4 = strong.

GOLDSTEIN, H. (1992), «Statistical information and the measurement of education outcomes (editorial)». *Journal of the Royal Statistical Society, A,* 155: 313-15.

GOLDSTEIN, H. (1995), *Multilevel Statistical Models*. London, Edward Arnold: New York, Halstead Press.

GOLDSTEIN, H. and SPIEGELHALTER, D. (1996), «League tables and their limitations: Statistical issues in comparisons of institutional performance». *Journal of the Royal Statistical Society, Series A* 159, 385-443.

GOLDSTEIN, H., RASBASH, J., YANG, M., WOODHOUSE, G., PAN H., and THOMAS, S. (1993), «A multilevel analysis of school examination results». *Oxford Review of Education*, 19: 425-33.

— **RANKING**: Based on the categorisation of the five most important competences according to academics, graduates, students and employers, a new variable was created for each competence. The competence that was ranked highest in the survey was allocated five points, four for the second and so on, with one point for the last in the selection. If the competence was not chosen in the survey, it scored zero points.

Once the variables had been defined, agreements were reached on who and how many people to consult:

Academics: University lecturers teaching on any of the theme areas of the project. Each university was asked to gather information from at least **30 academics** in the area in which the university was participating.

Graduates: people who had satisfactorily completed a complete study programme/university degree, in any of the areas of the project and had received the corresponding degree. Each participating university was asked to survey at least **150 graduates** from the area in which they were participating. The graduates selected had to have received their degree 3 to 5 years before the date of the survey. This criterion depended on the number of graduates who had received their degree during this period. If there were not many graduates each year, the sample had to include graduates from the 5 previous years. If there were enough, the sample was limited to graduates from the 3 previous years. In the case of participating universities which did not have sufficient graduates, graduates could be included from other similar institutions from the same country.

Students: people studying the last two years of a first degree in any of the project areas in the participating universities, or who, having completed their studies, still had to obtain said degree. Each university was asked to sample a minimum of **150 students** from the subject area in which they were participating in the project.[27]

Employers: people and/or organisations who had employed graduates from the university, or people and/or organisations which, although there is no evidence that they had hired graduates from the university, appeared to have jobs of interest for graduates. Each university was asked to obtain information from at least **30 employers** of graduates in the subject area represented by the university in the project.

As well as completing the agreed surveys, the NTCs were also asked if possible to extend the survey to other universities, which were not participating directly in the project. This alternative was made possible by the format of the survey which was preferably to be conducted on line.

[27] It is important to note that the **inclusion of students** as one of the groups to be surveyed is a significant contribution of the Tuning Latin America Project project. Students were not included in the survey conducted in Europe in 2001. However, based on the experience of The Tuning Latin America Project, Europe plans to conduct a fresh survey shortly, in which they will be included.

Various alternatives were proposed for carrying out the survey. Each NTC or university could use the form or forms they considered most suitable, depending on their institutional characteristics and the survey groups in question. The systems proposed were: on-line survey, face-to-face consultation, with an explanatory meeting and postal survey:

On-line survey: the simplest of all the variants. The technical staff of the project provided the universities with an electronic form for completing the questionnaire. The questionnaire was made available on the project website. Access to the survey required a user code. Each institution choosing to work with this form had to inform the technical project staff who then gave them a user code for each group with which the institution was going to use the on-line survey. This alternative simplified the work of the participating university, in that they only had to send an e-mail to possible interviewees, giving them the URL of the website with the questionnaire and an access code, together with a covering letter and an explanation of the reasons behind the questionnaire. The electronic questionnaires **were made available in Spanish and Portuguese**.

Face-to-face consultations with an explanatory meeting: in this variant, the group in question was invited to a talk on the Tuning Latin America Project and on its importance for the education system. Having set out the aims and characteristics of the survey, the questionnaire was handed out in print format among the participants to be completed. The procedure facilitated information gathering, given that the explanatory talk and information-gathering could be completed in just a short time. The answers to the questionnaires, in print format, had to be incorporated by the institution organising the questionnaire into an Excel spreadsheet. This then had to be sent to the technical core, to begin the process of consolidating the information and the subsequent statistical analysis.

Postal questionnaires: this format is more traditional and requires somewhat more time. It is interesting to note that in 2001, when the survey of generic competences was carried out within the framework of the Tuning project in Europe, this was the system chosen. The system consists of sending the printed questionnaires to the interviewer with a covering letter and a request to answer the survey and return it to the issuing institution within 10 days. The questionnaire and the covering letter were sent with a pre-paid envelope for participants to return the questionnaire in. The institution received the answers and then had to enter the information in an Excel sheet. This then had to be sent to the technical project staff, to begin the process of consolidating the information and the subsequent statistical analysis. This alternative is more complicated to carry out, but, in cases in which it as difficult to gather groups together or to get hold of e-mail addresses, it was the only option available.

During April 2005, the institutions decided on the system or systems they wanted to use for the survey. The survey was conducted in May and part of June 2005, predominantly through the on-line system, resulting in a very significant number of answers: in the 18 Latin American countries, more than 22,000 questionnaires were returned. The information was analysed by Jon Paul Laka and José Luis Narvaiza, statisticians from Deusto University. They were in charge of preparing the tables, graphs and analyses of the information the groups worked with, some of which are shown below.

Analysis of the results[28]

The data and results gleaned from the questionnaire allowed for four levels of analysis: general, by subject area, by country and by institution. The **GENERAL** analysis gives the results from the academics, graduates, students and employers throughout Latin America. The analysis by **subject area** shows the opinions of these four groups, in relation to each discipline. The results of the questionnaires by **COUNTRY** (without identifying the answering institution) were made available to the heads of the National Tuning Centres over the intranet, so that the information could be used for national studies and/or comparative analyses. Likewise, the results of the questionnaires by **INSTITUTION**, were posted on the intranet, for the consideration and use of participating universities. For reasons of confidentiality, given that the information gathered might be highly sensitive for participating countries and universities, this report centres exclusively on the general analysis and the analysis by subject area. The analysis by subject area will be developed at greater length in the following chapter. It is important to note that the NTCs drew up a document with an analysis of the general results[29], under the coordination of the representative of the National Tuning Centre of the Republic of Cuba, Roberto de Armas, on which the work set out below was based.

General analysis of the results

Firstly, to introduce the general analysis of the results of the questionnaire, we present the totals gathered in Latin America, divided up into the four groups with whom we worked:

Academics: 4,558
Graduates: 7,220
Students: 9,162
Employers: 1,669

Total number of questionnaires received: 22,609

The general analysis will be presented at three levels:

— Analysis by group.
— Analysis by variable.
— Factorial analysis and analysis of the variance.

[28] This report contains only a summary of all the project work related to the questionnaire. The working documents with all the tables and graphs are available on the website.

[29] See the report on the analysis of general results in the Brussels Working Document, posted on the project website.

The group analysis will present the results separately for each of the four groups (academics, graduates, students and employers), showing in each case what was considered to be most and least important and the way in which the group viewed the achievement of competences. We will also analyse the differences between the degree of importance and the degree of achievement, in order to highlight any that need to be re-thought. At the same time, where relevant, a comparison will be made between the Latin American and European projects, in terms of what each group in the two regions considered to be most and least important.

At the second level, the axis of analysis will consists of the three variables (importance, achievement and ranking), which will make it possible to see comparatively, among the four groups, what the response was with regard to each of the variables, in order to highlight the degree of correlation between them.

Finally, to complete the perspectives raised in the project, a factorial analysis and the variance will be given.

Analysis by group

Academics

Importance and achievement of generic competences for ACADEMICS from Latin America. Measures in decreasing order of importance

Competence	Importance	Achievement
Ethical commitment.	3.794	2.794
Ability to learn and update learning.	3.776	2.738
Capacity for abstraction, analysis, and synthesis.	3.774	2.723
Ability to apply knowledge in practice.	3.746	2.728
Ability to identify, pose, and solve problems.	3.727	2.691
Commitment to quality.	3.717	2.758
Knowledge regarding the area of study and related professions.	3.689	3.043
Capacity for oral and written communication.	3.673	2.601
Ability to make decisions.	3.618	2.604
Critical and self-critical abilities.	3.616	2.524
Capacity for investigation.	3.615	2.514
Ability to search for, process, and analyse information.	3.615	2.625
Creative skills.	3.596	2.503
Ability to work as part of a team.	3.582	2.767
Ability to work autonomously.	3.555	2.62
Social responsibility and commitment to citizenship.	3.55	2.614
Ability to formulate and manage projects.	3.527	2.458

Competence	Importance	Achievement
Ability to react to new situations.	3.516	2.536
Ability to use information technology.	3.502	2.441
Ability to organise and plan time.	3.482	2.571
Value and respect for diversity and multiculturality.	3.472	2.566
Commitment to socio-cultural environment.	3.456	2.527
Ability to motivate and work towards common goals.	3.421	2.519
Interpersonal skills.	3.414	2.625
Commitment to look after the environment.	3.359	2.243
Ability to work in international contexts.	3.325	2.112
Ability to communicate in a second language.	3.321	1.98

Academics scored all competences over 3.3 in terms of their importance. Of the 27 competences, 19 were scored over 3.5. However, only one competence (*knowledge regarding the area of study and professions*) scored an average of over 3 in terms of achievement.

The three competences considered by academics to be least important are also the ones that score lowest on achievement (*ability to communicate in a second language, ability to work in international contexts, commitment to look after the environment.*). It is interesting to note that the competence academics considered least important (*ability to communicate in a second language.*), is the only competence with an average score of less than 2 (1.98) in terms of achievement.

The six most and least important competences, according to Latin American ACADEMICS

Most important competences	Least important competences
Ethical commitment.	Commitment to socio-cultural environment.
Ability to learn and update learning.	Ability to motivate and work towards common goals.
Capacity for abstraction, analysis, and synthesis.	Interpersonal skills.
Ability to apply knowledge in practice.	Commitment to look after the environment.
Ability to identify, pose, and solve problems.	Ability to work in international contexts.
Commitment to quality.	Ability to communicate in a second language.

In the Tuning project Europe, the academics considered the six most important competences to be: *basic general knowledge; capacity for analysis and synthesis; capacity to learn; capacity for generating new ideas (creativity); capacity for applying knowledge in practice; and critical and self-critical abilities*. The least important competences were considered to be: *decision making, ethical commitment, interpersonal skills, knowledge of a second language, basic computer skills and appreciation of diversity and multiculturalism.*

Comparing the two, we can see an overlap in four of the competences[30] considered to be most important in the two projects (*basic general knowledge, capacity for analysis and synthesis, capacity to learn, capacity for applying knowledge in practice*). However, each of the two projects lists two different competences among the six most important: for Europeans, *creativity, and critical and self-critical abilities*, and, for the Latin Americans, *commitment to quality, and ethical commitment*.

Analysing the similarities and differences between the competences that the European and Latin American academics consider to be least important, we can see that two competences appear in both «bottom-six» lists: *interpersonal skills and capacity to communicate in a second language*. Of the 6 least important competences for Latin American academics, two are unique to the study conducted in the Tuning Latin America Project: *commitment to look after the environment, and commitment to the socio-cultural environment.*

It is important to note that *ethical commitment* is considered to be one of the most important competences by Latin American academics and as one of the least important by European academics.

Finally, returning to the work of the Tuning Latin America Project it is interesting to analyse the differences between the academics' relative scores for importance and achievement, in other words to spot the gap in each of the 27 competences between importance and achievement:

— The competences with the least difference in the relative score for importance and achievement are: *knowledge regarding the area of study and related professions; interpersonal skills; capacity for teamwork; ability to motivate and work towards common goals; value and respect for diversity and multiculturality.* Of these six competences, where there is no significant gap between importance and achievement, there are two which the academics considered to be among the least important (*interpersonal skills. and ability to motivate and work towards common goals*). This suggests that, despite not being considered important, they are perceived as being properly carried out.

— At the other extreme are the competences with the greatest difference between what was considered important and the rating given to

[30] It should be remembered that, as mentioned in page 40, all generic competences in Latin America were reformulated and are defined using different expressions, though in most cases equivalent, to those presented in the Tuning Europe project.

its achievement: *ability to communicate in a second language; ability to work in international contexts; commitment to look after the environment; capacity for investigation; creative skills; and critical and self-critical abilities*.

— In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *capacity for abstraction, analysis and synthesis and ability to learn and update learning*. In both cases, there is a significant difference between the average scores for importance and for achievement. We should bear this point in mind in later reflections in order to see where the academics see challenges to the education process.

Graduates

Importance and achievement of generic competences for GRADUATES from Latin America. Measures in decreasing order of importance

Competence	Importance	Achievement
Commitment to quality.	3.728	3.101
Ethical commitment.	3.726	3.134
Ability to learn and update learning.	3.719	2.953
Ability to identify, pose, and solve problems.	3.718	2.941
Ability to make decisions.	3.704	2.841
Ability to apply knowledge in practice.	3.674	2.814
Capacity for abstraction, analysis, and synthesis.	3.67	2.966
Capacity for oral and written communication.	3.646	2.882
Ability to work as part of a team.	3.634	3.12
Knowledge regarding the area of study and related professions.	3.608	3.086
Ability to react to new situations.	3.568	2.717
Ability to organise and plan time.	3.563	2.804
Ability to search for, process, and analyse information.	3.561	2.911
Ability to use information technology.	3.552	2.475
Critical and self-critical abilities.	3.534	2.821
Creative skills.	3.53	2.733
Ability to work autonomously.	3.529	2.835
Ability to formulate and manage projects.	3.527	2.64
Ability to motivate and work towards common goals.	3.517	2.712
Interpersonal skills.	3.508	2.862
Capacity for investigation.	3.493	2.819
Social responsibility and commitment to citizenship.	3.443	2.829
Value and respect for diversity and multiculturality.	3.365	2.787
Ability to work in international contexts.	3.323	2.218

Competence	Importance	Achievement
Commitment to socio-cultural environment.	3.322	2.688
Ability to communicate in a second language.	3.303	1.907
Commitment to look after the environment.	3.255	2.43

In the case of **graduates**, all generic competences scored higher than 3.2 on importance. Of the 27 competences, 20 were scored over 3.5. If we analyse the level of achievement, we can see that only four competences (*knowledge on the area of study and the profession; commitment to quality; ethical commitment; capacity for teamwork*) score over 3.

The second-lowest scoring competence, in terms of importance (*ability to communicate in a second language*), also scored lowest in terms of achievement, being the only competence of the 27 with an average score of under 2.

Another point worth highlighting is that the two generic competences considered to be most important (*commitment to quality and ethical commitment*) are amongst the three competences that score highest on achievement.

The six most and least important competences, according to Latin American GRADUATES

Most important competences	Least important competences
Commitment to quality.	Social responsibility and commitment to citizenship.
Ethical commitment.	Value and respect for diversity and multiculturality.
Ability to learn and update learning.	Ability to work in international contexts.
Ability to identify, pose, and solve problems.	Commitment to socio-cultural environment.
Ability to make decisions.	Ability to communicate in a second language.
Ability to apply knowledge in practice.	Commitment to look after the environment.

In the Tuning Europe project, the graduates considered the most important competences to be: *capacity for analysis and synthesis; problem solving; capacity to learn; ability to work autonomously, information management skills (ability to retrieve and analyse information from different sources) and capacity for applying knowledge in practice*. The least important competences were considered to be: *research skills; ability to work in an international context; leadership; ethical* *commitment; appreciation of diversity and multiculturalism; and understanding of the cultures and customs of other countries*.

If we compare the scores given by European and Latin American graduates, we see that they agree on three of the most important competences (*ability to identify, pose, and solve problems; capacity to learn and update learning and capacity for applying knowledge in practice*). Analysing the similarities and differences between the competences that the European and Latin American graduates consider to be least important, we can see that two competences appear in both «bottom-six» lists: *value and respect for diversity and multiculturality; and ability to work in international contexts*. As in the analysis of the results from academics, of the six least important competences for Latin American graduates, three are exclusive to the study carried out in Latin America: *commitment to look after the environment; commitment to socio-cultural environment; and commitment to the socio-cultural environment*. In the case of Tuning Europe, the six competences ranked least important by European graduates include one (*understanding of cultures and customs of other countries*) which is exclusive to the European study.

As in the case of the Latin American academic, Latin American graduates saw ethical commitment as one of the six most important competences, whereas European graduates placed it among the six least important.

Returning to the analysis of the results from Latin America, and focusing on the gap between the scores given by graduates for importance and achievement in each of the generic competences, we can identify two aspects of interest:

— The competences with the least difference in the relative score for importance and achievement are: *capacity for teamwork; knowledge of the area of study and related professions; value and respect for diversity and multiculturality; ethical commitment; social responsibility and commitment to citizenship and commitment to quality.* Of these six competences, where there is no significant gap between importance and achievement, there are two that were considered to be among the least important by the graduates (*value and respect for diversity and multiculturality and social responsibility and commitment to citizenship*). This would suggest that although they are not considered to be important, there is a perception that they have been achieved. In addition, these six competences with no significant difference between importance and achievement, include two on the «top six» list: *ethical commitment and commitment to quality.*
— The competences that display the greatest difference between the scores for importance and achievement were: *ability to communicate in a second language; ability to work in international contexts; ability to use information technology; ability to formulate and manage projects; ability to make decisions and capacity for applying knowledge in practice*. The last two, with significant gaps between importance and achievement, are among the six generic competences considered to be most important by the graduates.

Students

Importance and achievement of generic competences for STUDENTS from Latin America. Measures in decreasing order of importance

Competence	Importance	Achievement
Commitment to quality.	3.702	3.12
Ability to learn and update learning.	3.688	2.921
Ethical commitment.	3.688	3.093
Ability to apply knowledge in practice.	3.68	2.854
Ability to make decisions.	3.67	2.927
Ability to identify, pose, and solve problems.	3.655	2.925
Capacity for oral and written communication.	3.61	2.891
Knowledge regarding the area of study and related professions.	3.597	3.028
Capacity for abstraction, analysis, and synthesis.	3.571	2.938
Ability to work as part of a team.	3.565	3.145
Creative skills.	3.531	2.734
Capacity for investigation.	3.519	2.897
Ability to search for, process, and analyse information.	3.512	2.889
Critical and self-critical abilities.	3.502	2.82
Ability to formulate and manage projects.	3.501	2.662
Ability to use information technology.	3.49	2.491
Ability to work autonomously.	3.486	2.79
Ability to react to new situations.	3.484	2.732
Value and respect for diversity and multiculturality.	3.481	2.887
Ability to organise and plan time.	3.473	2.734
Ability to motivate and work towards common goals.	3.448	2.773
Social responsibility and commitment to citizenship.	3.447	2.879
Interpersonal skills.	3.447	2.857
Commitment to socio-cultural environment.	3.406	2.753
Commitment to look after the environment.	3.345	2.485
Ability to work in international contexts.	3.316	2.247
Ability to communicate in a second language.	3.223	2.027

Students rated all competences over 3.2 in terms of importance. Of the 27 competences, only 15 scored over 3.5. In terms of the level of achievement, only four competences (*knowledge of the area of study and profession, commitment to quality; ethical commitment; capacity to teamwork*) score over 3.

It is interesting to note that the competence that scores highest in terms of importance ranks second in terms of achievement (*commitment to quality*). *Ethical commitment*, which ranks third on importance, is also in third place in the achievement table.

The three competences seen as being least important (*commitment to look after the environment; ability to communicate in a second language; ability to work in international contexts*) are, in turn, the ones considered to have the lowest level of achievement.

The six most and least important competences, according to Latin American STUDENTS

Most important competences	Least important competences
Commitment to quality.	Social responsibility and commitment to citizenship.
Ability to learn and update learning.	Interpersonal skills.
Ethical commitment.	Commitment to socio-cultural environment.
Ability to apply knowledge in practice.	Commitment to look after the environment.
Ability to make decisions.	Ability to work in international contexts.
Ability to identify, pose, and solve problems.	Ability to communicate in a second language.

Like the two previous groups (academics and graduates), Latin American students included among the six least important competences those that had been specifically incorporated into the Tuning Latin America project: *commitment to look after the environment; social responsibility and commitment to citizenship; and commitment to the socio-cultural environment*.

Analysing the gap between the scores given by Latin American students to the importance and achievement of each of the generic competences, we come to the following conclusions:

— The competences with the least difference in the relative score for importance and achievement are: *capacity for teamwork; social responsibility* and *commitment to citizenship; knowledge of the area of study and related professions; commitment to quality; interpersonal skills; and value and respect for diversity and multiculturality.* These six competences, where there is no significant gap between importance and achievement, include two which were considered to be among the least important by students (*interpersonal skills and social responsibility and commitment to citizenship*). This would suggest that although they are not considered to be important there is a perception that they have been achieved.

— At the other extreme are the competences with the greatest difference between what was considered important and the rating given to its achievement: *ability to communicate in a second language; ability to* *work in international contexts; ability to use information technology; commitment to care for the environment; ability to formulate and manage projects; and capacity for applying knowledge in practice.* The last of these is among the competences students consider to be most important yet they rate it low on level of achievement.

In the case of the students, it is not possible to draw a comparison with the European study, since in that project students were not surveyed. A new European questionnaire is planned for 2007 and on this occasion students are expected to be among the groups invited to respond.

Employers

Importance and achievement of generic competences for EMPLOYERS from Latin America. Measures in decreasing order of importance

Competence	Importance	Achievement
Ethical commitment.	3.763	3.006
Commitment to quality.	3.72	2.914
Ability to learn and update learning.	3.682	2.945
Ability to apply knowledge in practice.	3.665	2.842
Ability to identify, pose, and solve problems.	3.656	2.826
Ability to work as part of a team.	3.654	2.937
Capacity for oral and written communication.	3.642	2.795
Capacity for abstraction, analysis, and synthesis.	3.623	2.891
Ability to make decisions.	3.593	2.719
Knowledge regarding the area of study and related professions.	3.585	3.137
Ability to organise and plan time.	3.549	2.7
Creative skills.	3.54	2.736
Ability to search for, process, and analyse information.	3.527	2.849
Critical and self-critical abilities.	3.518	2.716
Ability to react to new situations.	3.507	2.68
Ability to motivate and work towards common goals.	3.505	2.701
Social responsibility and commitment to citizenship.	3.503	2.79
Ability to use information technology.	3.487	2.596
Interpersonal skills.	3.483	2.797
Ability to formulate and manage projects.	3.464	2.618
Ability to work autonomously.	3.442	2.804
Value and respect for diversity and multiculturality.	3.41	2.78
Capacity for investigation.	3.402	2.767
Commitment to socio-cultural environment.	3.37	2.711

Competence	Importance	Achievement
Commitment to look after the environment.	3.273	2.456
Ability to work in international contexts.	3.155	2.306
Ability to communicate in a second language.	3.112	2.061

Employers scored all competences over 3.1 in terms of their importance. Of the 27 competences, 18 were scored over 3.5. In terms of achievement, only two competences (*knowledge of the area of study and the profession and ethical commitment*) scored over 3.

The competence that employers considered to be most important (*ethical commitment*) also scored second in terms of level of achievement.

As in the case of the students, for employers, the three competences rated as being least important are also those that are considered to have been least achieved (*commitment to look after the environment; ability to communicate in a second language; ability to work in international contexts*).

The six most and least important competences, according to Latin American EMPLOYERS

Most important competences	Least important competences
Ethical commitment.	Value and respect for diversity and multiculturality.
Commitment to quality.	Capacity for investigation.
Ability to learn and update learning.	Commitment to socio-cultural environment.
Ability to apply knowledge in practice.	Commitment to look after the environment.
Ability to identify, pose, and solve problems.	Ability to work in international contexts.
Ability to work as part of a team.	Ability to communicate in a second language.

European employers consider the following competences to be the most important: *capacity to learn; capacity for applying knowledge in practice; capacity for analysis and synthesis; problem solving; concern for quality; and teamwork.* The least important competences were considered to be: *leadership, knowledge of a second language; ability to work in an international context; appreciation of diversity and multiculturalism; research skills; and understanding of cultures and customs of other countries.*

A high level of coincidence can be seen in five of the six competences considered to be most important by European and Latin American employers (*commitment to quality; capacity to learn and update learning*, *capacity for applying knowledge in practice; ability to identify, pose, and solve problems and capacity for teamwork*).

We find a similar level of overlap in competences considered least important by employers in the two projects, where they coincide in over four of the six competences: *value and respect for diversity and multiculturality; capacity for investigation; ability to work in international contexts; and capacity to communicate in a second language*.

If we look at the differences between the rating given to the importance and achievement of each competence, we note the following aspects:

— The competences with the least difference in the relative score for importance and achievement are: *knowledge regarding the area of study and related professions; value and respect for diversity and multiculturality; capacity for investigation; ability to work autonomously; commitment to socio-cultural environment; and abilities to retrieve, process and analyse information.* Of these six competences, where there is no significant gap between importance and achievement, there are three that were considered to be among the least important by the employers (*value and respect for diversity and multiculturality, capacity for investigation and commitment to the socio-cultural environment*). This would suggest that, although they are not considered to be important, there is a perception that they have been achieved.

— At the other extreme are the competences with the greatest difference between what was considered important and the rating given to its achievement: *ability to communicate in a second language; ability to use information technology; ability to make decisions; ability to organise and plan time; ability to work in international contexts and capacity for oral and written communication*.

Analysis by variable

Importance

In the area of «importance», it is significant that all 27 competences were rated above 3, on a scale in which 3 is equivalent to Considerable and 4 to Strong. This means that the 27 competences defined by the participants in the project received backing and/or confirmation from those consulted. They consider them to be the generic competences that should really be considered in defining a university degree in Latin America. At the same time, having qualitatively analysed the open question on other possible competences not included in the list of 27, the answers contained no alternatives that were sufficiently significant to be incorporated into the list of 27. They only consisted of reformulations of the existing competences.

With regard to the competences considered most important by each of the 4 groups consulted, there was agreement on five of the six competences:

— Ability to apply knowledge in practice.
— Ability to learn and update learning.
— Ability to identify, pose, and solve problems.
— Ethical commitment.
— Commitment to quality.

Graduates and students added the *ability to make decisions.* **Academics** included *capacity for abstraction, analysis, and synthesis* while **employers** added *teamwork*.

Among **academics** and **employers,** the *ethical commitment* competence scored highest. Among **students** and **graduates,** the most highly valued competence was *commitment to quality*.

At the other end of the scale the four groups agreed on four of the six least important competences: *ability to communicate in a second language; ability to work in international contexts; commitment to look after the environment and commitment to the socio-cultural environment*. The **academics** also agreed with the **students,** in including *interpersonal skills among the six least important competences.* **Graduates** coincided with **employers** in identifying a fifth competence in this group, *value and respect for diversity and multiculturalism*. **Graduates** and **students** also shared one least important competence, *social responsibility and commitment to citizenship*.

For their part, the **academics** included amongst the six least important competences *the ability to motivate and work towards common goals*. **Employers** included *capacity for investigation* in this list.

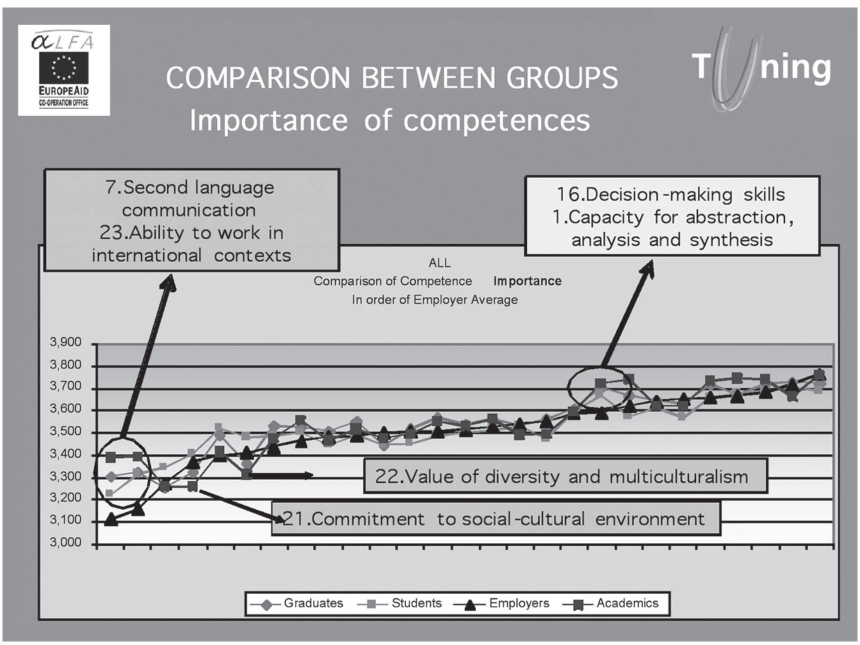
With regard to the **correlation matrix,** the values of the correlation coefficient (**r**) were very high —over 0.8 in all cases—. This means that there was a high degree of compatibility among the four groups in with regard to the level of importance given to the 27 competences, with slightly less compatibility between academics and students and academics and employers, and a particularly high correlation between academics and graduates.

Correlation matrix between averages, based on the level of importance between the different groups

	Graduates	Students	Employers	Academic
Graduates	1			
Students	0.92230454	1		
Employers	0.92274321	0.93048128	1	
Academic Personnel	0.94906738	0.84473339	0.83131338	1

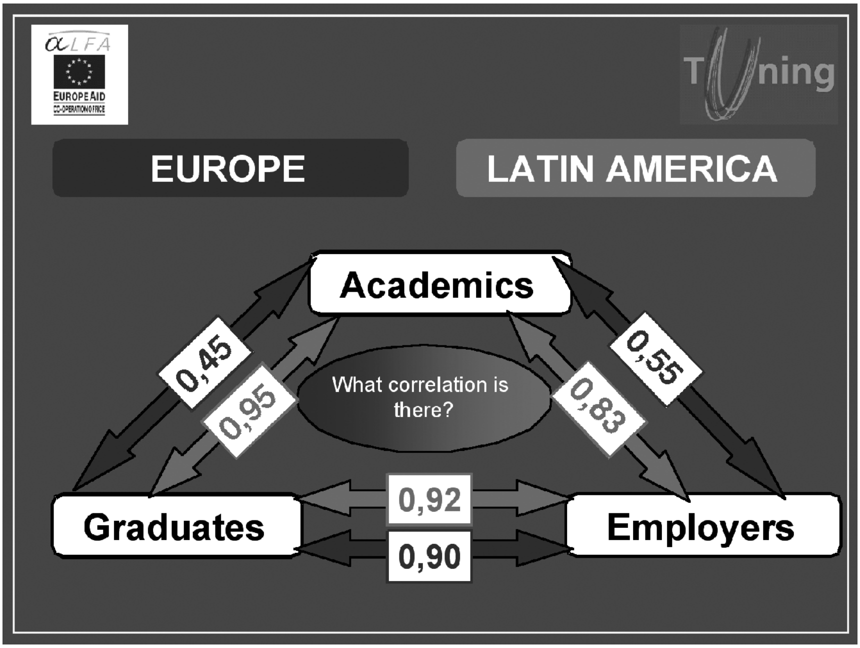
As an example, it is important to stress that there is a high degree of correlation between the four groups surveyed; however, as well as the particular features explained in previous points with regard to the graph shown below, it is important to mention the following:

— While it is true that the *communication in a second language and ability to work in international contexts* competences are rated low in all four groups, it is precisely the employers who rate them lowest, as compared, for example, to the academics.
— On the other hand, while *capacity for decision-making and capacity for abstraction, analysis and synthesis* both receive an intermediate score from the four groups, it is the academics who rate these competences the highest.



It is interesting to note that in the case of the European project, the correlation between the 3 groups consulted (academics, graduates and employers) is less than that seen in the Latin American study. However, in both studies, the correlation between graduates and employers is highest, followed by that between academics and employers.

Graph of correlation on importance among the groups, between Europe and Latin America[31]



Achievement

It is worthy of mention that in achievement, few competences were rated over 3 (Considerable). So, for example, *knowledge regarding the area of study and related professions* was seen by all groups as that with the greatest level of achievement, and yet only the academics scored it above 3.

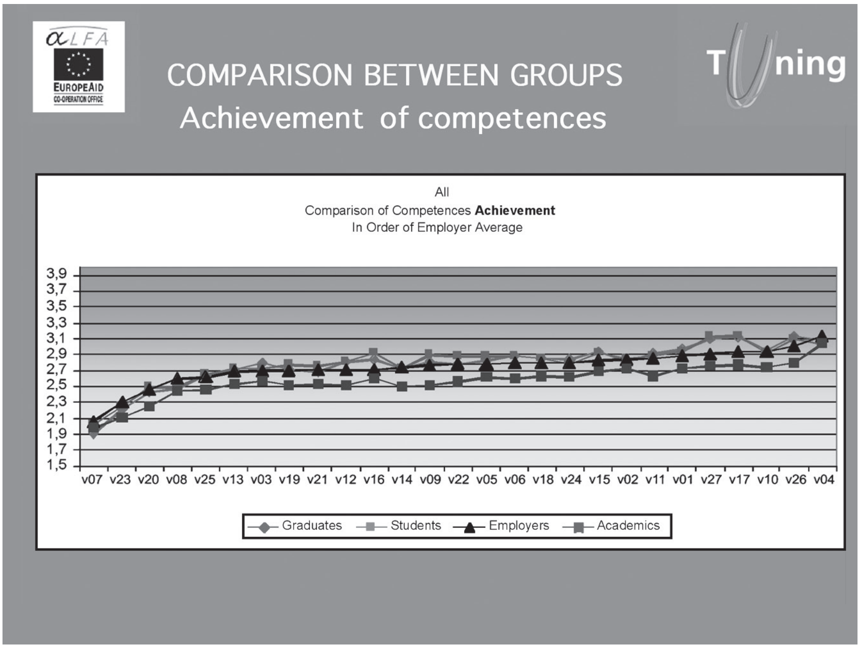
It is also important to stress that the only competence which ranked below 2 was the **ability to communicate in a second language** (this score was received from academics and graduates). The rest of the groups, as the graph shows, also gave it a low score, though still rating it above 3.

With regard to the achievement of competences, there is greater coincidence among the groups than with regard to the importance, and consequently the correlation matrix in all cases gave **r** values of over 0.9.

[31] Although the Latin American project also surveyed students, this group has not been included in this comparison, as there are no European figures for this group.

Correlation matrix between the averages, based on the level of achievement between the different groups

	Graduates	Students	Employers	Academics
Graduates	1			
Students	0.98606284	1		
Employers	0.96881438	0.94729668	1	
Academics	0.94460514	0.92037866	0.97989827	1



Ranking

The use of a third variable in analysing the information, has made it possible to verify the consistency of the information gathered and, therefore, the consistency of the conclusions set out in the paragraphs above. The table below compares the four groups, showing the ranking of the competences derived from analysis of this variable.

Var	Label	Academics	Students	Employers	Graduates
1	Cap. for abstraction, analysis, and synthesis …	1	2	2	2
2	Ability to apply knowledge in …	2	1	1	1
3	Ability to organise and plan time …	17	17	9	14
4	Knowledge on the area of study and …	3	3	3	4
5	Social responsibility and commitment …	9	11	10	17
6	Cap. for oral and written communication …	8	9	13	13
7	Ability to communicate in a second …	20	10	22	15
8	IT skills…	14	12	15	10
9	Cap. for investigation.	4	6	7	6
10	Ability to learn and update …	7	5	8	5
11	Ability to retrieve, processes and analyse …	15	19	19	18
12	Critical and self-critical cap..	12	14	18	19
13	Ability to react to new situations.	21	20	21	20
14	Creative skills.	10	13	14	16
15	Ability to identify, pose and …	5	4	5	3
16	Ability to make decisions.	13	8	12	8
17	Ability to work as part of a team.	11	15	6	9
18	Interpersonal skills.	24	25	20	22
19	Ability to motivate and work towards goals. …	23	22	17	21
20	Commitment to care for the environment…	26	27	26	27
21	Commitment to socio-cultural environment.	19	24	25	25
22	Value and respect for diversity …	22	21	23	26
23	Ability to work in international contexts. …	27	23	27	23
24	Ability to work autonomously.	25	26	24	24
25	Ability to formulate and manage projects.	18	16	16	12
26	Ethical commitment.	6	7	4	7
27	Commitment to quality.	16	18	11	11

If we examine the table above, we again see a high level of coincidence among the four groups consulted, both in terms of the competences they considered to be very important an those they saw as least important.

Factorial analysis and analysis of the variance

In addition to the analyses set out above, we also performed factorial analyses, with the measure of importance given to the 27 general competences. These analyses take into account the correlations between the different competences, extracting underlying factors that explain what those competences have in common, which is highlighted by the correlation between them.

Thus, the competences were grouped into four main components, or factors, depending on the nature of the competences they represent. These four factors were denominated in general terms and in no way were they meant to replace any competence in itself, but rather simply to allow related competences within a single factor to be identified.

Factor 1: Learning process:

- Capacity for abstraction, analysis, and synthesis.
- Ability to learn and update learning.
- Knowledge regarding the area of study and related professions.
- Ability to identify, pose, and solve problems.
- Critical and self-critical abilities.
- Capacity for investigation.
- Ability to search for, process, and analyse information.
- Capacity for oral and written communication.
- Ability to apply knowledge in practice.

Factor 2: Social values:

- Commitment to socio-cultural environment.
- Value and respect for diversity and multiculturality.
- Social responsibility and commitment to citizenship.
- Commitment to look after the environment.
- Ethical commitment.

Factor 3: Technological and international context:

- Ability to communicate in a second language.
- Ability to work in international contexts.
- Ability to use information technology.

Factor 4: Interpersonal skills:

- Ability to make decisions.
- Interpersonal skills.
- Ability to motivate and work towards common goals.
- Ability to work as part of a team.
- Ability to organise and plan time.
- Ability to react to new situations.

It is significant that amongst academics, students and graduates, the factor that contributed most to explaining the variance (over 30%) was Factor 1, related to learning and its application, whereas for employers the factor that contributed most was Factor 4, related to interpersonal skills, which accounted for over 40% of the variance in this case.

The explanation that each of the four factors gave of the variance, in each group surveyed, is shown in the table below. As we can see, in all the groups surveyed, the four factors considered could explain around 50% of the variance.

Percentage of variance, explained by each factor in each Group Survey

Component	Academics	Students	Graduates	Employers
F1(Learning)	36.40%	33.70%	36.75%	4.17%
F2 (Social)	6.69%	7.09%	6.75%	5.57%
F3 (Technological and International)	5.00%	4.11%	4.25%	4.85%
F4 (Interpersonal)	4.17%	4.73%	5.09%	42.70%
Totals	52.27%	49.63%	52.84%	57.29%

The factorial analysis, as well as confirming the conclusions reached in previous sections, is an innovation on the analysis conducted in the European project.

Some reflections on the results of the survey of generic competences

The procedure established met with wide acceptance in Latin America. More than 22,000 questionnaires were received, a reflection of the work carried out and the interest generated among the different agents in the 18 countries in Latin America.

We saw evidence of high rates of correlation among the four groups consulted (academics, graduates, students and employers) with regard to the 27 competences, both in terms of importance, and the level of achievement.

All groups considered the 27 competences established to be important, awarding them ratings of over 3, on a scale in which 3 is equivalent to considerable and 4 to Strong.

Comparatively lower scores were given for level of achievement, indicating a good level of criticism and demand among those surveyed. It is important to stress that the academics are the most critical group in this regard and the students the most optimistic.

Academics and graduates awarded Competence ***No. 4 - knowledge regarding the area of study and related professions,*** a score of nearly four points in terms of importance and in terms of achievement, considered it to be the best developed of the competences in the universities.

In most of the competences considered to be very important by the four groups, there are significant gaps when compared to the perceived level of achievement. It will be crucial in the future to review the areas this study have shown to be relevant for education and, where nonetheless there is perceived to be a lack of achievement. Competences that scored least in terms of importance showed less difference when compared to achievement.

Conclusions and questions for a reflection on generic competences

The importance given to the concept of generic competences is gradually being more widely accepted. The concept of competence-based education coincides with the great axes of debate in twenty-first century university education, namely:

- The paradigm of primarily student-centred education.
- The performance of teaching work in a transversal and trans-disciplinary fashion.
- The conception of quality, relevant and transparent education.
- Debates on the duration of degree courses and new distance and virtual teaching systems.
- The calls for the development of a higher education area, to include Latin America, the Caribbean and Europe, as expressed in the objectives and goals of the LACEU/EULAC Area and the Ibero-American Summits.

Nonetheless, a mere understanding and acceptance of this concept at a theoretical or ideological level will not suffice. What is really important are the implications of a competence-based approach for teaching and learning in university institutions.

We need to pose certain questions for reflection and debate:

- What does educating for the development of competences mean?
- What would competence-based teaching consist of?
- What are the most suitable educational models?
- How does one construct a competence-based curriculum?
- How can the development of the competences be implemented in educational practice?
- What learning activities best favour the development of such competences, in terms of knowledge, understanding and abilities?
- How can one assess through competences?
- What tools should be used in a competence-based reform of the curriculum?

— How often should the competences designed be reviewed?
— How should one incorporate new competences related to new needs?
— How should one design competences that prepare students to anticipate upcoming changes?
— How best can one integrate the general notion of competences into particular institutional and national situations?
— How can competences be included in the teacher training curriculum that will enable the inter-culturality of the Latin American context to be included?
— How can elements of a theoretical and practical nature from the different Latin American educational models be reflected in the generic competences?

These are some of the questions and conclusions arising out of the joint Latin American reflection on the potential for competences to favour the comparability and compatibility of study plans throughout the region. Many questions require further debate and reflection, but the space for doing so is open and enjoys invaluable contributions from all the participants in this project. Some of these questions will be answered in the following chapters, particularly in the reports by subject area, which focus on identifying specific competences and presenting some examples of good practice, of how to teach and assess through competences.

4

Subject specific competences and approaches to teaching, learning and assessment

INTRODUCTION

In addition to generic competences —which it is hoped will be developed in all study programmes— each degree also seeks to develop other competences that are more specific to the particular subject area. The twelve subject areas in the Tuning Latin America Project engaged in intense discussion in order to reach agreement on the competences for each area. Each group submitted a report on their investigations, which are included in this chapter. All groups followed more or less the same procedure, although differences in the individual disciplines meant that approaches to defining subject specific competences varied.

In the first phase, the members of the group exchanged information on the current situation in their institutions and countries, the type of programmes currently available and prospects for the future. They also worked to create a map of their discipline in Latin America. Some preliminary conclusions emerged. The way the discipline was defined was seen to be based to some extent on national concepts. In some cases, too, the role of related disciplines in the programmes differed from country to country and from university to university.

A second phase then began, focusing on whether it was possible to define a «core curriculum». The term itself was the subject of much discussion, since it can mean very different things depending on the context, not only within each country, but even within each discipline. The groups analysed differences and analogies in the existing systems and study programmes omit this sentence. As part of this phase, each of the study area groups prepared their own questionnaires, containing a list of suggested **subject specific competences** for the discipline, and decided whom they should survey. The education group, for example decided to consult graduates and academics. Business Administration, for its part, surveyed graduates, academics and employers. Altogether, **over 20,000 questionnaires were gathered,** for the 12 subject areas.

In the third phase, each of the groups analysed the results of the questionnaires. The information was checked against other available material and, in some cases, the results of the Tuning Europe project. The discussions were well structured and were based on draft reports, prepared in advance. The groups identified the common, different and dynamic elements in their discipline areas and tried to find a common framework for elements in which it was considered useful to have clear points of reference. They also looked at any differences and examined whether any divergences existed that might be made use of.

In the fourth phase, once the subject specific competences had been identified, different methods of teaching, learning and assessing competences were shared and discussed. It became apparent that the same learning targets and competences can be achieved using different models, techniques and formats for teaching and learning. Some examples include attendance at conferences, preparation of certain assignments, exercise of technical skills, preparation of increasingly difficult work, reading of essays, presentation of a constructive critique of other students' work, meetings (of seminars, for example), work under time pressure, work on co-production of essays or research, presentation of assignments, preparation of summaries, practicals and laboratory exercises, fieldwork, private study, etc. The groups took some of the specific and/or generic competences and debated the different ways of teaching and assessing them.

Finally, groups reached consensus on the findings to date. At this stage, the general impression was that major steps forward can, and perhaps need, to be taken. The rigid timeframe of the project had to be respected, however, and all groups were anxious to submit their results in suitable fashion, working very hard up to the last minute (and beyond), to present their ideas to a wider audience.

The general conclusion that may be drawn from the twelve very different reports is that there had been a *strong desire* and *openness* among academics to exchange their points of view on subject specific competences in their specific area of knowledge while at the same time *a significant degree of common understanding can be seen among academics* with regard to the competences related to their areas.

In a very short period of time, the Tuning Latin America project has managed to demonstrate that clear objectives in education can be met if the right forum is created. At a Latin American level, such platforms opportunities are a critical factor in offering academics a space in which to exchange points of view, debate new challenges and to update shared, different and dynamic features. The most important conclusion that can be drawn is probably that only by relating knowledge and the subject specific competences of each subject area to the profiles of academic degrees and professional profiles can greater transparency and consistency be achieved. This has all been made possible by the important work of the academics who gave their time to the Tuning Latin America project.

The reports submitted by the 12 areas are given below[32]. Each group was given the general structure of the report and what follows is a synthesis. The full versions of the reports, as well as other documents linked to the areas, are available on the project website[33]. Each report begins with an introduction to the subject area, describes the map of the subject, analyses the results of the questionnaire, presents the subject specific competences of the area, gives some examples of teaching, learning and assessment of generic and subject specific competences, and ends with a conclusion and recommendations for the future. In addition, the first four areas in the project which conducted surveys on generic competences. (Business Administration, Education, History and Mathematics) also offer an analysis of these.

4.1. BUSINESS ADMINISTRATION

Map of the Business Administration Area

Some countries offer a greater variety of degrees, but throughout the region there is a trend towards providing greater numbers of different degrees in Business Administration, with new degrees emerging under different names under the general umbrella of business, trade and government

This growing offering of varied degree courses in the field of Business Administration has its basis, in a range of factors including competition for jobs, a need for specialisation from first-degree level (in the case of the students, for employment reasons, and in the case of some universities, for commercial reasons) and general developments in business.

Latin American professionals appear to see graduate studies as a «continuation» of their studies or, at most, as a further specialisation. The gradual emergence of private universities —some not-for-profit and others with clearly commercial aims— is helping promote and satisfy this demand from the student market. The same is not the case in public universities, where the phenomenon of broadening diversity of degrees in the area is generally less common.

For their part, employers and companies have begun to demand young professionals with specific strengths in the area of administration, and this further

[32] To facilitate a parallel reading of the original report and the English translation, the areas are in the alphabetic order of their titles in Spanish.

[33] http://tuning.unideusto.org/tuningal

fosters both the creation of and demand for new degrees. It is worth repeating that despite the existence of targeted degree courses, Latin American professionals generally feel real strengths are only achieved after completing specific graduate study programmes.

The common feature is the «*Licenciatura*» or first degree, conferred by the different universities, giving the holder the title of «*Licenciado en…*» (Bachelor of...). In some cases, a special mention is added to the degree title, so that instead of the whole course being specialised, it is oriented through the particular development of certain strengths related to the profession: «*Licenciatura en… con Mención en…*» (e.g. Bachelor of *Business Administration* with Mention in *Corporate Finances*, or *BBA* with Mention in *Human Resources*, for example). In other countries, such as Colombia, the title conferred directly in the area is «Administrator …» [*Administrador*] (e.g. Hotel Administrator, Company Administrator, etc.), and, in Brazil the graduate becomes a *Bachelor in Administration*.

Area of application

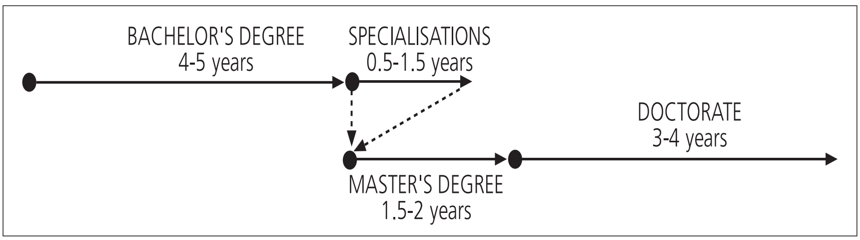
Despite the immense diversity in the names of the degrees, the professional scope of the degree extends to very similar fields throughout Latin America. Although job titles may vary from country to country, graduates in Business Administration normally proceed to a similar range of professional practice.

- — General Manager, Manager, Executive Chairman of operating companies.
- — Area Manager.
- — General Administrator.
- — Business Planner.
- — Consultant and Adviser to Companies and Organisations in general.
- — Company Developer and Manager.
- — Entrepreneur of Own Businesses.
- — University Lecturer and Researcher.
- — Public-sector employee.

There is general agreement that although the potential work destinations are varied, the specialisation of degree courses helps steer professionals towards specific types of company or specific jobs, as is the case of courses such as Health Administration, Maritime Administration, Quality Management, Police Administration. Many consider that in competitive job markets, this constitutes an obstacle to mobility, given that the university is defining a specific field of employment for the future professional, who, when choosing a degree, may not be entirely sure of his or her long-term aspirations and opportunities. On the contrary, some candidates, when choosing undergraduate courses, feel the need to know in advance —and they do assess this aspect— the type of company or activity in which they will operate, given that the employment field is a latent concern of young people in general.

Duration

The duration of academic degrees varies from country to country in the region. Generally speaking, however, it takes between 4 and 5 years to obtain a first degree, depending on the typical curriculum of the universities. The graduate can then continue, studying different specialities (under a great range of titles, such as Postdegrees, Diplomas, Specialities, and Professional Programmes, Updates, etc.). Many of these do not confer a further academic degree, since in most countries, the academic degree following on from the first degree (*Licenciatura*) is the Master's degree (1.5 to 2 years), followed by a Doctorate (3 to 4 years). In some universities, the Master's degree comprises the first years of the Doctorate. In others, the Master's degree is not part of (but neither is it a prerequisite for) the Doctorate programme. However, in all countries, it is necessary to have a first degree in the subject for admission to Master's level.



Structure of the Curriculum

It emerged that a typical curriculum model for Business Administration can be observed, divided into three levels:

a) **BASIC EDUCATION**: Subjects related to mathematics, economics, quantitative tools and common subjects (basic) in the area of Business Administration. In other countries, such as Brazil, subjects such as sociology, philosophy and psychology are included.
b) **PROFESSIONAL EDUCATION**: Subjects related to the professional area, or the discipline, which build on the basic education and which will form the core basis for the student's professional knowledge.
c) **EMPHASIS/SPECIALISATION**: Subjects related to the particular discipline, associated with the degree course.

One area that does differ is the flexibility of the curriculum. Not all universities offer optional subjects, and it is therefore impossible to talk of a typical workload for optional subjects, let alone the type of optional subjects that are included.

Another aspect that varies is the duration of each stage within the degree. In general terms, the basic phase covers the first 2 years of the degree (1-2 years), and is then followed by the professional part. What is not fully defined is the length of curriculum specialisation, nor when it begins. Some programmes include specialist subjects starting in the first semesters. Others, in contrast, wait until completion of the professional education stage, before beginning this type of subject. The relative weight of the specialist subjects also varies greatly, although, on average, they account for between 15% and 35% of the curriculum. As a result, because the duration of the basic education phase is relatively standard, the degree of professional education depends to a great extent on of the proportion of specialisation in each curriculum. We base this conclusion on the fact that the evidence shows that the degree of specialisation does not affect the length of the degree.

Finally, most Business Administration study plans in Latin American universities include practical work known by a range of names).

Survey of generic competences

The groups surveyed were employers, graduates, academic personnel and students, as follows:

Academics	824
Employers	714
Graduates	2,939
Students	3,944
Total	**8,421**

Analysis of the results

The following are the results of the **importance** given to the various competences:

a) Significant agreement among students and graduates, reflected in a high correlation coefficient (0.946);
b) Significant correlation (0.885) between graduates and employers;
c) The correlation between academics and students is also high (0.856);

d) The lowest degree of correlation as to the importance of the various competences is between employers and students (0.785).

The tables below show the competences rated above the average by the different groups surveyed:

Competences rated above average	
Graduates	**Employers**
—Ability to learn and update learning. —Ability to work as part of a team. —Ethical commitment. —Commitment to quality. —Ability to identify, pose, and solve problems. —Ability to make decisions.	—Ability to learn and update learning. —Ability to apply knowledge in practice. —Ability to identify, pose, and solve problems. —Ability to work as part of a team. —Commitment to quality. —Ethical commitment.

As we can see, graduates and employers were in agreement in identifying the most important competences as being:

— Ability to learn and update learning.
— Ability to work as part of a team.
— Ethical commitment.
— Commitment to quality.
— Ability to identify, pose, and solve problems.

Competences rated above average	
Academics	**Students**
—Ability to make decisions. —Ability to identify, pose, and solve problems. —Ability to learn and update learning. —Capacity for abstraction, analysis, and synthesis. —Ability to apply knowledge in practice. —Ethical commitment.	—Ethical commitment. —Ability to apply knowledge in practice. —Commitment to quality. —Ability to identify, pose, and solve problems. —Ability to learn and update learning. —Ability to make decisions.

As the table above shows, academics and students agreed that the most important competences are:

— Ability to make decisions.

— Ability to identify, pose, and solve problems.
— Ability to learn and update learning.
— Ability to apply knowledge in practice.
— Ethical commitment.

When asked about the **level of achievement of the different competences** which the universities seek to develop at the highest level, there is a high degree of correlation among the various opinions. Graduates and employers agree that the highest level of achievement is in the following competences:

— Ability to work as part of a team.
— Ethical commitment.
— Commitment to quality.
— Knowledge regarding the area of study and related professions.
— Ability to learn and update learning.

At the bottom end of the scale, graduates and employers consider that the following competences show the least level of achievement:

— Ability to communicate in a second language.
— Ability to work in international contexts.
— Commitment to look after the environment.
— Commitment to socio-cultural environment.

Likewise, **academics and students** agree with the other groups on the level of achievement of the competences.

Finally, it is important to note that academics gave a lower score in general for achievement of the competences than the other groups surveyed. In contrast, students and graduates give the highest scores in the area of achievement of the competences. Employers stand somewhere between the academics on the one hand and the students and graduates on the other.

Turning to the comparative ranking of generic competences, *capacity for abstraction, analysis, and synthesis* was included among the top four by three of the groups. *Capacity for applying knowledge in practice* was considered a priority by all groups. *Ability to identify, pose, and solve problems* was considered a priority by employers and graduates, and rated third in importance by academics and students. *Ability to make decisions* was also rated among the six most important competences by academics, students, graduates and employers. Other competences seen as important by specific groups were: *knowledge regarding the area of study and related professions,* rated more highly by students and *ability to work as part of a team* which was scored much higher by employers. *Ethical commitment*, although considered important by all groups, was seen as being more important by employers and graduates.

Far from constituting the last word on the importance and level of achievement of the competences, the results of the survey should be seen as the basis for analysing the appropriateness of beginning formal processes for implementing competence-based curricula.

At the same time, the results must also be analysed against the backdrop of the specific characteristics and context of each country and university, without ignoring the results for the whole of Latin America, where the different groups surveyed generally rated the same competences higher or lower in terms of importance. This is based on the high rates of correlation among groups, with a correlation interval of between 0.785 (students-employers) and 0.946 (students-graduates).

This base for internal examination and reflection by universities in particular, and education systems in the region in general, will stand as a reference point in producing graduates who are capable of exercising citizenship and engaging with their surroundings. Analysis in this area must nonetheless be backed by the results of the subject specific competences of the Company Administrator, which will constitute sources of debate and reflection on the area of competences.

Survey of subject specific competences

The purpose of the survey on subject specific competences was to obtain the opinions of the groups surveyed on two aspects: a) the importance of competences for professional work and, b) the level to which they had been achieved in the university.

The questionnaire was targeted at the following groups:

Graduates	707
Employers	580
Academics	681
Total	**1,968**

1968 questionnaires were returned from 14 countries[34].

Those surveyed were asked to rate the importance and achievement on a scale of 1 to 4, as follows:

1: None
2: Weak
3: Considerable
4: Strong.

The subject specific competences surveyed are shown in the table below (Table 1):

[34] Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Honduras, Mexico, Nicaragua, Panama, Peru, Uruguay, Venezuela.

Table 1
Subject Specific Competences

Subject Specific Competences in the area of Business Administration
1. Developing strategic, tactical, and operational planning skills.
2. Identifying and administrating business risks in organisations.
3. Identifying and optimising business processes within organisations.
4. Administrating an integral logistics system.
5. Developing, implementing, and managing business control systems.
6. Identifying functional inter-relations within organisations.
7. Evaluating the legal framework applied to business management.
8. Producing, evaluating, and managing business projects within different types of organisations.
9. Interpreting accounting and financial information for the taking of managerial decisions.
10. Using costing information for planning, control, and decision making.
11. Taking decisions regarding investment, financing, and management of financial resources within a company.
12. Leadership skills, for the achievement and following up of aims within the organisation.
13. Managing and developing human talent within the organisation.
14. Identifying ethical and cultural aspects of reciprocal impact within the organisation and the social environment.
15. Improving and innovating administrative processes.
16. Detecting opportunities for undertaking new business and/or developing new products.
17. Using information and communications technology in management.
18. Managing the technological infrastructure of a business.
19. Formulating and optimising information systems for management.
20. Formulating marketing plans.

Analysis of the results

Table 2 shows a significant correlation in the perception of the **relative importance of the subject specific competences** among the different groups surveyed.

Table 2

Correlation among the groups surveyed (Importance dimension)

	Academics	Graduates	Employers
Academics	1	0.936	0.951
Graduates	0.936	1	0.951
Employers	0.951	0.951	1

As Table 3 shows, the highest correlations as to the importance of competences were found between graduates and employers, and between academics and employers, and were significant in both cases.

Table 3

Relative importance of the subject specific competences
for the Graduates and Employers Groups (in decreasing order)

Specific competence	Average graduates	Average employers
Developing strategic, tactical, and operational planning skills.	3.675	3.719
Interpreting accounting and financial information for the taking of managerial decisions.	3.675	3.644
Taking decisions regarding investment, financing, and management of financial resources within a company.	3.642	3.590
Leadership skills, for the achievement and following up of aims within the organisation.	3.629	3.639
Managing and developing human talent within the organisation.	3.585	3.635

Between academics and graduates, there is also a significant correlation, although slightly lower. Table 4 shows, the five most important subject specific competences for these two groups in decreasing order of average rating:

Table 4

Relative importance of the subject specific competences
for the Groups of Academics and Graduates (in decreasing order)

Specific competence	Average academics	Average graduates
Developing strategic, tactical, and operational planning skills.	3.787	3.675
Taking decisions regarding investment, financing, and management of financial resources within a company.	3.643	3.642
Interpreting accounting and financial information for the taking of managerial decisions.	3.631	3.675
Managing and developing human talent within the organisation.	3.621	3.585
Detecting opportunities for undertaking new business and/or developing new products.	3.615	3.653

A significant correlation can also be seen between the groups of employers and academics. Table 5 shows the five most important subject specific competences for these two groups listed in decreasing order:

Table 5

Relative importance of the subject specific competences
for Employers and Academics (in decreasing order)

Specific competence	Average employers	Average academics
Developing strategic, tactical, and operational planning skills.	3.719	3.787
Taking decisions regarding investment, financing, and management of financial resources within a company.	3.590	3.643
Identifying and administrating business risks in organisations.	3.594	3.633
Interpreting accounting and financial information for the taking of managerial decisions.	3.644	3.631
Managing and developing human talent within the organisation.	3.635	3.621

We can see that the three groups coincide on four of the most important subject specific competences: developing strategic, tactical, and operational planning skills; interpreting accounting and financial information for the taking of managerial decisions regarding investment, financing and management of financial resources within a company; managing and developing human talent within the organisation.

With regard to the level of **achievement of the different subject specific competences** in university studies, a significant correlation can be seen amongst the perceptions of the three groups surveyed (Table 6).

Table 6

Correlation among the groups surveyed (Achievement)

	Academics	**Graduates**	**Employers**
Academics	1	0.944	0.962
Graduates	0.944	1	0.915
Employers	0.962	0.915	1

The subject specific competences considered to have the highest level of achievement are shown in Table 7.

Table 7

Achievement of subject specific competences for groups of Employers, Graduates and Academics (by greatest relative achievement)

Competence	**Academics**	**Employers**	**Graduates**
Interpreting accounting and financial information for the taking of managerial decisions.	3.138	3.083	3.011
Using costing information for planning, control, and decision making.	2.953	2.992	2.897
Taking decisions regarding investment, financing, and management of financial resources within a company.	2.941	2.862	2.823
Formulating marketing plans.	2.923	2.895	2.865
Developing, implementing, and managing business control systems.	2.873	2.829	2.806

Examples of experiences in competence-based teaching, learning and assessment

Examples of teaching/learning are given below, one for generic competences and two for subject specific competences. The examples of subject specific competences both refer to the same competence, with different forms of presentation. These examples offer a structure —from amongst several possibilities— for achieving the proposed educational objectives. The concepts of competences given in the examples are not meant to be exhaustive, nor to ignore the variety of approaches which institutions and universities may wish to use.

GENERIC COMPETENCE: Social responsibility and commitment to citizenship

Formulate and achieve freely acquired social obligations, which will improve and sustain the collective wellbeing in a spirit of solidarity, in the different areas of society and the environment.

Levels	Indicators	Descriptors
First Level: Knowledge Identifies and evokes notions and concepts of social responsibility and commitment to citizenship, linked to the social, economic and environmental environment with which the individual interacts.	Recognises his/her social responsibility and role as a responsible citizen.	a) Identifies family, organisational and community behaviour. b) Defines his/her role in the community. c) Joins activities related to social responsibility and commitment.
Second Level: Understanding Provides examples and counter-examples of responsible behaviour and citizenship in different social, economic and environmental areas.	a) Understands different human and social values. b) Reflects constantly on the search for the common good.	a) Contributes to generating a healthy climate inside and outside the organisation. b) Shows an understanding of the concepts of rectitude and honesty. c) Proposes collective actions of improvement.
Third Level: Application Performs activities in one or more social, economic or environmental areas and demonstrates his/her social responsibility and commitment to citizenship.	a) Displays different forms of citizenship. b) Displays different forms of being a socially responsible person.	a) Performs one or more citizenship activities. b) Participates in sports and/or cultural activities. c) Participates in social activities and/or activities of environmental protection.

SUBJECT SPECIFIC COMPETENCE: Interpreting accounting and financial information for the taking of managerial decisions

Interprets accounting information and financial statements, converting them through financial analysis into appropriate and objective information to support management decisions

Levels	Indicators	Descriptors
First Level: Knowledge. Knows and identifies the components of the company's accounting and financial structure.	a) Knows the basics of accounting. b) Identifies the structure of the financial statements.	A1. Does not know the basics of accounting. A2. Understands Generally Accepted Accounting Principles (GAAP). A3. Recognises adjustments to accounting information based on the GAAP. B1. Does not distinguish financial statements (FSs). B2. Distinguishes differences between FSs but does not understand the components. B3. Relates the FSs and their components.
Second Level: Understanding. Interprets the information using financial indicators.	a) Calculates relevant and appropriate financial ratios. b) Uses vertical and horizontal analysis for decision making.	A1. Does not know the different financial ratios. A2. Knows the financial ratios but is not able to calculate them correctly. A3. Calculates financial ratios. A4. Interprets financial ratios. B1. Is not able to decide what information to use for vertical and horizontal analysis B2. Performs vertical and horizontal analysis using suitable information. B3. Interprets the results of the vertical and horizontal analysis.
Third level: Application. Takes management decisions based on the accounting and financial information.	a) Identifies problems. b) Proposes alternatives for solving them and takes the right decision.	A1. Analyses financial indicators but does not relate them to the real problems of the company. A2. Based on the financial indicators, detects the areas that require deeper analysis. A3. Detects problems as a result of financial analysis. B1. Does not take any type of decision. B2. Takes decisions but without assessing scenarios. B3. Assesses the impact of the different solution alternatives. B4. Chooses the best scenario and takes responsibility for the decision made.

SUBJECT SPECIFIC COMPETENCE:
Interpreting accounting and financial information for the taking of managerial decisions

Understands the knowledge, abilities and skills specifically related to analysis and interpretation of accounting and financial information.

Levels	Indicators	Descriptors
First Level: Knowledge Has an understanding of the basic knowledge related to aspects of evaluation and presentation of financial statements and calculation of indicators and ratios.	a) Knows the structure and contents of the financial statements. b) Knows the composition of the different economic, financial and equity items. c) Knows and performs economic, financial, equity and operational measurements using applicable indices.	A1. Has a clear mastery of balance sheets, the income account, the statement of changes in shareholders' equity and the statement of cash flows. *Assessment (*):* • Very satisfactory • Satisfactory • Moderately satisfactory • Unsatisfactory A2. Recognises changes in shareholders' equity *Assessment*: ditto (*) B1. Identifies the compositions of the items in Assets. *Assessment*: ditto (*) B2. As in B1. with regard to items in Liabilities. *Assessment*: ditto (*) B3. As in B1. with regard to the balance sheets. *Assessment*: ditto (*) C1. Correctly calculates economic and financial indices in different monetary contexts. *Assessment*: ditto (*) C2. Ditto for operating results. *Assessment*: ditto (*)
Second Level: Understanding. Refers to the aspects related to analysis and interpretation of FSs.	a) Makes an analysis of financial statements. b) Performs an interpretation of the financial statements. c) Writes reports on the organisation's economic, financial, equity and operating situation.	A1. Detects the causes of the problems identified. Assessment: ditto (*) A2. Makes holistic judgements Assessment: ditto (*) A3. Makes critical evaluations of strategic solutions. Assessment: ditto (*) B1. Applies a broad and systemic approach for implementation. Assessment: ditto (*) B2. Combines cross-results from the different indices and draws conclusions. Assessment: ditto (*) B3. Introduces and interprets vertical and horizontal analysis. Assessment: ditto (*) C1. Produces relevant and appropriate economic, financial, equity and operating reports. Assessment: ditto (*) C2. Produces economic/financial, operational, tactical and strategic reports. Assessment: ditto (*)

Levels	Indicators	Descriptors
Third Level: Application Refers to **making** decisions characteristic of corporate finances in different spheres.	a) Assesses projects in different scenarios. b) Contributes recommendations for decision making. c) Participates in feedback to incorporate corrective measures.	A1. Administers investment projects, assessing profitability, risk and impact of inflation. *Assessment*: ditto (*) A2. Applies simulation models to alternative scenarios. *Assessment*: ditto (*) A3. Introduces prospective analyses. *Assessment*: ditto (*) B1. Assesses alternative decisions. *Assessment*: ditto (*) B2. Gives reasons for the proposed solutions. *Assessment* ditto (*): B3. Defends the proposed solutions. *Assessment*: ditto (*) B4. Prepares financial decision making (operational, tactical and strategic). *Assessment*: ditto (*) C1. Acts on the basis of the causes of the problems detected. *Assessment*: ditto (*) C2. Tackles changes. *Assessment*: ditto (*) C3. Contextualises the decision-making process. *Assessment*: ditto (*) C4. Performs decision making. *Assessment*: ditto (*)

Conclusions and reflections

The group achieved its objective of mapping the area of Business Administration in Latin America and coming up with a set of generic and subject specific competences that would act as a benchmark for educating potential personnel in the area of Business Administration. The examples of how competences can be planned may also provide a vision of some of the many ways in which this task can be achieved. The deliberations and the questions raised may also provide material which the Tuning Latin America project may wish to address in the future.

The key conclusions were:

a) The involvement of different agents in defining and prioritising competences is particularly relevant when it comes to drawing up relevant curricula that build citizenship and a capacity to act within the environment;
b) Defining subject specific competences in order to build curricula constitutes one important reference point for enhancing teaching and learning;
c) The high degree of correlation between the perceptions of the various groups surveyed with regard to the relative importance of the generic

and subject specific competences suggests that this could form a starting point for significant consensus;

d) The high level of correlation associated with the level of achievement of the subject specific competences also points to common elements which should be taken into consideration;

e) The fact that the ratings for perceived achievement were significantly lower than those for importance for each competence should encourage us to focus our debate and reflection especially on strategies, systems, processes and indicators that will make it possible to achieve, continue, monitor and assess the level of achievement of the competences defined.

In this respect, a number of questions arise: what is the most suitable methods for developing subject specific competences throughout a study programme? Is there a core element of subject specific competences which can be developed jointly? At what point during the course should subject specific competences be developed? How can we objectively verify and measure the development of competences throughout the student's education?

4.2. ARCHITECTURE

Introduction and background

Architecture has been one of the subject areas of the Tuning Latin America project since 2005. The area's first meeting was held in San José, Costa Rica, with representatives from Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Mexico, Panama, Peru, Uruguay and Venezuela attending, as well as accompaniment from Greece in representation of the European community. The Dominican Republic joined at the third meeting, held in Mexico, to give a total of 16 participating countries from Latin America.

The degree of architecture has developed differently in response to the specific cultural and social conditions and requirements in each of the countries of Latin America. The longest-standing degrees in the field are those conferred by the University of Chile (where the first course was held in 1848) the School of Architecture of the University of the Republic of Uruguay, which is 91 years old (in 1915 it broke off from the School of Mathematics and associated fields), the schools of Guatemala, Argentina (Cordoba) and the Architecture Programme in Cuba, created at the beginning of the twentieth century (the latter underwent a change in orientation from 1959 on as a result of changes in the island's political and cultural context).

The curricula and syllabus of Latin American Architecture programmes share one common denominator: architectural design —also known as project workshop or project design— which combines all of the theoretical and practical components of the other subjects: drawings and impressions, geometry, technology and construction, structures, land use planning, history and theory, to mention but a few.

Another common aspect of the education and of the day-to-day work of Latin American architects involves work in planning. In all countries, responsibility for zoning and urban planning has been delegated or assigned to architects although no specific qualification exists for planners. The natural leader of the interdisciplinary work related to urban or territorial projects has always been the architect —known either by the name of urban planner, or simply as a general architect—.

In recent years, the social and political conditions of the countries in the region have begun to condition the way architects operate, with a focus on providing economical housing for deprived and/or displaced communities, controlling urban sprawl in the cities (nearly 70% of the region's population is concentrated in urban centres, an exact inversion of the situation at the beginning of the twentieth century) and enhancing awareness of the rich environmental potential which needs to be preserved and treated as a valuable asset.

These factors, added to various other characteristics that are essential to architecture, such as climate, topography, hydrology, seismic activity, landscape and cultural roots in each of the countries, has conditioned and shaped the work of Latin American architects differently in each country, with little professional exchange amongst the Latin community, and greater influence coming from North America, Europe and Asia.

Map of the subject area

Educational and/or degree profile

Generally speaking, the professional degree conferred in the region is that of: ARCHITECT. Exceptionally, some universities add the title of PLANNER.

Professional and/or work profile

Architects in Latin America operate mainly in five fields:

1. As planners and designers. This work involves designing and planning architectural and urban projects at different scales, both for new sites, and for the conservation of heritage sites.
2. As urban and other planners.
3. As constructors of buildings, a job which includes preparation of budgets, programming, surveying, property valuation, management, administration and technical management.

4. As researchers in the theme areas of the profession.
5. As lecturers.

Duration of studies

In some countries, the academic programme is divided up by years and in others by semesters. The shortest degree is five years or ten semesters, and the longest six years or twelve semesters[35]. The difference lies in the components of the curricula and the final degree assignment (the name varies from country to country: close of programme, degree project, end-of-course project, undergraduate assignment or thesis, supervised work experience) takes between one and two semesters. In some cases, this is included in the curriculum while in others it is in addition to the curricular programme.

Pre-Professional Practice or Supervised Professional Academic Practice, during the professional cycle or after completion of the studies, is increasingly being stipulated as an educational requirement for testing the theoretical knowledge acquired in the school and contrasting it with the real needs of work, through practical work by students in the public and/or private sectors. It is not compulsory in all countries, but it is considered relevant as a means of assessing and ensuring competences.

In some countries, social service is either required by law, or by the university itself (inside or outside the syllabus) as a community outreach activity.

Cycles (levels of education) / hours spent by the student in his/her process of professional education as an architect

The general trend is for three levels of education, a basic one, covering the first two or three years, an intermediary level, and a final professional level, lasting to graduation. In several countries, however, students pass directly from the basic cycle to the professional one.

Discipline areas (goals of learning)

The main discipline, forming the backbone of education in architecture is practice in the Project Workshop or of Architectural Design Workshop. This practice is fed by the following areas of knowledge: a) theory, history and critique, b) environment and land use planning, c) technology in construction and structures, d) expression and systems of graphic and volumetric representation, e) humanities and basic exact sciences.

---

[35] In the real situation in Latin America, the actual time taken to meet the degree requirements may be longer than that stipulated in the study plans.

Some universities place particular stress on curricular content related to research, as an independent area of professional education. Other universities are beginning to follow suit.

Students' credits or volume of work

There is a moderate difference between the criteria used to measure contact hours in programmes, and a major difference in the criteria for measuring hours of independent student work at basic, intermediary and professional levels. This is due to the lack of common agreement on the system used for measuring the time the student has to spend on his/her education as an architect, and on how this should be structured and measured within the curriculum of each country or university.

There are major differences in the number of credits: in some cases the concept is based on contact hours; in others on more complex calculations of each student's tutored and independent workload, and in yet others the concept is not used.

The teaching of architecture is monitored and controlled by the state in some countries, but in others, each institution is free to establish the scope of the programme and decide how much time is required to complete it.

Recognition and professional exercise

In this area, there is no common denominator between the participating countries: in some, each institution university confers the professional qualifications independently; in others, this task is performed by associations of educational institutions; in others, it is the collegiate association of architects; and in others it is state-regulated through the Ministry of Education.

After conferral of the professional qualification as architect, several countries have councils, boards, schools or professional associations that issue an association qualification or card required to sign plans and to practice as an architect, but most do not. Similarly, to regulate professional work some countries have professional societies, schools, councils and boards, which supervise the architect's work in the social context. These bodies are normally private, and in a few cases come under state control and supervision.

Processes of accreditation and certification

Most countries participating in the Tuning Latin America project have established processes for accrediting Architecture programmes. In some countries this is a state-run initiative, and in others it is privately run; but the wish of each institution to participate in the accreditation and/or certification processes is respected. Countries that have associations of schools of Architecture use them to establish common curricular parameters and decide on educational methodologies and strategies.

Increased globalisation has led to quality control processes and the internationalisation of the curriculum and the syllabus. In several countries, the international agencies have conducted accreditation processes in schools of Architecture that submitted to their standards and criteria. Others have made use of their own and their neighbours' strengths to establish academic links and academic communities. This is the case, for example, of MERCOSUR, and the association of programmes in Central American countries (ACAAI - the Central American Agency of Accreditation in Architecture and Engineering).

Quality examinations in higher education

Three of the participating countries have an established methodology for assessing final year students prior to graduation, using state exams. This is a recent development, and the strategy is still under review, to determine its relevance and level of application, given that each of the countries involved has over forty schools of Architecture (private and public).

The benefit of the mechanism is that it has required the various institutions in each of the countries to establish channels of communication and study in order to define curricular contents common to all programmes in the same country, which will make up the subjects in the state exam.

Specific competences for the area of Architecture in Latin America

Having presented 30 subject specific competences for architects in Latin America and tested them on four different population groups (academics, students, graduates from the last two years and employers), using the methodology established by the Tuning project, there emerged agreement on 26 subject specific competences.

Subject specific competences: Architecture
1. Awareness of the cultural function of Architecture.
2. Awareness of the social function of Architecture and of how the architect can contribute ideas to society to improve habitats.
3. Awareness of responsibility concerning the environment and concerning architectural and urban heritage values.
4. Skill in designing buildings and/or urban development projects that blend with the surrounding environment and fully satisfy local human, social and cultural requirements.

5.	Skill in formulating ideas and transforming them into architectural creations exemplifying the principles of composition, and good visual perception and spatial perception.
6.	Knowledge of history, theories of Architecture, art, aesthetics and human sciences.
7.	Knowledge, sensitivity and commitment regarding current architectural issues at local and global levels.
8.	Ethical commitment regarding the discipline and practice of Architecture.
9.	Imaginative, creative and innovative ideas in processes or architectural design and urban development.
10.	Knowledge of and ability to apply research methods to resolve creatively the demands of the human habitat, on different scales and at different levels of complexity.
11.	Desire to research and produce new knowledge that will contribute to the development of Architecture.
12.	Ability to perceive, conceive and manage space in three dimensions and on different scales.
13.	Skill in reconciling all the factors involved in architectural design and urban development.
14.	Mastery of the media and tools used for communicating verbally, in writing and/or volumetrically architectural and urban development ideas and designs.
15.	Ability to form part of interdisciplinary teams deploying different intervention techniques to improve degraded and/or disputed urban and architectural spaces.
16.	Ability to recognise, evaluate, enhance and preserve architectural and urban heritage.
17.	Skill at leading, taking part in and co-ordinating interdisciplinary work in Architecture and urban development.
18.	Capacity to undertake architectural and urban development projects guaranteeing sustainable development and environmental, social, cultural and economic maintainability.
19.	Capacity to design buildings and structures that will respond well to the bioclimatic, landscape and topographical conditions of the region in question.
20.	Capacity to define the structural system of architectural projects.

21.	Capacity to define the appropriate construction systems and technology for the architectural project and local context in question.
22.	Capacity to define the installation systems called for by the architectural and/or urban development design conception.
23.	Capacity to apply the legal and technical codes regulating the field of Architecture, construction and urban development.
24.	Capacity to produce all the technical documentation necessary for bringing an architectural project to completion.
25.	Capacity for planning, programming, budgeting and managing architectural and urban development projects in the market.
26.	Capacity to build, direct, supervise and oversee the execution of architectural and urban development construction projects on different scales.

Analysis of the results of the surveys on subject specific competences

Surveys were conducted in each country. Several systems were used: on-line surveys, face-to-face meetings with explanatory meeting, and postal surveys. The sample was as follows:

Country	Academics	Employers	Students	Graduates	Total
Argentina	37	30	36	31	134
Bolivia	67	30	97	39	233
Brazil	30	17	40	28	115
Chile	174	66	252	113	605
Colombia	10	3	35	1	49
Costa Rica	17	2	19	11	49
Cuba	24	18	32	24	98
Ecuador	23	19	133	71	246
El Salvador	25	26	30	32	113
Guatemala	22	0	15	19	56
Mexico	31	30	31	32	124
Panama	26	15	39	16	96
Peru	30	16	30	30	106
Uruguay	25	8	74	33	140
Venezuela	32	16	27	32	107
Total	**573**	**296**	**890**	**512**	**2,271**

Characteristics of the survey

The survey was designed using the same criteria for the four groups, and the aims were:

- To detect the relevance or level of importance of each competence for the group surveyed.
- To establish the level of achievement of each competence on completion of a university education in Architecture.

Those polled had to rate their perception of the importance and level of achievement of each competence on a scale of 1 to 4 for each.

The academics' view

The academics view of the importance of the competences reflects a greater appreciation of a broad education in the discipline and a desire to relate knowledge, skills and capacities to ethics, the socio-cultural dimension, and the environment.

Asked about the level of achievement, the academics stressed the importance of developing essential abilities and skills, and the aforementioned commitments were diluted.

With regard to the abilities linked to the capacities and skills for complete design of buildings and urban development projects, the academics considered that theoretical knowledge and praxis are essential for the architect's education.

This analysis shows the need to know, become more aware of and engage in the topics of the current architectural debate, at local and global level, recognising its importance in the education process.

Queried about the skill for «leading interdisciplinary work», the academics felt that it is given little importance in education. They also coincided in the competences they scored lowest for importance and achievement, including those related to certain practical aspects of the professional work.

The students' view

The students' rating of the subject specific competences was significantly different to that of the other groups.

They laid greater importance on the field of resources and tools for representing architectural ideas and projects, which they consider to be essential for entering the labour market.

They also highly rated the importance of the capacity to undertake architectural and urban development projects guaranteeing sustainable development.

The group considers that university education should give greater importance to the competences that are more closely associated with professional practice, those related to planning, programming, construction, direction and supervision of architectural and urban development projects.

The graduates' view

The graduates feel well equipped to exercise their profession with a capacity and mastery of the media involved, but they recognise the need for research to further develop themselves and acquire work experience.

They were unsure as to their knowledge because of a lack of professional practice, capacity for management, supervision and administration of projects, and the need for a greater knowledge of current legislation governing Architecture. All of these factors can have a negative influence on their active incorporation onto the labour market.

An analysis of the surveys also shows that the graduates do not place direct importance on professional practice in areas of sustainability and heritage and do not associate their professional work with any ethical and social commitment.

The employers' view

The opinion of the employers is coloured by the fact that they view the education of professional architects in terms of their place on the job market. They stress the importance of certain competences related to the architect's creativity, as opposed to design and the way it is implemented at different levels.

With regard to ethical education, they display an interest in maintaining working conditions based on socially strong agreements and established conditions.

The employers give relative here it has to be either **relatively little** or **relatively greater**. Relative cannot stand alone like this importance to sustainable development and heritage conservation and the role played by research in the architect's professional education.

Additional competences suggested by the people surveyed

A total of 117 new competences were suggested by the interviewees; of which 84 were already included among the generic ones and 27 among the specific ones. Three were not formulated as competences and only 3 constituted a specific contribution, but because they each related to a speciality area (either in education or the career), they have not been included in this work.

NOTE: *There are only very small variations in the results of weighting in both importance and achievement, from which we may conclude that the competences selected are considered relevant.*

Reflections and examples on teaching, learning and assessment of competences

To illustrate the chapter, the group selected two competences. The generic one, ETHICAL COMMITMENT, which has direct areas of application in Architecture, was rated very highly in the surveys conducted by the Tuning Latin America project, with particular stress on the way it impacts on multiple subject specific competences. The specific one, ABILITY TO PERCEIVE, CONCEIVE AND MANAGE SPACE IN THREE DIMENSIONS AND ON DIFFERENT SCALES, reflects an ability to draw up designs, a core feature of the architect's education and professional work.

Analysis of Generic Competence: ETHICAL COMMITMENT

EDUCATIONAL AND TEACHING METHODOLOGY	To promote professional ethical reflection, in order to respond appropriately to social duties and commitments by means of: —Reviewing the theory of ethics and its application to the architect's professional work. —Analysis and simulation exercises of case studies. —Forums of reflection and debate. —Guidance on bibliography.
LEARNING ACTIVITIES	—Classes on ethical and moral information and guidance. —Sessions for clarifying terms and concepts, interpretation of texts. —Discussion seminars. —Application workshops. —Personal reflections.
SYSTEM OF ASSESSMENT: (LEARNING OUTCOMES)	Assess the capacity for ethical and moral response in situations of conflict, individually and in groups. Qualitative assessment. Critical and self-critical behaviour by teachers and students in their professional work.

Levels of mastery, indicators and descriptors

Four scenarios of performance have been established for assessing the competence, as follows:

On taking the course units:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Address the work of the architect with the ethical and moral principles relevant to the profession.	Knows and classifies the principles and terms of ethics and morality	Does not know.	Makes decisions without knowledge.	Knows but does not classify.	Knows and classifies.	Knows, classifies and proposes.
	Assesses and selects the ethical and moral principles.	Does not assess or make decisions.	Makes decisions without criteria.	Assesses the principles but does not apply them.	Assesses and selects.	Assesses, compares, updates and identifies the best option.
	Applies moral and ethical principles in his/her activities.	Does not apply them.	Applies them under obligation or requirement.	Complies minimally.	Applies them sufficiently.	Applies them systematically.

In designing:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Revises and applies the most suitable standards and solutions for the well being of the users as a responsible commitment by the architect.	Compiles information and classifies the standards.	Does not compile information.	Compiles information and does not classify it.	Compiles and classifies without criterion.	Compiles and classifies.	Compiles, classifies and innovates.
	Selects and includes the most suitable standards and systems.	Neither selects nor includes.	Selects but does not include.	Selects, but includes without criterion.	Selects and includes.	Selects, includes and innovates.
	Is aware of the importance of the standards in the act of designing.	Is not aware.	Is aware but does not include them in designing.	Is aware but does not design appropriately.	Is aware and designs appropriately.	Is aware and proposes new alternatives.

In interpreting and applying planning and building codes:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Assesses the importance of urban and building codes, as a commitment to respect for community living and to ensuring the safe habitability of the buildings.	Checks and analyses the building and planning provisions and standards.	Does not check or analyse	Checks but does not analyse	Checks and analyses without criterion	Checks and analyses.	Checks, analyses and proposes new alternatives.
	Is aware and knows the contents and spirit of the planning and building standards.	Does not know and is not aware.	Has little awareness and little knowledge.	Has knowledge but no awareness.	Has knowledge and awareness.	Is aware, has knowledge and proposes updating of standards.
	Applies and/or adapts the standards consciously and responsibly.	Does not apply them.	Rejects them.	Applies them inappropriately.	Applies them appropriately.	Applies and proposes.

In relating with others in the process of undertaking an architectural project:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Stresses the importance of a responsible attitude in compliance with all the commitments and personal and interpersonal relations developed in the work.	Considers it very important to adhere to and comply with the assigned work in the agreed time and manner.	Does not know or rejects the guidelines established for compliance	Shows little willingness to comply.	Adheres to and complies with the strictly essential minimum of the provisions.	Complies formally with the provisions assigned in his/her individual work.	Complies satisfactorily and contributes more than required.
	Approaches interpersonal relations in an attitude of fairness, seriousness and responsibility.	Rejects work with other people and does not value interpersonal work.	Has difficulty acting fairly when working with other people.	Tries to comply minimally.	Shows an attitude of fairness and responsibility.	Stimulates, complies with and specifies commitments fairly and satisfactorily.

ETHICAL COMMITMENT —as a generic competence with a specific application for the architect— is learnt gradually at the beginning of the education in terms of general principles, and its professional application is consolidated as the student's studies progress and he/she goes into the subjects in greater depth.

Analysis of Subject Specific Competence: ABILITY TO PERCEIVE, CONCEIVE AND MANAGE SPACE IN THREE DIMENSIONS AND ON DIFFERENT SCALES

Because of its importance (it is a determining factor in the architect's basic trade), and professional scope (on the Map of the Area of Architecture) it is clear that this is the structuring feature of the curriculum and the one that integrates all other knowledge. The table below shows the educational methodologies, activities and learning outcomes for this subject specific competence:

EDUCATIONAL METHODOLOGY	—Bring students face to face with the everyday reality of Architecture and planning, based on their life experience and using analytical observation, so that they are capable of seeing the relationship of proportion that exists between the architectural and urban space and the individual who inhabits it. —Apply consciously and coherently in their projects of architectural and urban design the different scales and dimensions, the proportion and size of the spaces being designed depending on the individual or individuals intended to occupy them. —Know and use the elements of architectural and urban shape and space.
LEARNING ACTIVITIES	—Develop a capacity for observation, through a living experience of the architectural and urban space; use of the sketch as a tool for transforming everyday reality and bringing the experience to internal discussion in the workshop. —Site work of surveying and exploration, in individual and group assignments. Use of own experience as an individual using and inhabiting the architectural and urban space to achieve an understanding of the relationships of dimension and scale involved. —Discussion in class and workshop with teacher and students; preparation of graphic and conceptual presentations on the issues addressed; graphic and written documentation on the problem. —Apply the use of scale and proportion *vis-à-vis* the individuals intended to utilise the spaces being designed, using three-dimensional exercises of different complexity depending on the level of each workshop. Requires contact time and other autonomous work by the student. —Requires the development of specific skills and the use of tools: preparation of models, sketches, representations, precision drawings, and mastery of computer tools. —Bibliography, graphic media and continuous practice. —Understanding of the use of space and shape during development of the ideas in the design. —Visual tours in different types and scales of space and shape.

ASSESSMENT SYSTEM	—Presentations of the design exercises by the students. —Assessment of the level of understanding, use and application by the student in creating the design project, expressed in terms of the planimetry (sections, plans and elevations), models at different scales, sketches, perspectives, modelling, etc. —Oral dissertation by the student on his/her conceptual project. —The assessments may be individual or collective (assessment by the teacher or teachers' committees), and may involve systems of self-assessment and educational and summative assessments. —Assessment by skills and results.
NOTES	There are many different methodologies for achieving this competence, since within the creative process required in Architecture, practical work —especially at the first levels— is eminently exploratory. Each student must explore and know the different techniques for communicating his/her projects, and choose that which best matches his/her needs and skills. The methods of assessment also vary depending on the objectives set for of each level, the degree of complexity and the level of development of the design exercise.

Levels of mastery, indicators and descriptors

The four performance scenarios below have been established for assessing this competence:

In studying the units, the student:

Levels of mastery	**Indicators**	**Descriptors**				
		1	**2**	**3**	**4**	**5**
Acquires the skill to develop creativity and innovation in the process of architectural and urban design.	Knows and develops skills for design.	Does not know them.	No knowledge of 2 and 3-D.	Knows and applies them in projects of low and medium complexity.	Knows and applies them in complex architectural projects	Knows and applies them in planning projects and larger facilities.
	Knows the theory of Architecture and urban development.	Knows basic theoretical elements.	Knows the theory thoroughly, without applying it.	Applies them in projects of low and medium complexity.	Applies them in complex projects.	Formulates theories based on knowledge of real architectural and urban situations.
	Assesses and performs systemic processes.	Does not know them.	Knows the different theories.	Knows and applies the theories.	Assesses the systemic processes.	Makes decisions on systems.

In designing:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Develops skills in project synthesis and in inter-relating the components of the space.	Investigates processes.	Does not compile information.	Compiles information and does not classify it.	Compiles and classifies without criterion.	Compiles and classifies.	Compiles, classifies and innovates.
	Develops proposals with input from project research.	Does not develop proposals.	Develops proposals without relating them to project proposal.	Applies them in basic form and without self-criticism.	Applies them in complex form and is on the way towards self-criticism.	Applies them and is self-critical.
	Assesses the project self-critically.	Is not aware.	Is aware but is not self-critical.	Projects shape/function/technology systemically.	Makes decisions and uses suitable alternatives.	Proposes complete projects in the different scales by applying the research.

In interpreting and applying the conception and handling of the space in three dimensions and in the different scales:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Develops skills by adapting the proposals to specific contexts and needs in the different scales.	Knows the different realities and contexts.	Does not know them.	Gains experience of the different spaces.	Analyses the needs of the different spaces.	Applies and formulates context-adapted programmes of requirements.	Designs with abilities and decision making.
	Makes a critique of the context by differentiating scales.	Does not know and is not aware.	Knows the context and does not know scales of intervention.	Knows context and scale and their specific needs.	Applies and proposes without criticism, the knowledge acquired in the project.	Criticises, self-assesses and develops alternative proposals.
	Proposes new forms of organisation for the space.	Does not apply them.	Rejects them.	Applies them for scales at basic level.	Applies them properly and in scales of greater complexity.	Applies and proposes.

In relating with others in the process of undertaking an architectural project:

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Develops processes of adaptation, flexibility, experimentation to lifelong learning.	Develops processes of adaptation.	Does not know them.	Develops initial processes of adaptation.	Adapts them, without integrating knowledge.	Adapts them and manages to integrate knowledge.	Leads processes of integration.
	Develops processes of experimentation.	Does not know them.	Knows them but does not apply them.	Experiments in basic form in low complexity designs.	Experiments in projects of medium complexity and scale.	Experiments in processes of integration and design experimentation.
	Develops processes of flexibility and application of knowledge.	Does not know them.	Knows the different possibilities of design.	Applies the different possibilities of the knowledge in basic form.	Applies and integrates different possibilities of the knowledge.	Considers and integrates proposals with the different possibilities of the knowledge.

Learning, teaching and assessment

The table below compares the definitions of the relationship between the examples of learning, teaching, assessment and the subject specific competences acquired to achieve the project competence set out above.

EXAMPLE OF LEARNING Learning activities	EXAMPLE OF TEACHING Teaching/educational activities	EXAMPLE OF ASSESSMENT Assessment activities	COMPETENCE ACQUIRED —Specific competence—
—Systemise and synthesise information relevant to each school assignment. —Prepare proposals in sketches, plans and models manually and digitally. —Constructively criticise external work and productively apply the criticisms of others.	—Theoretical/practical classes. —Work-based practices. —Tutored workshops. —Seminars —criticism— —Visit to buildings.	—Written and oral examinations, —Tests of knowledge or skill. —Assessment of presentations. —Action in discussion groups. —Monitoring of the process. —Checking results in exercises.	*Skill in formulating ideas and transforming them into architectural creations exemplifying the principles of composition, and good visual and spatial perception.*

EXAMPLE OF LEARNING Learning activities	EXAMPLE OF TEACHING Teaching/educational activities	EXAMPLE OF ASSESSMENT Assessment activities	COMPETENCE ACQUIRED —Specific competence—
—Reading and analysis of texts and magazines. —Systemise and conclude the information with teacher guidance and independently. —Preparation of summary essays of the subject.	—Theoretical classes. —Guidance on reading. —Visit to monuments.	—Written and oral examinations. —Assessment of presentations. —Action in discussion groups.	*Systemic knowledge of history, architectural theory and related human sciences as the grounding on which to base architectural practice.*
—The student is faced with a problem in a rural town, in which he/she has to determine possible scenarios of development, establish the activities that would complement such development and suggest the location, functional inter-relation, elements and physical and spatial needs of each activity.	Using discussion and directed reading, the teacher provides instruments of analysis and tools to help students in this process and checks the student's work at different stages.	The teacher assesses both the process and the final assignment, laying stress on consistency between different levels of analysis and the rational process of making design decisions.	*Skills for designing works of Architecture and/or urban development*
—Use tools of spatial representation in two and three dimensions.	Introduce basic concepts and techniques of representation in two-dimensions —plans, sections and elevations— and three-dimensional ones —isometric, perspective and axonometric—.	Assesses the representation of spatial proposals from the perspective of technical correctness, use of scale and clarity.	*Mastery of the resources and tools for communicating the ideas and projects orally, graphically and volumetrically.*
—Practise skills and techniques for representing the space in three dimensions in sketches, plans and models manually and digitally. —Perform scale work of internal spaces —cell— in buildings and urban development. —Bring students face to face with the everyday reality of Architecture and planning, based on their life experience and using analytical observation, so	—Theoretical/practical classes. —Tutored workshops. —Work—based practices —Seminars —criticism— —Visits to buildings and urban spaces. —Develop a capacity of observation, by means of life experience, of the architectural and urban space, use of sketches as a tool for changing the everyday reality and bringing the experience to the internal discussion in the workshop. —Performance of individual or group work of site surveying and exploration.	—Assessment of presentations. —Tests of knowledge or skill. —Observation of practices in use of the space. —Monitoring of the process. —Checking of results by exercises. —Presentations of design exercises by students. —Assessment of the student's level of understanding, use and application in creating the design project, expressed in terms of the planimetry (sections, plans and	*Ability to perceive, conceive and manage space in three dimensions and on different scales.* *NOTE: There are many different methodologies for achieving this competence, since within the creative process required in Architecture, work in the workshop —especially at the first levels— is eminently exploratory and students progress through a process of continuous feedback, trial and error and learning on their feet.*

EXAMPLE OF LEARNING Learning activities	EXAMPLE OF TEACHING Teaching/educational activities	EXAMPLE OF ASSESSMENT Assessment activities	COMPETENCE ACQUIRED —Specific competence—
that they are capable of seeing the relationship of proportion that exists between the architectural and urban space and the individual who inhabits it. — Apply consciously and coherently in their projects of architectural and urban design the different scales and dimensions and the proportion and size of the spaces being designed depending on the individual or individuals intended to occupy them.	—Use of own experience as an individual using and inhabiting the architectural and urban space to achieve an understanding of the relationships of dimension and scale. —Discussion in the class and workshop with the teacher and students; Graphic and conceptual presentations on the issues addressed; Graphic and written documentation on the problem. — The use of scale and proportion in relation to the individuals intended to use the spaces being designed by means of three-dimensional exercises of different complexity according to the level of each workshop. Requires contact work and other autonomous work by the student. — Requires the development of specific skills and the use of tools of representation: models, sketches, precision drawings, and mastery of computer tools.	elevations), models at different scales, sketches, perspectives, modelling, etc. —Oral dissertation by the student on the conceptual proposal that forms the basis of his/her design. —The assessments may be individual or collective (assessment by the teacher or teachers' committees), and may involve systems of self—assessment, educational and summative assessments.	*The methods of assessment also vary depending on the objectives set for of each level, the degree of complexity and the level of development of the design exercise.*

Conclusions

The conclusions of the Architecture area of the Tuning Latin America project are divided into five different perspectives. Firstly, the impact the project has had on processes of architectural education in the region; secondly, the changes in the curriculum structures of the participating programmes; thirdly —leading on from the second perspective— changes in institutional policies; fourthly, the impact seen with the implementation of Tuning methodology; and fifthly, the challenges arising out of the above with a view to at the future.

1. EDUCATION:

— As a profession, Architecture in Latin America has not spawned any other degrees. In their professional work, architects are general practitioners: specialisations come at advanced or graduate study level.

— Study plans are similar throughout the region and the component subjects are based on targets and content, not on competences. Teachers have not been trained to teach through competences, although some universities have incorporated this methodology in their educational processes.
— The project workshop, or design workshop, is the core area around which the curriculum is structured. Other complementary areas have similar content in the different countries.
— The curriculum demands a large number of contact hours.
— The number of years or semesters required to complete the degree is similar.
— Some countries have state definitions of the credit concept; in others it is defined by the university. In all cases, credits are not transferable.
— To obtain a degree in Architecture students need to complete an end-of-course assignment, under different names.
— There are differences of vision as to the way of teaching, depending on the origin of the universities (public or private) and the specific context of each country.

2. Curriculum structures:

— Study plans are structured by theme areas or areas of knowledge which are broken down into in subjects, and are concurrent.
— The cycles or levels of education are based on subjects or periods, but not on performance competences.
— No uniform definition has been reached on the academic credit system, as a measurement of the time required by the student to acquire a competence, either among different universities, countries or regions.

3. Institutional policies:

— Shared Latin American culture is a strength.
— There is agreement on criteria and a desire by participating universities to work towards competence-based education.
— Pre-existence of associations such as ARQUISUR, AUGM, UDEFAL, ACAAI.
— Events are promoted that bring together members of the professions such as the ELEA, CLEFA and the Latin American Architecture Biennial.
— There are institutional experiences in competence-based education which should be extrapolated to other universities in the region, to advance comparable degrees and mobility.

— Review of the criteria and methodologies used in accreditation processes: these are currently based on curriculum content and objectives and not on competences.
— There is a need to further examine the areas of coincidence mentioned above, in order to define policies on integration and internationalisation of higher education in the area of Architecture.

4. IMPACT:

— Importance of defining generic competences. Tuning has established a common framework of reference which did not previously exist.
— The great challenge of this project is the paradigm shift required in higher education: it is proposed to address the teaching-learning process on the basis of a student-centred and competence-based system.
— Creation of a new theoretical element —Tuning methodology— for drawing up the curriculum.
— Establishment and consolidation of a theme network in Architecture.
— Willingness to replace plans and programmes with competences.
— Redefinition of the terms in which competence is defined and viewed.
— Fostering of knowledge and integration among Latin American countries and their university schools of Architecture.
— Teaching processes designed for the student.
— High costs in implementing the changes required to take on a competence-based reform of the curriculum.
— It was possible to lay the foundations of a common project and share experiences and documents.
— The material drafted by other areas, at inter- and trans-disciplinary levels is available.
— The impact in the different countries has been positive, though with varying degrees of intensity.
— The documents produced serve as a framework of reference for supporting competence-based educational processes.

5. CHALLENGES:

— Some countries have called for the National Tuning Centres to liaise more with the universities.
— Need to continue developing the Tuning project, in order to achieve the ultimate objective: harmonisation and compatibility of the degrees in different countries, based on competence-based curriculum organisation of the degree courses and their structured cycles.

— Need to generate programmes of dissemination, awareness and participation of the Tuning methodology, in each country and among public and private universities.
— In order to achieve a real space of convergence in the area of Architecture, it will be necessary to consolidate and extend the regional academic theme networks, in order to ensure channels of academic/student integration, cooperation and exchange.
— Overcome slowness and resistance to change among institutions and academic inertia.
— Need to establish uniform criteria, for defining durations in Architecture degree curricula in Latin American universities.
— Extend the definition of a Latin American credit system, compatible with the European credit system, to facilitate regional and international student mobility.
— Incorporate principles of flexibility in the undergraduate curriculum. This must be structured in such a way as to ensure that it can be projected towards areas of specialisation, through graduate study programmes (specialisations, masters' degrees, and doctorates).

4.3. LAW

Introduction to the subject area

Law is one of the oldest degree programmes in Latin America and as a result has a long history in terms of curriculum design, teaching methodology, learning objectives, teacher training, etc., often clashing with the model of competence-based education espoused by Tuning.

The Law group was set up in February 2006, in San José, Costa Rica, and comprises representatives from Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Spain, Mexico, Nicaragua, Paraguay, Peru, Uruguay and Venezuela.

The group took as its starting point the need to: a) modernise the way law is taught, adapting it to new times and situations; b) achieve a system that fully meets the needs of future professionals and employers; c) further the process of internationalisation in the teaching of law, to enable mobility of students, professionals and academics, and d) increase the quality of the teaching/learning process with a transparent model.

Group members agreed on the benefits of building on an educational model based on the development of student competences, which could be first discussed, agreed and validated by academics, students, graduates and employers. They concluded that a significant process is now underway to restructure and re-conceptualise the model used for teaching Law in Latin America.

The group went on to develop subject specific competences, There was a large degree of agreement in defining the competences, further backed by the relevance ascribed to them in the surveys.

It is important to stress that Law teaching in Latin America operates against a complex backdrop, with some particular features common to the region and others that are shared by several countries, though with strong differentiating nuances. Examples of these factors include:

- The restoration of democracy, begun in the 1980s, though sometimes with very different degrees of progress and depth;
- The recognition of human rights as an inescapable objective of the legal system;
- The crisis of the welfare state and setbacks in the protection of second-generation human rights (economic, social and cultural rights), with disturbing rates of poverty and social exclusion;
- Serious problems in processes of integration between states, hindering development;
- Problems resulting from the level of economic development of the states and their difficulties in entering commercially into a globalised world;
- The problems of migrations within Latin America and from it, and
- New difficulties related to environmental conservation.

Map of the area in Latin America

In the process of mapping this subject area in Latin America, two indicators were considered to be essential. The first is the curriculum designs adopted by the teaching institutions (based on information provided by each representative of the area in Latin America). The second was the profiles of qualification and most common employment of graduates.

Education in Law- Curricular Conceptions in Latin America

Legal dogma has been the dominant theoretical matrix in most schools or courses, with methodology largely based on the transmission of theoretical content by the teacher and the absorption of this by the student. There is no systemic approximation between teaching and learning processes, and in most universities the process continues to be very conservative, founded as they are on a methodology of uncritical assimilation of theoretical propositions, or the memorizing of legal regulations. Legislation, or the regulatory system, is commonly the structuring element in disciplines whose organisation reflects of traditional legal fields.

In some countries, dissemination of Law postgraduates and the professionalisation of the Law degree have sparked initiatives of curricular reform, with proposals being adopted on flexibility, emphasis on practical training, return to a more critical education, with the study of relations between Law and other social sciences, and a greater participation by students in the teaching and learning processes. Processes for assessing the quality of teaching in Law have been implemented in some countries, and this has been reflected in discussions and changes in curricular conceptions, teaching profiles and the need to bridge the gap between theoretical and practical education.

It should be noted that, over recent decades, there has been sharp rise in the number of Law degrees, in most Latin American countries and this situation has brought new complexities to the process of educating future Lawyers.

Graduation Level in Law

The education process involved in obtaining the degree takes an average of five years study. Graduates in most Latin American countries are conferred with the title of Lawyer [*abogado*] (Argentina, Bolivia, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela). The title of Bachelor in Law is only conferred in the case of Brazil, where prospective Lawyers are required to sit an exam set by the Order of Lawyers in each state. The title «Graduate in Legal Sciences» [*Licenciado en Ciencias Jurídicas*] is used in El Salvador and Nicaragua, while in Chile a «Degree in Legal and Social Sciences» may be obtained (the title of Lawyer is conferred by the Chilean Supreme Court).The respective title is a formal requirement for practising most legal professions.

There are also more advanced degrees derived from graduate studies, such as specialisations, Master's degrees and Doctorates in the area, with a move towards a system of lifelong learning.

Graduate studies are increasingly being required throughout the continent and in some countries are used as a criterion of quality. The Doctorate in Law is recognised as a benchmark of quality throughout the region.

Map of Professions

The degree in Law offers access to multiple employment opportunities and professional activities. Degrees range from the typical state courses, linked compulsorily to a Bachelor's Degree in Law (Brazil), and those related to the administration of the judicial system, to those leading to more recent functions, such as consultancy work in innovative areas of the private sector. There are also professional functions which are traditionally restricted to jurists, such as lectureships in Law. In some Latin American countries, the latter is becoming an increasingly important professional option, because of the growth in the number of Law courses and Law schools. To sum up, Law is essential for the administration of justice, and its graduates can exercise various traditional and innovative professional functions, with extensive possibilities for professional work. It should also be noted that in Latin America many students see courses in Law as back-up for an existing profession, as is the case with many civil servants.

The table below shows the main activities and functions performed by Law graduates.

Profile of professional functions in the area	
Public Functions	
Magistracy	Federal, state and municipal levels (magistrates in constitutional courts and supreme courts, judges of first and second instance, justices of the peace, etc.) members of the council of justice, of magistracy boards and military judge advocates.
Public Ministry	Attorneys general and attorneys, Attorneys of the Republic and Promoters of Justice.
Auxiliary functions in the administration of justice	Auxiliaries general of justice, clerks, administrative functionaries of the judicial system, officers of justice.
State Administration	State and military attorneys, public and duty defence Lawyers, directors and advisors to the organs of state, legal advisors to legislators, notaries and registrars, etc.
Public Security	Superintendents and officials of the federal, state and municipal police, prison administrations.
Teaching in public institutions	Members of educational institutions (university and third-level teachers and researchers).
Private Functions	
Law and general legal activities	Law (litigant, Lawyer, employee, and others), legal consultant or adviser to private institutions, members of reconciliation and arbitration organisations (arbitrator, conciliator, mediator), members of private teaching institutions (university and third-level teachers and researchers), researcher in the legal field, consultant or director responsible in the legal area of private companies and non-governmental organisations.

Report of the results of the survey on the subject specific competences of the discipline

The workgroup drew up a list of 24 subject specific competences for the area, as shown in the table below. To check their validity, we then conducted a survey of academics, graduates, students and employers into the level of importance attributed to each of the competences and its respective level of achievement.

List of Subject Specific Competences: Law
(Order in the questionnaire)

Competence	Description
V01	Knowledge of, and ability to interpret and apply the general principles of Law and the legal system.
V02	Knowledge of, and ability to interpret and apply the legislation and principles of the national and international legal system in specific cases.
V03	Commitment to justice and fairness in all situations in which the Lawyer is involved.
V04	Commitment to human rights and to the social, democratic rule of Law.
V05	Capacity to exercise the profession as a member of a team of Lawyers.
V06	Capacity to work in interdisciplinary teams as a legal expert, making an effective contribution to the teams' work.
V07	Good understanding of political, social economic, personal and psychological phenomena (among others), taking them into consideration in interpreting and applying the Law.
V08	Awareness of the ethical dimension of the legal professions and of the social responsibility of Law graduates, and acting accordingly.
V09	Good capacity for legal reasoning and argumentation.
V10	Capacity to discuss and debate from a legal perspective, understanding different points of view and articulating them in order to propose reasonable solutions.
V11	Ability to consider the wisdom of using alternative means in resolving conflicts and disputes.
V12	Sufficient knowledge of a foreign language to be able to work efficiently in the legal field (English, Portuguese and Spanish).
V13	Capacity to use necessary technology for information searches in the course of conducting, and keeping up to date in, a legal practice.
V14	Capacity to apply scientific research criteria in the course of professional activity.
V15	Capacity to apply knowledge with particular effectiveness in a given area of the legal profession.
V16	Capacity to confront new situations and contribute to the creation of legal solutions and institutions in general and particular cases.

Competence	Description
V17	Capacity for good written and oral expression, in fluent technical language, using precise, clear legal terms.
V18	Capacity to analyse a broad range of complex works concerned with Law and to summarise their arguments precisely.
V19	Capacity to take well-reasoned legal decisions.
V20	Capacity to understand the philosophical and theoretical fundamentals of Law, relating them to their practical application.
V21	Evident critical awareness in analysing the legal system.
V22	Capacity to take action legally and technically in different government or legal venues with the proper utilisation of processes, acts and procedures.
V23	Capacity to decide whether the circumstances in fact are sufficiently clear to be able to adopt a decision grounded in Law.
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.

Characteristics of the surveys

The survey on subject specific competences was conducted in 13 countries. A total of 2216 replies were received, of which 20.44% came from academics, 18.86% from employers, 38.40% from students and 22.29% from graduates. The results by participating country and survey group are shown in the table below.

Number of people surveyed by country and group

Country \ Group	Academics	Employers	Students	Graduates	Total
Argentina	48	37	61	55	201
Bolivia	15	20	20	15	70
Brazil	50	55	87	59	251
Chile	25	1	35	5	66
Colombia	36	55	47	58	196
Ecuador	30	24	170	40	264
El Salvador	29	23	30	30	112
Mexico	61	71	79	70	281
Nicaragua	30	30	30	30	120
Paraguay	70	47	66	73	256
Peru	28	36	165	35	264
Uruguay	17	14	31	16	78
Venezuela	14	5	30	8	57
Total	**453**	**418**	**851**	**494**	**2,216**

The surveys were conducted in the 13 countries during April and May 2006. The methodology described in the general documents of the project was adopted for the purpose.

At the meeting held in Brussels, in June 2006, with participation by representatives from 13 Latin American countries, the numerical results of the surveys were analysed and validated. This was the framework used to determine the level of achievement and importance attributed to the competences.

Comparison of IMPORTANCE of competences

Num	Competence	Graduates	Students	Employers	Academics
V09	Good capacity for legal reasoning and argumentation.	3.824	3.780	3.778	3.844
V24	Capacity to act faithfully, diligently and transparently…	3.858	3.756	3.823	3.806
V01	Knowledge of, and ability to interpret and apply the general …	3.769	3.666	3.815	3.799
V08	Awareness of the ethical dimension of the legal professions …	3.653	3.656	3.705	3.791
V19	Capacity to take well-reasoned legal decisions.	3.726	3.691	3.746	3.744
V17	Capacity for good written and oral expression, in …	3.685	3.688	3.695	3.736
V03	Commitment to justice and fairness in all situations in which …	3.661	3.614	3.616	3.726
V04	Commitment to human rights and to the social, democratic …	3.650	3.578	3.654	3.716
V10	Capacity to discuss and debate from a legal perspective, …	3.668	3.614	3.632	3.699
V02	Knowledge of, and ability to interpret and apply the legislation…	3.626	3.569	3.631	3.695
V21	Evident critical awareness in analysing the legal system …	3.577	3.514	3.570	3.645
V22	Capacity to take action legally and technically in different …	3.626	3.627	3.632	3.628
V07	Good understanding of political, social economic, personal …	3.522	3.537	3.432	3.587
V23	Capacity to decide whether the circumstances in fact are …	3.636	3.577	3.653	3.573
V13	Capacity to use necessary technology for information …	3.550	3.545	3.521	3.543
V20	Capacity to understand the philosophical and theoretical …	3.379	3.299	3.439	3.532
V16	Capacity to confront new situations and contribute to the …	3.482	3.483	3.481	3.530
V15	Capacity to apply knowledge with particular effectiveness …	3.607	3.525	3.617	3.507
V14	Capacity to apply scientific research criteria in the course …	3.416	3.318	3.435	3.500
V18	Capacity to analyse a broad range of complex works …	3.551	3.466	3.511	3.459
V11	Ability to consider the wisdom of using alternative means in …	3.545	3.389	3.432	3.457
V05	Capacity to exercise the profession as a member of a team…	3.493	3.387	3.486	3.418
V06	Capacity to work in interdisciplinary teams as a legal …	3.448	3.305	3.466	3.404
V12	Sufficient knowledge of a foreign language to be able to work …	3.383	3.336	3.387	3.381

Comparison of ACHIEVEMENT of competences

Num	Competence	Graduates	Students	Employers	Academics
V24	Capacity to act faithfully, diligently and transparently …	3.279	3.123	3.077	3.186
V01	Knowledge of, and ability to interpret and apply the …	3.094	3.097	3.063	3.071
V04	Commitment to human rights and to the social, democratic …	2.969	3.039	2.937	3.065
V22	Capacity to take action legally and technically in different …	2.853	2.787	2.888	2.942
V09	Good capacity for legal reasoning and argumentation.	3.064	3.076	2.945	2.937
V08	Awareness of the ethical dimension of the legal …	2.989	2.956	2.842	2.933
V03	Commitment to justice and fairness in all situations in …	2.992	2.929	2.872	2.885
V19	Capacity to take well-reasoned legal decisions.	3.037	2.931	2.868	2.881
V15	Capacity to apply knowledge with particular effectiveness …	2.856	2.805	2.835	2.877
V21	Evident critical awareness in analysing the legal system …	2.919	2.896	2.773	2.858
V23	Capacity to decide whether the circumstances in fact are …	2.907	2.916	2.863	2.857
V02	Knowledge of, and ability to interpret and apply the …	2.794	2.765	2.847	2.856
V10	Capacity to discuss and debate from a legal perspective…	2.883	2.870	2.763	2.793
V17	Capacity for good written and oral expression, in …	2.824	2.736	2.721	2.728
V20	Capacity to understand the philosophical and theoretical …	2.817	2.769	2.710	2.713
V13	Capacity to use necessary technology for information …	2.442	2.485	2.593	2.670
V07	Good understanding of political, social economic, personal …	2.675	2.805	2.637	2.670
V11	Ability to consider the wisdom of using alternative means …	2.707	2.693	2.637	2.668
V16	Capacity to confront new situations and contribute to the …	2.647	2.550	2.628	2.641
V18	Capacity to analyse a broad range of complex works …	2.757	2.695	2.661	2.606
V05	Capacity to exercise the profession as a member of a …	2.639	2.703	2.683	2.584
V14	Capacity to apply scientific research criteria in the course …	2.588	2.538	2.670	2.567
V06	Capacity to work in interdisciplinary teams as a legal …	2.453	2.439	2.487	2.487
V12	Sufficient knowledge of a foreign language to be able to …	1.914	1.974	2.215	2.209

Level of importance of specific competences, based on statistical analysis

The different groups surveyed show a high level of agreement as to the importance they ascribe to each of the competences.

Law- Academic

Importance of the competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V09	Good capacity for legal reasoning and argumentation.	3.772	3.916	**3.844**	0.033
V24	Capacity to act faithfully, diligently and transparently in defending …	3.722	3.890	**3.806**	0.038
V01	Knowledge of, and ability to interpret and apply the …	3.714	3.884	**3.799**	0.039
V08	Awareness of the ethical dimension of the legal professions …	3.716	3.865	**3.791**	0.034
V19	Capacity to take well-reasoned legal decisions.	3.664	3.824	**3.744**	0.037
V17	Capacity for good written and oral expression, in …	3.665	3.808	**3.736**	0.033
V03	Commitment to justice and fairness in all situations in which …	3.660	3.792	**3.726**	0.031
V04	Commitment to human rights and to the social, democratic …	3.615	3.818	**3.716**	0.046
V10	Capacity to discuss and debate from a legal perspective, …	3.620	3.777	**3.699**	0.036
V02	Knowledge of, and ability to interpret and apply the legislation …	3.600	3.790	**3.695**	0.044
V21	Evident critical awareness in analysing the legal system …	3.559	3.731	**3.645**	0.039
V22	Capacity to take action legally and technically in different …	3.553	3.704	**3.628**	0.035
V07	Good understanding of political, social economic, personal and, …	3.522	3.651	**3.587**	0.030
V23	Capacity to decide whether the circumstances in fact are …	3.467	3.679	**3.573**	0.049
V13	Capacity to use necessary technology for information searches …	3.459	3.627	**3.543**	0.039
V20	Capacity to understand the philosophical and theoretical …	3.452	3.613	**3.532**	0.037
V16	Capacity to confront new situations and contribute to the …	3.440	3.619	**3.530**	0.041
V15	Capacity to apply knowledge with particular effectiveness …	3.366	3.648	**3.507**	0.065
V14	Capacity to apply scientific research criteria in the course …	3.418	3.582	**3.500**	0.038
V18	Capacity to analyse a broad range of complex works …	3.318	3.601	**3.459**	0.065
V11	Ability to consider the wisdom of using alternative means in …	3.343	3.570	**3.457**	0.052
V05	Capacity to exercise the profession as a member of a team of …	3.320	3.515	**3.418**	0.045
V06	Capacity to work in interdisciplinary teams as a legal …	3.293	3.515	**3.404**	0.051
V12	Sufficient knowledge of a foreign language to be able to work ….	3.268	3.494	**3.381**	0.052

Law- Academics

Achievement of competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V24	Capacity to act faithfully, diligently and transparently in defending …	3.026	3.346	**3.186**	0.073
V01	Knowledge of, and ability to interpret and apply the …	2.971	3.171	**3.071**	0.046
V04	Commitment to human rights and to the social, democratic …	2.904	3.226	**3.065**	0.074
V22	Capacity to take action legally and technically in different …	2.766	3.118	**2.942**	0.081
V09	Good capacity for legal reasoning and argumentation.	2.763	3.112	**2.937**	0.080
V08	Awareness of the ethical dimension of the legal professions …	2.783	3.083	**2.933**	0.069
V03	Commitment to justice and fairness in all situations in which …	2.718	3.051	**2.885**	0.076
V19	Capacity to take well-reasoned legal decisions.	2.681	3.081	**2.881**	0.092
V15	Capacity to apply knowledge with particular effectiveness …	2.683	3.071	**2.877**	0.089
V21	Evident critical awareness in analysing the legal system …	2.691	3.025	**2.858**	0.077
V23	Capacity to decide whether the circumstances in fact are …	2.686	3.029	**2.857**	0.079
V02	Knowledge of, and ability to interpret and apply the legislation …	2.701	3.012	**2.856**	0.071
V10	Capacity to discuss and debate from a legal perspective, …	2.597	2.989	**2.793**	0.090
V17	Capacity for good written and oral expression, in …	2.546	2.911	**2.728**	0.084
V20	Capacity to understand the philosophical and theoretical …	2.525	2.900	**2.713**	0.086
V13	Capacity to use necessary technology for information searches …	2.464	2.877	**2.670**	0.095
V07	Good understanding of political, social economic, personal and, …	2.494	2.846	**2.670**	0.081
V11	Ability to consider the wisdom of using alternative means in …	2.473	2.862	**2.668**	0.089
V16	Capacity to confront new situations and contribute to the …	2.453	2.829	**2.641**	0.086
V18	Capacity to analyse a broad range of complex works …	2.428	2.785	**2.606**	0.082
V05	Capacity to exercise the profession as a member of a team of …	2.409	2.759	**2.584**	0.080
V14	Capacity to apply scientific research criteria in the course …	2.402	2.733	**2.567**	0.076
V06	Capacity to work in interdisciplinary teams as a legal …	2.275	2.698	**2.487**	0.097
V12	Sufficient knowledge of a foreign language to be able to work …	1.980	2.439	**2.209**	0.105

Law- Graduates

Importance of the competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V24	Capacity to act faithfully, diligently and transparently in defending …	3.787	3.929	**3.858**	0.033
V09	Good capacity for legal reasoning and argumentation.	3.729	3.918	**3.824**	0.043
V01	Knowledge of, and ability to interpret and apply the …	3.712	3.825	**3.769**	0.026
V19	Capacity to take well-reasoned legal decisions.	3.646	3.805	**3.726**	0.036
V17	Capacity for good written and oral expression, in …	3.604	3.767	**3.685**	0.038
V10	Capacity to discuss and debate from a legal perspective, …	3.582	3.753	**3.668**	0.039
V03	Commitment to justice and fairness in all situations in which …	3.552	3.770	**3.661**	0.050
V08	Awareness of the ethical dimension of the legal professions …	3.555	3.752	**3.653**	0.045
V04	Commitment to human rights and to the social, democratic …	3.556	3.744	**3.650**	0.043
V23	Capacity to decide whether the circumstances in fact are …	3.543	3.729	**3.636**	0.043
V02	Knowledge of, and ability to interpret and apply the legislation …	3.561	3.691	**3.626**	0.030
V22	Capacity to take action legally and technically in different …	3.563	3.688	**3.626**	0.029
V15	Capacity to apply knowledge with particular effectiveness …	3.528	3.685	**3.607**	0.036
V21	Evident critical awareness in analysing the legal system …	3.475	3.680	**3.577**	0.047
V18	Capacity to analyse a broad range of complex works …	3.435	3.666	**3.551**	0.053
V13	Capacity to use necessary technology for information searches …	3.467	3.634	**3.550**	0.038
V11	Ability to consider the wisdom of using alternative means in …	3.466	3.624	**3.545**	0.036
V07	Good understanding of political, social economic, personal and, …	3.452	3.592	**3.522**	0.032
V05	Capacity to exercise the profession as a member of a team of …	3.427	3.559	**3.493**	0.030
V16	Capacity to confront new situations and contribute to the …	3.346	3.618	**3.482**	0.062
V06	Capacity to work in interdisciplinary teams as a legal …	3.383	3.514	**3.448**	0.030
V14	Capacity to apply scientific research criteria in the course …	3.291	3.542	**3.416**	0.058
V12	Sufficient knowledge of a foreign language to be able to work …	3.245	3.522	**3.383**	0.064
V20	Capacity to understand the philosophical and theoretical …	3.269	3.489	**3.379**	0.050

Law- Graduates

Achievement of competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V24	Capacity to act faithfully, diligently and transparently in defending …	3.147	3.412	**3.279**	0.061
V01	Knowledge of, and ability to interpret and apply the …	2.984	3.205	**3.094**	0.051
V09	Good capacity for legal reasoning and argumentation.	2.899	3.229	**3.064**	0.076
V19	Capacity to take well-reasoned legal decisions.	2.877	3.197	**3.037**	0.073
V03	Commitment to justice and fairness in all situations in which …	2.841	3.143	**2.992**	0.069
V08	Awareness of the ethical dimension of the legal professions …	2.810	3.167	**2.989**	0.082
V04	Commitment to human rights and to the social, democratic …	2.801	3.136	**2.969**	0.077
V21	Evident critical awareness in analysing the legal system …	2.753	3.086	**2.919**	0.077
V23	Capacity to decide whether the circumstances in fact are …	2.733	3.081	**2.907**	0.080
V10	Capacity to discuss and debate from a legal perspective, …	2.712	3.055	**2.883**	0.079
V15	Capacity to apply knowledge with particular effectiveness …	2.678	3.035	**2.856**	0.082
V22	Capacity to take action legally and technically in different …	2.641	3.066	**2.853**	0.098
V17	Capacity for good written and oral expression, in …	2.664	2.984	**2.824**	0.073
V20	Capacity to understand the philosophical and theoretical …	2.661	2.972	**2.817**	0.071
V02	Knowledge of, and ability to interpret and apply the legislation …	2.638	2.950	**2.794**	0.072
V18	Capacity to analyse a broad range of complex works …	2.599	2.915	**2.757**	0.072
V11	Ability to consider the wisdom of using alternative means in …	2.471	2.944	**2.707**	0.109
V07	Good understanding of political, social economic, personal and, …	2.526	2.825	**2.675**	0.069
V16	Capacity to confront new situations and contribute to the …	2.423	2.871	**2.647**	0.103
V05	Capacity to exercise the profession as a member of a team of …	2.439	2.838	**2.639**	0.092
V14	Capacity to apply scientific research criteria in the course …	2.375	2.800	**2.588**	0.098
V06	Capacity to work in interdisciplinary teams as a legal …	2.240	2.666	**2.453**	0.098
V13	Capacity to use necessary technology for information searches …	2.182	2.702	**2.442**	0.119
V12	Sufficient knowledge of a foreign language to be able to work …	1.580	2.248	**1.914**	0.153

Law- Students

Importance of the competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V09	Good capacity for legal reasoning and argumentation.	3.664	3.896	**3.780**	0.053
V24	Capacity to act faithfully, diligently and transparently in defending …	3.653	3.858	**3.756**	0.047
V19	Capacity to take well-reasoned legal decisions.	3.567	3.814	**3.691**	0.057
V17	Capacity for good written and oral expression, in …	3.584	3.792	**3.688**	0.048
V01	Knowledge of, and ability to interpret and apply the …	3.528	3.803	**3.666**	0.063
V08	Awareness of the ethical dimension of the legal professions …	3.552	3.760	**3.656**	0.048
V22	Capacity to take action legally and technically in different …	3.520	3.734	**3.627**	0.049
V10	Capacity to discuss and debate from a legal perspective, …	3.524	3.705	**3.614**	0.041
V03	Commitment to justice and fairness in all situations in which …	3.497	3.730	**3.614**	0.054
V04	Commitment to human rights and to the social, democratic …	3.453	3.703	**3.578**	0.057
V23	Capacity to decide whether the circumstances in fact are …	3.473	3.680	**3.577**	0.048
V02	Knowledge of, and ability to interpret and apply the legislation …	3.481	3.656	**3.569**	0.040
V13	Capacity to use necessary technology for information searches …	3.421	3.668	**3.545**	0.057
V07	Good understanding of political, social economic, personal and, …	3.441	3.634	**3.537**	0.044
V15	Capacity to apply knowledge with particular effectiveness …	3.416	3.634	**3.525**	0.050
V21	Evident critical awareness in analysing the legal system …	3.398	3.630	**3.514**	0.053
V16	Capacity to confront new situations and contribute to the …	3.382	3.584	**3.483**	0.047
V18	Capacity to analyse a broad range of complex works …	3.373	3.559	**3.466**	0.043
V11	Ability to consider the wisdom of using alternative means in …	3.302	3.475	**3.389**	0.040
V05	Capacity to exercise the profession as a member of a team of …	3.289	3.486	**3.387**	0.045
V12	Sufficient knowledge of a foreign language to be able to work …	3.194	3.477	**3.336**	0.065
V14	Capacity to apply scientific research criteria in the course …	3.188	3.448	**3.318**	0.060
V06	Capacity to work in interdisciplinary teams as a legal …	3.217	3.394	**3.305**	0.041
V20	Capacity to understand the philosophical and theoretical …	3.181	3.418	**3.299**	0.054

Law- Students

Achievement of competences: averages and intervals (95%)

Var. no.%	Competence	Lower Lmt.	Upper Lmt.	Average	Standard Devtn.
V24	Capacity to act faithfully, diligently and transparently in defending …	2.998	3.248	**3.123**	0.057
V01	Knowledge of, and ability to interpret and apply the …	2.963	3.231	**3.097**	0.062
V09	Good capacity for legal reasoning and argumentation.	2.905	3.247	**3.076**	0.079
V04	Commitment to human rights and to the social, democratic …	2.884	3.195	**3.039**	0.071
V08	Awareness of the ethical dimension of the legal professions …	2.779	3.133	**2.956**	0.081
V19	Capacity to take well-reasoned legal decisions.	2.771	3.091	**2.931**	0.074
V03	Commitment to justice and fairness in all situations in which …	2.775	3.083	**2.929**	0.071
V23	Capacity to decide whether the circumstances in fact are …	2.786	3.046	**2.916**	0.060
V21	Evident critical awareness in analysing the legal system …	2.750	3.042	**2.896**	0.067
V10	Capacity to discuss and debate from a legal perspective, …	2.747	2.993	**2.870**	0.056
V15	Capacity to apply knowledge with particular effectiveness …	2.670	2.940	**2.805**	0.062
V07	Good understanding of political, social economic, personal and, …	2.655	2.955	**2.805**	0.069
V22	Capacity to take action legally and technically in different …	2.635	2.938	**2.787**	0.070
V20	Capacity to understand the philosophical and theoretical …	2.649	2.889	**2.769**	0.055
V02	Knowledge of, and ability to interpret and apply the legislation …	2.617	2.913	**2.765**	0.068
V17	Capacity for good written and oral expression, in …	2.539	2.932	**2.736**	0.090
V05	Capacity to exercise the profession as a member of a team of …	2.543	2.864	**2.703**	0.074
V18	Capacity to analyse a broad range of complex works …	2.495	2.895	**2.695**	0.092
V11	Ability to consider the wisdom of using alternative means in …	2.465	2.920	**2.693**	0.104
V16	Capacity to confront new situations and contribute to the …	2.338	2.762	**2.550**	0.097
V14	Capacity to apply scientific research criteria in the course …	2.341	2.735	**2.538**	0.090
V13	Capacity to use necessary technology for information searches …	2.285	2.685	**2.485**	0.092
V06	Capacity to work in interdisciplinary teams as a legal …	2.232	2.646	**2.439**	0.095
V12	Sufficient knowledge of a foreign language to be able to work …	1.669	2.280	**1.974**	0.140

The six most important competences among the four groups surveyed

V09	Good capacity for legal reasoning and argumentation.
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.
V01	Knowledge of, and ability to interpret and apply the general principles of Law and the legal system.
V08	Awareness of the ethical dimension of the legal profession and of the social responsibility of Law graduates, and acting accordingly.
V19	Capacity to take well-reasoned legal decisions.
V17	Capacity for good written and oral expression, in fluent technical language, using precise, clear legal terms.

The six least important competences for the four groups surveyed

V12	Sufficient knowledge of a foreign language to be able to work efficiently in the legal field (English, Portuguese and Spanish).
V06	Capacity to work in interdisciplinary teams as a legal expert, making an effective contribution to the teams' work.
V05	Capacity to exercise the profession as a member of a team of Lawyers.
V11	Ability to consider the wisdom of using alternative means in resolving conflicts and disputes.
V18	Capacity to analyse a broad range of complex works concerned with Law and to summarise their arguments precisely.
V14	Capacity to apply scientific research criteria in the course of professional activity.

The two most relevant competences by survey group

ACADEMICS

Comp.	Description
V09	Good capacity for legal reasoning and argumentation.
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.

GRADUATES

Comp.	Description
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.
V09	Good capacity for legal reasoning and argumentation.

STUDENTS

Comp.	Description
V09	Good capacity for legal reasoning and argumentation.
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.

EMPLOYERS

Comp.	Description
V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.
V01	Knowledge of, and ability to interpret and apply the general principles of Law and the legal system.

Level of achievement of the competences surveyed

The four groups agreed that the two subject specific competences with the highest level of achievement were:

V24	Capacity to act faithfully, diligently and transparently in defending the interests of persons represented.
V01	Knowledge of, and ability to interpret and apply the general principles of Law and the legal system.

Reflections on the results

In all the groups surveyed, none of the subject specific competences proposed was rated less than 3 for importance, on a scale of 1 to 4, showing that no competence is considered to be unimportant. There is little numerical difference between the competences considered most and least important. The greatest difference was seen in the employers' group. There was broad support for all the proposed competences in the four groups surveyed.

With regard to the level of achievement of the different competences, all four groups surveyed were critical of the process of professional education and indicated the need for a profound change in the teaching of Law in Latin America, to allow further development of the competences considered to be most important.

The high score given to the competences «Good capacity for legal reasoning and argumentation» and «Capacity to act faithfully, diligently and transparently in defending the interests of persons represented» may be interpreted as a warning sign for the traditional conception of Law teaching, characterised as it is by an excessive emphasis on retaining supposedly relevant legal information (legal regulations or doctrinal theories, *and so on*) and conceptualisation in general, to the detriment of the development of certain professional skills and the strengthening of ethical values. The first of these competences shows the importance given to the role of the Lawyer as a professional who helps solve legal problems, for which purpose a knowledge of relevant regulations or principles is not sufficient; the Lawyer also needs to be able to construct arguments based on the demands of the prevailing legal culture and social expectations. The second of the competences mentioned reveals the appreciation of the ethical conduct of Lawyers who are expected to inspire trust among their clients and society at large. Consequently, in addition to the great importance of conceptual knowledge, Law teaching must also help strengthen the skills and attitudes that are expected of the profession. In this regard, a competence-based education model could be a valid alternative that would help modernise the traditional way of teaching this discipline.

Independently of the importance shown in the surveys, a significant change can be seen in the consensus on the importance of encouraging social and democratic rule of Law and human rights, and on its lack of achievement. This is one of the most major changes as compared to the situation in the region 25 years ago and appears to be leading towards a vision of Law as a practice based on reasoning, founded basically on the two aforementioned concepts.

Suggested competences

The groups surveyed proposed new subject specific competences, but in isolated form, showing that there is no general consensus in this area; in other cases, the proposed competences were simply variations on the original ones.

Example of teaching/learning and assessment of a subject specific competence

Capacity to decide whether the circumstances in fact are sufficiently clear to be able to adopt a decision grounded in Law

Context of the Competence

In general, until now this competence has not been addressed in Law studies, but in professional practices and in legal clinics; nonetheless, if this is addressed speedily and appropriately it would be possible to promote the development of other competences, since these as a whole, could form the core of legal reasoning.

One interesting aspect of this competence is the fact that it is linked to others in other disciplines, which involve an individual's capacity to identify good factual premises for decision-making in different areas of his or her life or career.

In developing this competence, it is particularly useful to analyse real or fictional case studies, with legal implications, in order to relate it to skills in identifying and interpreting legal regulations. Methodologically, then, it is advisable to frame it within analysis of case studies, and the students can adopt the roles of the different people involved in a lawsuit (lawyers, witnesses, juries or judges).

Definition of the competence

It is the combination of the knowledge and skills required for pleading and/or justifying a certain version of the facts in question, which have been presented in a specific case, in such a way that the facts chosen constitute good grounds for making a judicial ruling, compensation and other charges or benefits, based on legal provisions.

Mastery of this competence is related to

— Capacity to take well-reasoned legal decisions.
— Good understanding of political, social, economic, personal and psychological —phenomena among others—, taking them into consideration in interpreting and applying the Law.
— Good capacity for legal reasoning and argumentation.

	Level of achievement	Indicator	Descriptors
First Level	Identifies the facts that have to be proved in order for the situation provided for in legislation to be applied to a particular case.	a) Applies rules of interpretation that allow a meaning to be attributed to the legal regulations in a way that may be accepted by the community of judges and Lawyers.	1. Has difficulty understanding the meaning of relatively simple legal regulations. 2. Interprets the legal regulations quite superficially. 3. Is capable of attributing a meaning to the legal regulations which would be found reasonable by a non-specialist audience. 4. Interprets the legal regulations by correctly applying rules of interpretation accepted by the legal community, but has some difficulty justifying his/her points of view 5. Interprets the legal regulations by correctly applying rules of interpretation accepted by the legal community and sufficiently justifies his/her points of view.
		b) Recognises the relevant facts that would need to be proved in a specific case in order for the solution established in an already interpreted piece of legislation to be applicable.	1. Has serious difficulty determining the facts that need to be proved in order for the legal regulation interpreted to be applicable. 2. Can recognise some relevant facts that need to be proved, but there are others which he/she omits; or else he/she indicates some which are irrelevant. 3. Identifies the relevant facts to be proved, but is not capable of contextualizing them sufficiently in the specific situation. 4. Identifies relevant facts to be proved based on the specifications of the legislation and relates them with some precision to the specific case. 5. Identifies relevant facts to be proved based on the specifications of the legislation and relates them with a high degree of precision to the specific case.

	Level of achievement	Indicator	Descriptors
Second Level	Masters the epistemological and legal rules that are relevant for a fact to be deemed to have been proved.	a) Masters the epistemological rules that are relevant for a fact to be deemed to have been proved.	1. Has difficulty in establishing connections between the available information and the statement to be proved. 2. Establishes plausible connections between the available information and the statement to be proved, but does so purely intuitively without any possibility of justifying them. 3. Establishes plausible connections between the available information and the statement to be proved, but has difficulties in justifying them. 4. Establishes appropriate connections between the available information and the statement to be proved, and justifies them albeit with some weak points. 5. Establishes very good connections between the available information and the statement to be proved, and justifies them using appropriate forms of argument from a scientific point of view.
		b) Masters the legal rules that are relevant for a fact to be deemed to have been proved.	1. Ignores the legal rules governing admissibility and means of evaluating evidence in a trial. 2. Knows how to locate the rules governing the admissibility and means of evaluating the evidence in a trial, but does not understand them properly. 3. Understands in abstract terms the rules governing the admissibility and means of evaluating the evidence in a trial, but is not capable of identifying precisely their implications for a specific case. 4. Properly understands the rules governing the admissibility and means of evaluating the evidence in a trial, but has some difficulty applying them in a specific case. 5. Properly understands the rules governing the admissibility and means of evaluating the evidence in a trial, and is capable of applying them accurately in a specific case.

	Level of achievement	Indicator	Descriptors
Third Level	Establishes suitable strategies for producing relevant evidence in a specific case and is capable of arranging all the available evidence in a trial into a plausible account which might serve as the basis for a favourable judicial ruling.	a) Establishes suitable strategies for producing relevant evidence in a specific case.	1. Is unable to design strategies for obtaining relevant evidence in a specific case. 2. Designs strategies for producing relevant evidence, but they prove to be very unrealistic given the characteristics of the case. 3. Designs strategies for producing evidence, but they contain some moderately important weaknesses for demonstrating the relevant facts of the case. 4. Designs strategies for producing evidence, but they contain some weaknesses for demonstrating the relevant facts of the case. 5. Designs strategies for producing evidence and these prove to be highly efficient for demonstrating the relevant facts of the case.
		b) Is capable of arranging all the available evidence in a trial into a plausible account which might serve as the basis for a favourable judicial ruling.	1. The accounts constructed contain inconsistencies, either in relation to the case in question or with the rule it is hoped to have applied. 2. The accounts are constructed quite reasonably, but they do not connect sufficiently with the available evidence. 3. The accounts are constructed quite reasonably, although they contain some weaknesses in their association with the available evidence. 4. The accounts are well constructed, although they do not make sufficient use of all the potential of the available evidence, and could therefore be refuted by the opposing party. 5. The accounts are very well constructed and make full use of the potential of the available evidence, offering little room for refutation and, therefore, are very likely to serve as the grounds for a favourable judicial decision.

Conclusions

The phenomenon of globalisation which has made local law more complex; the growing recovery of fundamental rights, characterised by a more diffuse formulation than that of other legal regulations; and the large numbers exercising the profession have tended to highlight the crisis in the current model of legal education, characterised as noted above by the excessive value given to memorizing and to the basic analysis of legal regulations.

Oddly enough, this view, which seem to be widely held, has little empirical back-up and is based more on the intuitions of academics and students, who see themselves as being forced to replicate a model that does not appear to have integrated the profound social, economic and technological changes of recent decades. Against this backdrop, the Tuning Latin America project's results in the area of Law of are of particular interest, in that they are the result of an initial proposal for competences viewed as relevant by representatives of universities from different countries, and their subsequent validation by different relevant social groups, including academics, graduates, employers and students from the field.

In the light of the survey results, we can see that value is placed not only on purely conceptual competences, but also the capacity to carry out different professional tasks and a capacity for ethical behaviour.

There has already been some discussion about the possibility of adopting a competence-based system of higher education to replace the existing content based one. This discussion has generally been abstract and conceptual in nature, and has not identified the forms of teaching-learning or assessment required to implement such a model. In this situation, and given that there is an evident need for changes in the teaching of Law, the Tuning Latin America project has provided the opportunity to begin a process of transformation, giving us both knowledge and use of valuable information and practical experience into ways of reformulating competence-based teaching and learning processes.

It still remains for us to convey the achievements reached to date in the Tuning Latin America project to the rest of our academic communities. Now that this first phase of the project is complete, for the rest of 2007 it is planned to continue with dissemination and debate on the project within the participating universities and countries.

One basic challenge will be to create a space for critical reflection in the Law schools who are committed to teaching of the discipline, in order to achieve greater consensus on:

a) the necessary renovation of the system for teaching Law (for example, educational innovations, curriculum analyses, etc.);
b) the use of a system for teaching and learning Law based on the competences required by future professionals and by employers and
c) training for all those involved in the process.

For these purposes, it is recommended that a possible next phase of Tuning Latin America should include the following activities:

a) assessment of the advances achieved by each of the participants, in their respective faculties and/or countries;
b) analysis of a credit system or other mechanism of compatibility or evaluation of work;
c) training in competence-based teaching, learning and assessment processes, with examples of good practice and support for innovative experiences in this area;
d) exchange of information on the advances made by each of the participants in these processes, between Latin American and European countries;
e) consideration of the systems of self-assessment and accreditation in Law degrees.

4.4. EDUCATION

This report contains a map of the area of education in Latin America and the results of the survey on generic and subject specific competences for educating educators. It also gives examples of ways of assessing the achievement of some of the competences.

The group for the education area, which began working together through the Tuning Latin America project in 2005, is made up of representatives from Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Mexico, Nicaragua, Paraguay, Peru and Venezuela.

Map of the area of Education in Latin America

This map describes the name of the degree and the curriculum structures in Latin America. It was drawn up using information from the fourteen countries in the education area of the Tuning Latin America project.

Name of the Degrees

There is a great diversity of names of degrees in the subject area of education in Latin America. Over time, there has been demand for new courses in addition to the traditional offering in teacher-training, in order to meet the needs of specific groups (young people, mature students, younger children) as well as to cover areas of emerging interest (diversity, intercultural studies, gender studies). The result has been a growing diversification in the educational offering.

Despite this diversification and fragmentation, it is possible to identify certain shared criteria:

1. **By levels of school system.** A group of degrees has been identified that target teacher training, focusing on the development of professional competences to attend to specific levels of the school systems in the various countries. There are specific degrees geared towards initial and primary education, and others oriented towards secondary education. The former tend to have a broad curriculum while the latter generally include disciplinary specialisation by area of knowledge.
2. **In catering to groups with special educational needs.** We have identified degrees that train teachers to meet the educational needs of special segments of the population, such as adults, vulnerable groups and others.
3. **By academic degree.** Another group of degrees offers an academic degree as well as a professional one. This is the case of first degrees in education, pedagogy or education sciences, which cover a wide range of specialities, such as educational administration, planning and assessment, educational research, preparation of materials, educational guidance and curriculum. The first degree in Latin America is 4 to 5 years long. The total time varies between 2700 to 3400 hours. In some cases, there are also «degree cycles» [*ciclos de licenciaturas*], created precisely to allow graduates from non-university institutions to obtain a first degree so that they can then pursue graduate studies in specialist courses, master's degrees and doctorates.
4. **By system.** The systems in which degree courses are offered are: contact, semi-contact and virtual. In some cases, students can choose a bimodal or even multi-modal system.

Structure of the curriculum

In terms of structure, the curriculum for education degrees in Latin America is characterised by:

- Diversity of plans and programmes for training educators, in terms of: hours, emphasis, content and names of the disciplines. This diversity can be found not only between different countries, but also within each country and even within a university. On some occasions, the curriculum of different teacher-training institutions is not uniform within the same country.
- Most Latin American countries have a three-pronged curriculum: one area consists of disciplines related to the basics of education, such as education psychology, education philosophy, education sociology, education anthropology and education policy. Another comprises the dis-

ciplines in the pedagogic and disciplinary field, such as didactics, curriculum, pedagogic theories, pedagogic management and coordination, as well as specific disciplines. The third axis consists of supervised practice, which is included into the curriculum with a specific workload earmarked for work experience. It is known by a variety of names (*práctica profesional*, *pasantía*, *estadía* and *estagio*).

— In some countries, teacher-training includes a series of disciplines oriented towards action in social, cultural and multicultural movements. There is also a move to train educators in research for action, through a range of pedagogic approaches. These concentrate on identifying problems and bringing critical analysis to bear on professional practice, rather than limiting themselves to different perspectives of research.

Results of the survey on generic and subject specific competences

The survey was conducted between April and October 2005 in several countries in Latin America. A total of 5,496 people linked to the field of education responded, distributed as follows:

Groups surveyed	Generic competences	Specific competences
Academics	418	876
Graduates	1,471	664
Students	1,755	Not surveyed
Employers	312	Not surveyed
Total	**3,956**	**1,540**

Students and employers were not included in the survey on subject specific competences, because of the close statistical consistency observed between the responses from graduates and students, and between academics and employers. Moreover, in the education sector, academics and employers are in many cases one and the same people.

Generic competences

After a process of debate and consultation at meetings of the countries participating in Tuning Latin America, twenty-seven generic competences were decided upon. The following is the final list:

v01	Capacity for abstraction, analysis, and synthesis.	**v15**	Ability to identify, pose, and solve problems.
v02	Ability to apply knowledge in practice.	**v16**	Ability to make decisions.
v03	Ability to organise and plan time.	**v17**	Capacity for teamwork.
v04	Knowledge regarding the area of study and related professions.	**v18**	Interpersonal skills.
v05	Social responsibility and commitment to citizenship.	**v19**	Ability to motivate and work towards common goals.
v06	Capacity for oral and written communication.	**v20**	Commitment to look after the environment.
v07	Ability to communicate in a second language.	**v21**	Commitment to the socio-cultural environment.
v08	Ability to use information and communication technology.	**v22**	Value and respect for diversity and multiculturality.
v09	Capacity for investigation.	**v23**	Ability to work in international contexts.
v10	Ability to learn and update learning.	**v24**	Ability to work autonomously.
v11	Ability to search for, process, and analyse information.	**v25**	Ability to formulate and manage projects.
v12	Critical and self-critical abilities.	**v26**	Ethical commitment.
v13	Ability to react to new situations.	**v27**	Commitment to quality.
v14	Creative skills.		

Importance of the generic competences

The four groups surveyed considered all of the competences to be very important. On a scale of 1 to 4, no competence obtained an average score of less than 3 points.

Amongst the four groups, the competences considered to be most important were v04 (knowledge regarding the area of study and related professions), v06 (capacity for oral and written communication), v02 (capacity to apply knowledge in practical situations), v10 (ability to learn and update learning) and v26 (ethical commitment.). The competences considered least important by all four groups, were v07 (ability to communicate in a second language), v20 (commitment to the environment) and v23 (ability to work in international contexts).

The most important competences particularly involve abilities related to *professional performance* and ethical commitment, which might be viewed in a political and social sense or within the field of professional ethics. With regard to the competences considered least important (albeit with high scores), it is interesting to note that in an international context of globalisation, the groups surveyed did not give greater importance to competences that might be associated with involvement in a more interconnected world. It is also interesting that they did not prioritise second-language learning, despite the fact that Latin America is a region characterised by multiculturalism and the existence of different languages within each country, nor did they place as much importance on new technologies and teamwork. Also interesting is the relatively low importance ascribed to a commitment to the environment, a vital element for the development and survival of all countries.

In general, students and graduates rated the achievement of the competences in the education process higher than employers and academics did.

Achievement of the generic competences

According to the four groups surveyed, the competences with the highest level of achievement are v04 (knowledge of the area of study and the profession), v17 (capacity for teamwork) and v26 (ethical commitment). Among the competences that scored lowest on achievement, was v07 (ability to communicate in a second language), v23 (ability to work in international contexts), v20 (commitment to the environment), v08 (skill in the use of technologies) and v25 (ability to formulate and manage projects).

The competences that scored highest on achievement were generally the professionally-focused ones. In this field, the message is good for the universities, which are seen to be educating teachers to master the area of study and encourage their capacity for teamwork and ethical conduct. The competences with the lowest level of achievement were predominantly those of a social nature, such as international projection and technical qualification within the profession. It may be concluded that more attention needs to be paid to developing university outreach, which is precisely where these competences could be used with the education plans.

The analysis suggests the need to review current teacher training plans and programmes and, in general, the different study plans on offer in Education, and to go on to evaluate the opportunities or conditions that would enable these competences to be developed. The group of specialists recognised the need to build a system of international mobility, use technological resources for the exchange of information and encourage the capacity to communicate in a second language.

Importance and achievement of generic competences

There is a high degree of correlation in both importance and achievement among the four groups, indicating that to a great extent they share a common view of the competences that reflect desirable learning goals. However, the average figures for «achievement» (between 3.261 and 1.902) are lower than those for «importance» (between 3.85 and 3.03), suggesting that in general the generic competences are seen as important, but have a lower degree of achievement.

This suggests that policies and management of university education systems at state, institutional and classroom level need to take actions to enable the generic competences to be better achieved.

Questions for reflection

The following questions for debate in the education area arise out of this analysis:

- What are the characteristics of an educator's teaching performance in Latin America and how do these relate to the generic competences?
- In what way do existing curricula cover the different competences and what changes are required for them to be properly implemented?
- In what way does the curriculum develop more synergic and relevant relationships between the different types of competences and educational theories?
- How can a competence-based curriculum be built, implemented and assessed?
- How can competences be included in the teacher training curriculum that will allow the inter-culturality of the national and Latin American context to be included?
- How can the development of the competences be implemented in educational practice?
- How can elements of a theoretical and practical nature from the different Latin American educational models be reflected in the generic competences?
- What institutional support is required for a change in the approach of the curriculum?
- What decisions need to be taken to ensure the sustainability of curriculum change towards a competence-based approach?

Subject Specific Competences

The survey on subject specific competences was conducted in fourteen countries. A total of 1540 academics (876) and graduates (664) responded.

The questionnaire did not discriminate between results by country or institution. The information received from the different countries and 1540 people surveyed was taken as applying to the entire population of the Latin American region.

Shown below is the final list of subject specific competences which arose out of the debate and survey process carried out in the Tuning Latin America meetings in the various participating countries:

v01	Understanding of the theory and methodology of the curriculum, for orientation of educational action (design, carrying out, and evaluation).	**v15**	Providing education in values, citizenship, and democracy.
v02	Understanding of knowledge of the disciplines of the area of specialist knowledge.	**v16**	Researching education, and applying the results in a systematic transformation of education practice.
v03	Designing and operationalising teaching and learning strategies in appropriate contexts.	**v17**	Coming up with innovations in different areas of education systems.
v04	Projecting and developing education which is interdisciplinary in nature.	**v18**	Knowledge of education theory, and critical use of it in different contexts.
v05	Knowledge and application of the theories which form a basis for general and specific teaching.	**v19**	Reflecting on personal practice so as to improve provision of education.
v06	Identifying and managing support for specific educational needs in different contexts.	**v20**	Orientation and facilitation of processes of change in the community through education.
v07	Designing and implementing varied strategies and learning evaluation processes on a basis of specific criteria.	**v21**	Critical analysis of educational policy.
v08	Designing, managing, implementing, and evaluating educational programmes and projects.	**v22**	Generating and implementing educational strategies that respond to socio-cultural diversity.
v09	Choosing, producing, and using appropriate teaching materials for the context.	**v23**	Assuming and responsibly managing personal and professional development in a permanent manner.
v10	Creating and evaluating challenging and favourable environments for learning.	**v24**	Recognising historical processes of education in the country and Latin America.
v11	Developing logical, critical, and creative thought among students.	**v25**	Recognising and using theories from other sciences which form a basis for education: linguistics, philosophy, sociology, psychology, anthropology, politics, and history.
v12	Achieving learning outcomes at different levels.	**v26**	Interacting socially and educationally with different community members so as to encourage processes of development.
v13	Designing and implementing education which integrates people with special needs.	**v27**	Producing educational materials in accordance with different contexts so as to encourage teaching and learning processes.
v14	Choosing, using, and evaluating information and communications technologies as resources for teaching and learning.		

Importance and achievement of the subject specific competences for academics

The following are the results obtained from the survey amongst academics as to the importance and achievement attained in the 27 subject specific competences:

	Specific competence	Average
Most important subject specific competences	v02. Understanding of knowledge of the disciplines of the area of specialist knowledge.	3.797
	v11. Developing logical, critical, and creative thought among students.	3.770
	v19. Reflecting on personal practice so as to improve provision of education.	3.767
	v01. Understanding of the theory and methodology of the curriculum, for orientation of educational action.	3.699
	v03. Designing and operationalising teaching and learning strategies in appropriate contexts.	3.638
	v10. Creating and evaluating challenging and favourable environments for learning.	3.614

	Specific competence	Average
Least important subject specific competences	v26. Interacting socially and educationally with different community members so as to encourage processes of development.	3.437
	v08. Designing, managing, implementing, and evaluating educational programmes and projects.	3.427
	v24. Recognising historical processes of education in the country and Latin America.	3.366
	v25. Recognising and using theories from other sciences which form a basis for education.	3.327
	v06. Identifying and managing support for specific educational needs.	3.316
	v13. Designing and implementing education which integrates people with special educational needs.	3.216

	Competence	Average
Specific competences with the highest level of achievement	v02. Understanding of knowledge of the disciplines of the area of specialist knowledge.	3.205
	v01. Understanding of the theory and methodology of the curriculum, for orientation of educational action.	2.956
	v09. Choosing, producing, and using appropriate teaching materials for the context.	2.920
	v12. Achieving learning outcomes at different levels.	2.892
	v23. Assuming and responsibly managing personal and professional development in a permanent manner.	2.890
	v03. Designing and operationalising teaching and learning strategies in appropriate contexts.	2.887

	Competence	Average
Specific competences with the lowest level of achievement	v20. Orientation and facilitation of processes of change in the community through education.	2.619
	v24. Recognising historical processes of education in the country and Latin America.	2.578
	v04. Projecting and developing education which is interdisciplinary in nature.	2.577
	v17. Coming up with innovations in different areas of education systems.	2.563
	v06. Identifying and managing support for specific educational needs.	2.527
	v13. Designing and implementing education which integrates people with special educational needs.	2.244

Importance assigned to the subject specific competences by the group of academics

In terms of the «importance» of the subject specific competences, the score given by the academics lies within a range of between 3.797 and 3.216. On a possible score of between 1 and 4, this means all competences were considered to be very important.

The most important subject specific competences relate to skills required for professional and discipline work, which can be applied in the class or institution; those marked as being least important relate to social or community outreach and historical and cultural aspects. Greater importance is given to aspects related to professional training of the discipline and to educational aspects than to competences associated with social and cultural outreach of the teaching profession.

«Achievement» of the subject specific competences, according to the group of academics

In terms of «achievement», the academics scored the subject specific competences in a range between 3.205 and 2.244. On a possible scale of 1 to 4, this means that all competences are rated between medium and high.

Subject specific competences with the greatest level of achievement at university level are those required for professional and discipline work, whereas those with the lowest degree of achievement are those related to social or community outreach.

«Importance» and «achievement» of the subject specific competences, according to the academics group

The academics scored the «importance» of the subject specific competences between 3.797 and 3.216 and their «achievement» between 3.205 and 2.244, indicating that the competences are important, but there are problems in achieving them at university level.

Competences v02 (understanding of knowledge of the disciplines of the area of specialist knowledge) and v03 (designing and operationalising teaching and learning strategies in appropriate contexts), receive the highest score, both in terms of importance and achievement, whereas competences v06 (identifying and managing support for specific educational needs), v13 (designing and implementing education which integrates people with special educational needs) and v24 (recognising historical processes of education in the country and Latin America) are given the lowest scores in terms of both importance and achievement.

In both criteria, the subject specific competences with the highest scores are those related to professional preparation, centring on the discipline and the education area, rather than those related to the social and cultural sphere, particularly in terms of the educational attention given to groups with special educational needs and to a historical understanding of education. This suggests weaknesses in the curriculum structures of teacher training programmes, in terms of the historical and social projection of the profession.

Graduates' view of the importance and achievement of subject specific competences

The following are the results obtained from the survey amongst graduates as to the importance and achievement attained in the 27 subject specific competences:

	Competence	Average
Most important subject specific competences	v23. Assuming and responsibly managing personal and professional development in a permanent manner.	3.663
	v11. Developing logical, critical, and creative thought among students.	3.644
	v02. Understanding of knowledge of the disciplines of the area of specialist knowledge.	3.624
	v19. Reflecting on personal practice so as to improve provision of education.	3.607
	v15. Providing education in values, citizenship, and democracy.	3.589
	v09. Choosing, producing, and using appropriate teaching materials for the context.	3.548

	Competence	Average
Least important subject specific competences	v08. Designing, managing, implementing, and evaluating educational programmes and projects.	3.373
	v20. Orientation and facilitation of processes of change in the community through education.	3.364
	v26. Interacting socially and educationally with different community members so as to encourage processes of development.	3.359
	v25. Recognising and using theories from other sciences which form a basis for education.	3.332
	v24. Recognising historical processes of education in the country and Latin America.	3.307
	v13. Designing and implementing education which integrates people with special educational needs.	3.157

	Competence	Average
Most achieved subject specific competences	v02. Understanding of knowledge of the disciplines of the area of specialist knowledge.	3.180
	v11. Developing logical, critical, and creative thought among students.	3.113
	v23. Assuming and responsibly managing personal and professional development in a permanent manner.	3.098
	v05. Knowledge and application of the theories which form a basis for general and specific teaching.	3.063
	v15. Providing education in values, citizenship, and democracy.	3.053
	v19. Reflecting on personal practice so as to improve provision of education.	3.042

	Competence	Average
Least achieved subject specific competences	v24. Recognising historical processes of education in the country and Latin America.	2.766
	v06. Identifying and managing support for specific educational needs.	2.737
	v20. Orientation and facilitation of processes of change in the community through education.	2.733
	v26. Interacting socially and educationally with different community members so as to encourage processes of development.	2.704
	v14. Choosing, using, and evaluating information and communications technologies as resources for teaching and learning.	2.665
	v13. Designing and implementing education which integrates people with special educational needs.	2.400

Importance assigned to the subject specific competences in the graduates' group

In the field of «importance», the graduates scored the subject specific competences in a range between 3.663 and 3.157. On a possible scale of between 1 and 4, this means that all competences were rated highly.

The most important competences relate to skills required in aspects of personal, intellectual, evaluative, professional, disciplinary and educational development, and the least important relate to different aspects of the social and historical-cultural projection of the profession. Greater importance can be seen to be given to the aspects of personal and professional development than to social and cultural projection of the teaching profession.

Achievement of the subject specific competences, according to the graduates' group

In the field of «achievement», the graduates scored the subject specific competences in a range between 3.180 and 2.400. On a scale of 1 to 4, this means that all competences rated between medium and high.

The competences with the greatest level of achievement at university level are those related to skills required in aspects of personal, intellectual, evaluative, professional, disciplinary and educational development. The least important were related to different aspects of the social, historical and cultural projection of the profession. Likewise, capacities related to the use of technologies in education were not considered to be sufficiently well developed in the university area. Competences related to personal and professional development scored highest on achievement, as opposed to those related to social and cultural projection and the use of technologies.

Importance and achievement of subject specific competences, according to the graduates

On «importance», graduates scored the competences in a range of between 3.663 and 3.157, whereas for «achievement» the rating was between 3.180 and 2.400. It can be seen that the competences are considered very important, but there are fewer actions for developing or achieving them at the level of university education.

Competences v23 (assuming and responsibly managing personal and professional development in a permanent manner), v11 (developing logical, critical, and creative thought among students), v02 (understanding of knowledge of the disciplines of the area of specialist knowledge), v19 (reflecting on personal practice so as to improve provision of education) and v15 (providing education in values, citizenship, and democracy) scored highest in terms of both importance and achievement, whereas competences v20 (orientation and facilitation of processes of change in the community through education), v26 (interacting socially and educationally with different community members so as to encourage processes of development) and v13 (designing and implementing education which integrates people with special educational needs) scored lowest in both importance and achievement.

Those surveyed gave a higher score in the two criteria to competences related to personal, intellectual, evaluative, professional and disciplinary development, and less to different aspects of the profession's social and community outreach. Professional education can be seen to be more committed to competences associated with personal and professional education than with social and community-related competences. This may indicate weaknesses in the curriculum structures of teacher training programmes, in areas of social and community outreach.

Comparison of the importance given to subject specific competences by academics and graduates

Generally speaking, academics rate the importance of subject specific competences higher than graduates, (between 3.797 and 3.216 and 3.663 and 3.157, respectively). Nevertheless, there was a correlation of 0.885 between the average scores of academics and graduates, indicating that they coincide to a great extent on the respective importance of the different competences.

For example, competences v02 (understanding of knowledge of the disciplines of the area of specialist knowledge), v11 (developing logical, critical, and creative thought among students) and v19 (reflecting on personal practice so as to improve provision of education) were rated highly by both academics and graduates, and competences v26 (interacting socially and educationally with different community members so as to encourage processes of development), v08 (designing, managing, implementing, and evaluating educational programmes and projects), V24 (recognising historical processes of education in the country and Latin America), v25 (recognising and using theories from other sciences which form a basis for education) and v13 (designing and implementing education which integrates people with special educational needs) were given the lowest scores by both academics and graduates.

Both academics and graduates placed greater importance on competences related to professional training —centring on intellectual personal and disciplinary development— than to competences related to social/community and historical/cultural aspects.

Comparison of perceived levels of achievement among academics and graduates

Academics scored the achievement of the competences slightly higher than the graduates, (between 3.205 and 2.244 or 3.180 to 2.400 respectively) except in the case of competence v02, where the score is similar for the two groups.

The graduates therefore appear to be broadly more satisfied than the academics with the level of achievement of the subject specific competences in the curriculum programmes, except in some competences where the scores are similar.

In terms of achievement, competences v02 (understanding of knowledge of the disciplines of the area of specialist knowledge) and v23 (assuming and responsibly managing personal and professional development in a permanent manner) scored highest among academics and graduates; whereas the competences given the lowest achievement scores by academics and graduates alike were v20 (orientation and facilitation of processes of change in the community through education), v24 (recognising historical processes of education in the country and Latin America), v06 (identifying and managing support for specific educational needs) and v13 (designing and implementing education which integrates people with special educational needs) score highly on achievement.

The correlation between the average scores of academics and graduates was 0.894, indicating that academics and graduates coincide to a great extent on the respective achievement of the different competences.

Academics and graduates both tend to rate the achievement of competences linked to professional preparation higher than that of competences related to historical/cultural and social/community aspects, especially with regard to educational attention to people with special educational needs.

Questions for reflection

Based on the analysis of the results of the questionnaire on subject specific competences, the education area group of Tuning Latin America submitted a series of questions, to help guide educational, pedagogic and curricular reflection:

- What political, organisational, curricular and pedagogic efforts need to be made to ensure «achievement» of the subject specific competences in the teacher training programmes?
- How can the level of importance and achievement of subject specific competences of a social and cultural nature be raised, to foster respect and support for differences, in teacher training programmes?
- How can the importance and achievement of subject specific competences related to critical knowledge of the history of education be promoted in teacher training programmes?
- How should the particular results of learning throughout the education programmes be related to the subject specific competences?
- How should a permanent dialogue be created between academics, graduates, students and employers, as to the importance and achievement of the subject specific competences?
- How can the generic competences be articulated with the specific ones?

Conclusions and projections

A competence based approach is of particular relevance at this moment in time, when education is taking on an increasing importance in the public agenda of Latin American countries. The public demands greater fairness and quality in education and to meet this demand, we need to define more precisely the professional teaching skills in the classroom, in management of the school establishments, and in the relationship between the school and the community, as a more diverse and more complex society requires. A competence based approach helps advance the definition of skills and requires an articulated effort between the theory on which the action is based and the procedures and values that support it.

Teacher-training universities are faced with the challenge of going from a curriculum based on academic tradition to one based on the needs of society, and to move from an approach that centres on teaching to one that centres on learning. This requires taking into account not only the views of academics, but also those of employers, graduates and students.

The surveys of different social and educational agents show that they give greater importance to subject specific competences related to professional areas (discipline and education), than to the profession's social and community outreach. The challenge is to review curriculum policies in order to meet the social and cultural diversity of Latin America, including groups with special needs and ethnic minorities. These results are consistent with those obtained in the survey on generic competences, which also give a lower score for social and community-related competences.

The surveys also show that the importance given to the competences is not reflected in their level of achievement. It is therefore necessary at later stages of the project to place greater stress on the implementation of a competence-based approach. This will require suitable conditions that make implementation of this approach viable: processes of awareness-raising, political decisions at public and institutional level, curriculum management, training and accompaniment of academics, monitoring and assessment.

We recommend that the next step should be to focus on the best ways of implementing a competence-based approach. This will mean identifying examples of implementation in universities from countries participating in the Tuning Latin America project and disseminating them, as references for guiding initiatives in the area of curriculum reform. Conditions will also have to be created in the public policies of each country to make such initiatives viable.

4.5. NURSING

Introduction

The history of nursing in Latin America clearly reflects the region's cultural diversity. The profession has managed to respond to the socio-political and economic changes that have taken place in the different countries, reorienting and adapting itself accordingly. Forward-looking innovations have been undertaken as a result of these changes, allowing the profession to remain abreast of the times, while retaining respect and acknowledged leadership.

We believe that nursing is a professional discipline which forms part of a set of living forces in society, defending life and the planet, and its higher purpose is to promote human wellbeing, by managing care from holistic, ethical and interpersonal perspectives. This involves choosing the right actions to be taken, which should answer the particular needs of individuals and groups. Care management involves the ongoing creation of a particular language and taking an active role in social and health organisations. It also involves an act of communication that requires scientific and technological knowledge and an understanding of the cultural context in which the individuals being cared for live, spend their leisure time and fall sick. (Latin American Association of Nursing Schools and Faculties - *Asociación Latinoamericana de Escuelas de Enfermería y Facultades de Enfermería*, ALADEFE, 2003)

In Latin America, nursing is structured into different levels of education, with degrees varying from country to country. There is a clear predominance of women in the profession.

University education of nurses in Latin America began in the 1900s, but degrees in nursing only emerged in the 1960s. The length of the degree varies between 4 and 5 years in Latin America. According to the WHO, 52% of the programmes are in universities and 47% in other institutions, such as the Ministry of Education (21%), Ministry of Health (19%) and others (7%). (Castrillón, C. 2006)

Non-university programmes, corresponding to the level of healthcare assistant and/or technician, grew in the 1990s, probably as a result of the first processes of reform and the lack of regulation. They normally have a duration of 6 to 18 months. This trend was reversed in 2004 with an increase in university programmes, a move which may have been related to the beginning of accreditation processes.

Graduate study programmes began in the 1980s, with specialisations in different areas. The graduate study programmes in this discipline were developed as the master's degrees and have been running for over 20 years and are offered in schools and faculties with greater levels of research. Graduate studies are associated to the Ministries of Education and Health, and in some countries also to the Councils or Ministries of Science and Technology.

Programmes at doctoral level, began earliest in Brazil and then in Argentina, Venezuela, Chile, Colombia, Peru and Mexico. There have been various stages in the development of research. The trend is currently to investigate the dimension of care, from the perspective of care recipients.

There is a shortage of nurses in various Latin American countries as a result of migratory and economic trends, among other factors.

There are frameworks regulating professional work in the area with specific legislation. Although there has been major progress in the legislation governing the profession, it is acknowledged that mechanisms of supervision —for which the state is responsible — are lacking.

In various countries in the region, nurses study and develop national and regional policies and plans, investigate and adapt professional education, supervise the quality of services, promote new legislation and regulatory frameworks and participate in public health decisions. (Malvarez, S. 2006). Subject specific competences are those that give the nursing programmes their identity and consistency, while at the same time each country contextualises them, and as a result certain dimensions are more developed in some countries than others.

Map of the area in Latin America

Nursing is one of the disciplines where professional education is very important. The importance of nursing in this project lies in its humanistic conception within the framework of higher education.

Duration of studies and degree

In Latin America, nursing education at first degree level or above is the sole responsibility of the universities, as stipulated in each country's legislation on higher education. At undergraduate level, it is general in its orientation, training professionals who are qualified to offer comprehensive assistance to the person, family and community and it leads to the professional title of nurse, with the academic title of Bachelor (*Licenciado/a*).

Study plans in nursing are based on conceptual frameworks that include theoretical models such as: Orem, Roy, Peplau, Travelbee, Henderson, Maslow, Pender, King and others. This conceptual base stresses the contribution of these theories to the development of the discipline and the profession. (Behn, V., Jara, P. 2002). The study plans are also founded on work by theoreticians from the epistemological field, including Edgar Morin, a complex theoretician and author of *Les Sept Savoirs*.

The various components of study plans are care management, research and education, stressing professional independence through leadership, teamwork, critical attitude and application of ethical principles in the student's work.

The basic content of the study plan consists of elements of the psychosocial, biological and scientific-professional sciences, regularly updated in accordance with national and institutional education and health policies, in keeping with the care models of each country and standards on care quality, in order to satisfy the health needs of the population.

The optional components include advanced areas and other courses, allowing students to complement their education in a number of fields, e.g. those of science, arts, humanities and ethics.

Profile of First Degree graduates

The graduate is a professional with scientific, technical and humanistic knowledge and social, critical, creative and innovative sensitivity, who contributes with skill and quality to nursing care for people of different ages, and for the family and the community. S/he is also prepared to work independently, in multidisciplinary, interdisciplinary and transdiciplinary forms, with a civic awareness and an ability to respond to changes in national and international circumstances.

The second cycle [*posgrado* or graduate studies] level embraces the master's and doctoral degrees. This level is geared towards offering advanced education for exercising the profession. In some countries, specialisation courses are also classed amongst graduate studies.

Specialisation is the level at which the professional, after obtaining his/her first degree acquires a mastery of a field of knowledge, which can be applied to solving problems in his/her professional work.

The master's degree is the level at which the professional, after obtaining the first degree, trains in advanced skills for nursing practice. It includes a component of investigation in problem-solving.

The doctorate corresponds to an academic research degree and demonstrates mastery of the most advanced concepts in an area of knowledge and capacity to contribute intellectually and independently to a field of knowledge. This is the highest academic degree conferred by universities.

Some universities do not yet design their curricula on the basis of competences. Those that do have not disseminated the results. The general structure of the curriculum, in most countries, is determined by the number of credits with which the student completes the course and obtains his or her degree.

Spheres of professional action

Nursing graduates can be employed competently in the following areas:

- Providing comprehensive nursing care in the health services network, in both public and private sectors and in non-governmental organisations.
- Teaching, at all levels of formal and non formal education.
- Managing nursing care services, at local, regional and national levels and in education levels and in political health-related areas.

— Research, as a designer, manager, agent and assessor of research projects in health and nursing, in social development and education.

Specific competences identified

One of the aims of this project was to identify the subject specific competences of the first degree programmes in Nursing which are currently taught in the participating countries. These are listed below.

Variable	Competence
V01	Capacity to apply knowledge in the holistic care of patients, families and the community, taking into account the different phases in the life cycle in processes of illness and health.
V02	Skill in applying the nursing methodology and theories that underlie and organize intervention, guaranteeing the care relation.
V03	Capacity to document and communicate information fully and completely to patients, families and community to provide continuity and security in care.
V04	Capacity to utilise information and communication technologies for assertive decision-making and healthcare resource management.
V05	Respect for culture and human rights in nursing interventions in the healthcare field.
V06	Skill in interacting in interdisciplinary and multi-sector teams, with problem-solving capacity to meet priority, emergent and special healthcare needs.
V07	Capacity to design and manage research projects.
V08	Skill in resolving healthcare problems using research in one's nursing practice.
V09	Capacity to participate actively in the development of healthcare policies, respecting cultural diversity.
V10	Capacity to plan, organise, execute and evaluate disease prevention and recovery campaigns, using quality criteria.
V11	Capacity to work within a context of codes of ethics, rules, standards and Laws governing the profession.
V12	Capacity to design, execute and evaluate formal and non-formal health education programmes addressing local needs.
V13	Capacity to participate in multidisciplinary and trans-disciplinary teams in formulating educational projects.

Tuning A Latina INGL.indd 143 19/7/07 10:45:19

Variable	Competence
V14	Skill and capacity to promote ongoing learning among persons, groups and the community to foster good health habits and healthy life styles in relation to the surrounding environment.
V15	Knowledge of and capacity to apply technology and computers in nursing and healthcare research.
V16	Knowledge of the different functions, responsibilities and roles to be undertaken by nursing professionals.
V17	Capacity to apply in practice the principles of safety and hygiene in nursing care.
V18	Knowledge of and skill in using the instruments inherent in human care procedures.
V19	Capacity to participate actively in ethics committees for the practice of nursing and bioethics.
V20	Capacity to defend the dignity of the individual and right to life in interdisciplinary healthcare.
V21	Capacity to administer safely drugs and other treatments necessary in providing quality nursing care.
V22	Capacity to recognise, respect and support people's spiritual needs.
V23	Capacity to participate effectively in local, regional, national and international collective bodies that promote the development of the profession.
V24	Capacity to establish and maintain a caring relationship with patients, families and community faced with different care requirements, with greater emphasis in critical situations and in the terminal phase of life.
V25	Capacity to promote and undertake actions designed to stimulate public participation and community development within the chosen field of healthcare competence.
V26	Capacity to demonstrate solidarity in situations of disaster, catastrophe and epidemics.
V27	Capacity to manage autonomously new nursing services.

Analysis of the results

It should be noted that a greater number of questionnaires was responded to than initially forecast, due to the fact that the Ministries of Education of some countries asked to extend the survey to include nursing schools and associations. Only one country conducted a lower number among, as a result of a strike at the university during the collection period.

A total of 2,348 questionnaires were received, as follows:

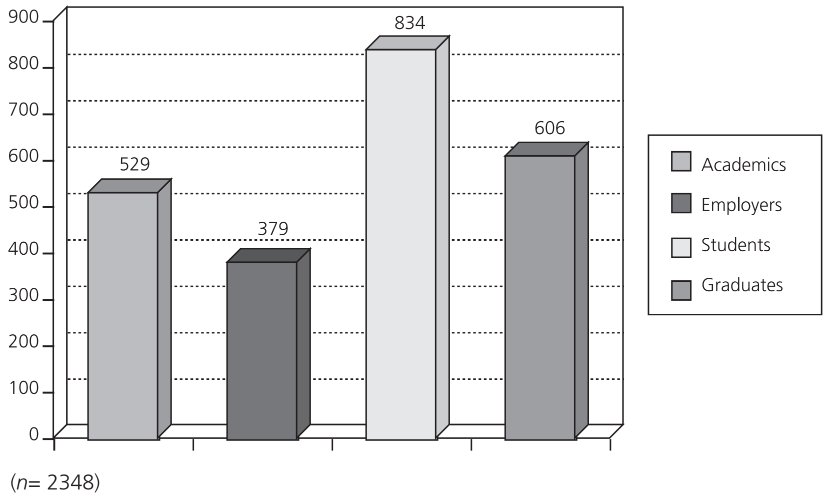


Figure 1

Distribution of the respondents in the area of nursing

Table 1

Least and most important competences, by average in decreasing order of importance

Group	Least important		Most important	
Academics	V27	Capacity to manage autonomously new nursing services.	V05	Capacity to show respect for culture and human rights in nursing interventions …
	V09	Capacity to participate actively in the development of healthcare policies...	V10	Capacity to plan, organise, execute and evaluate disease prevention and recovery...
	V04	Capacity to utilise information and communication technologies...	V21	Capacity to administer safely drugs and other treatments...
	V13	Capacity to participate in multidisciplinary and …	V11	Capacity to work within a context of the codes of ethics, rules, standards and Laws…
	V23	Capacity to participate effectively in local, regional, national and international collective bodies...	V20	Capacity to defend the dignity of the individual and right to life...
	V15	Knowledge of and capacity to apply technology and computers...	V17	Capacity to apply in practice the principles of safety and hygiene...

Group	Least important	Most important
Graduates	V07 Capacity to design and manage research projects. V19 Capacity to participate actively in ethics committees for the practice... V13 Capacity to participate in multidisciplinary and trans-disciplinary teams... V15 Knowledge of and capacity to apply technology and computers …	V21 Capacity to administer safely drugs and other treatments … V17 Capacity to apply in practice the principles of safety and hygiene … V16 Knowledge of the different functions, responsibilities. V05 Capacity to show respect for culture and human rights in...
	V09 Capacity to participate actively in the development of healthcare policies, … V23 Capacity to participate effectively in local, regional, national and international collective bodies,…	V20 Capacity to defend the dignity of the individual and right to life … V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery...
Students	V23 Capacity to participate effectively in local, regional, national and international collective bodies, … V09 Capacity to participate actively in the development of healthcare policies, … V12 Capacity to design, execute and evaluate formal and non-formal health education...	V05 Capacity to show respect for culture and human rights in nursing interventions … V17 Capacity to apply in practice the principles of safety and hygiene … V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery, …
	V13 Capacity to participate in multidisciplinary and … V04 Capacity to utilise information and communication technologies … V19 Capacity to participate actively in ethics committees for the practice …	V11 Capacity to work within a context of the codes of ethics, rules, standards and Laws … V20 Capacity to defend the dignity of the individual and right to life … V21 Capacity to administer safely drugs and other treatments …
Employers	V15 knowledge of and capacity to apply technology and computers … V25 Capacity to promote and undertake actions designed to stimulate … V08 Skill in resolving healthcare problems using research… V07 Capacity to design and manage research projects … V09 Capacity to participate actively in the development of healthcare policies, … V23 capacity to participate effectively in local, regional, national and international collective bodies, …	V21 Capacity to administer safely drugs and other treatments … V11 Capacity to work within a context of the codes of ethics, rules, standards and Laws … V17 capacity to apply in practice the principles of safety and hygiene … V20 Capacity to defend the dignity of the individual and right to life … V10 capacity to plan, organise, execute and evaluate disease prevention and recovery, … V16 Knowledge of the different functions, responsibilities …

The table has been prepared using the average score for importance and level of achievement of the different competences.

For all four groups, the competences considered to be of most importance are those related to the organisation and provision of care, ethical principles and principles of safety and hygiene, within the standards of nursing practice.

The competences seen as least important were those related to involvement in developing health policies, in associate bodies, in management of new services and use of ICT. These competences, within the framework of international higher education, are indispensable for professional work at a world level.

Competences related to development of leadership within the nursing group, and those related to the nurse's work in the health team were rated least important even by academics, who are a major reference point for this study.

The competences that the four groups considered to have attained the highest level of achievement coincided with those that scored highest on importance. There is a high degree of agreement between the four groups as to the importance and achievement of the competences (r = .87 – .97), as can be seen from the correlation matrix between the average «importance» and «achievement» scores (Tables 2 and 3 respectively).

Table 2

Correlation between the average scores for importance of the competences

	1	2	3	4
1. Graduates	1			
2. Students	0,933	1		
3. Employers	0,923	0,870	1	
4. Academics	0,912	0,949	0,875	1

(*n*= 2348)

The students gave a higher importance rating to the competences than employers, who in turn gave a higher score than the academics. This suggests that students and employers see the acquisition of skills for practice as a priority.

Table 3

Correlation between the average scores for achievement of the competences

	1	2	3	4
1. Graduates	1			
2. Students	0,959	1		
3. Employers	0,951	0,910	1	
4. Academics	0,957	0,927	0,976	1

(*n*= 2348)

The students gave a higher achievement rating to all the competences than the academics who in turn scored them higher than the employers.

If we analyse the least and most important competences, we can see areas of coincidence, particularly amongst the competences related to the role as a provider of care and administrative management (Table 4).

Table 4

Most important competences by group and professional role

Groups	Role as care provider	Role as administrator
Academics	V05 Capacity to show respect for culture and human rights in nursing interventions … V11 Capacity to work within a context of the codes of ethics, rules, standards and Laws … V17 Capacity to apply in practice the principles of safety and hygiene … V21 Capacity to administer safely drugs and other treatments …	V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery, … V20 Capacity to defend the dignity of the individual and right to life …
Graduates	V05 Capacity to show respect for culture and human rights in nursing interventions … V16 Knowledge of the different functions, responsibilities. V17 Capacity to apply in practice the principles of safety and hygiene … V21 Capacity to administer safely drugs and other treatments …	V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery, … V20 Capacity to defend the dignity of the individual and right to life …
Students	V05 Capacity to show respect for culture and human rights in nursing interventions … V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery, … V11 Capacity to work within a context of the codes of ethics, rules, standards and Laws … V17 Capacity to apply in practice the principles of safety and hygiene … V21 Capacity to administer safely drugs and other treatments …	V20 Capacity to defend the dignity of the individual and right to life …
Employers	V10 Capacity to plan, organise, execute and evaluate disease prevention and recovery, … V11 Capacity to work within a context of the codes of ethics, rules, standards and Laws … V16 Knowledge of the different functions, responsibilities. V17 Capacity to apply in practice the principles of safety and hygiene … V21 Capacity to administer safely drugs and other treatments …	V20 Capacity to defend the dignity of the individual and right to life …

(n= 2348)

The two roles identified in the competences correspond to the direct patient care provider and the administrator. All groups considered Variables 17 and 21 to be important and three groups also included Variables 5 and 11, all of which come under the heading of the care provider. In the case of the administrator, all groups considered Variable 20 to be important. The roles of researcher and educator were not mentioned as being important, possibly because they are given greater emphasis in the objectives of graduate studies programmes.

Reflections on teaching/learning and assessment of generic and subject specific competences

Investment in human capital is an essential condition for enabling productivity and development. However, in order to design the curricula, Latin American universities need to take into account aspects related to the cultural crisis of our age and the challenges of building a social order that includes the recipients of care.[36]

The challenge for nursing is wider, if we take into account the World Health Organisation's request for member states to ensure participation of nursing staff in the integrated planning of human resources for health, particularly with regard to strategies intended to maintain a sufficient number of competent nursing staff.[37]

Nursing-specific competences of Nursing can be defined in terms of action, as associated with the different skills of nursing care. The skills of the discipline are backed by effective and efficient knowledge, preparation and application of care, to help satisfy the needs of individuals, family and community, within a biological, psychological, ethical and spiritual context.

The International Council of Nurses recommends that systems of Nursing education should ensure that study plans are regularly updated to satisfy the needs of a changing environment and that they are properly applied and address the need for lifelong learning, in accordance with the specific historical context of each country. For its part, the WHO recommends, for development of science and education in nursing, that particular attention be paid both to the macro determinants and to the needs and demands of health and the services they serve.[38]

---

[36] Sepúlveda, Leandro, *El concepto de competencias laborales en educación, notas para un ejercicio crítico*, CIDE, Santiago de Chile, 2001.

Vargas Zúñiga, Fernando, *Competencias en la formación y competencias en la gestión del talento humano, convergencias y desafíos*, OIT Cinterfor, 2002.

[37] 59th World Health Assembly. Strengthening Nursing and Midwifery, 27 May 2006.

[38] OPS-WHO. *Panorama de la fuerza de trabajo en enfermería*, Serie Desarrollo de Recursos Humanos, N.º 39, 2005.

Nursing has sought to delimit its field of action and develop knowledge through research, seeing this as a constant process of exploration and discovery. To this end, it is necessary to go further in developing the individual's own knowledge, which will serve to guide his/her practice.

Given the importance of the role played by nurses as educators, and in keeping with the spirit of the Tuning Latin America project, the group has highlighted the importance of continuing to look for knowledge that will allow best practices to be drawn up for the competence-based learning process. The following questions have been raised as challenges for progress in professional education:

How can the generic and subject specific competences be developed in a curriculum? What strategies of teaching/learning by levels can be implemented in this type of curriculum? How can consistency be ensured in implementation of the study plan? How can competence-based assessment be designed and implemented? What indicators will be taken into account in assessing competences related to the learning of knowledge, procedures and attitudes? What procedures ensure consistent execution and a continuous process of review and updating of the competence-based curriculum? How are the credit systems established? What are the terms of agreements allowing mobility of Latin American nursing students?

While the project obtained significant results, we need to continue working on issues such as the implementation of bases to allow the curriculum to be developed, analysed and assessed using competences, and to extend the theoretical bases underpinning the subject and the competence-based teaching/learning methodologies, assessment, the system of transferable credits and teacher training.

Higher Nursing education faces the great disciplinary challenge of continuing to be a reference point in the context of current trends in higher education, through the Tuning Latin America project.

Impact of the results and advances of the project

The group has collated all the results of expansion of the project in the different countries and these are summarised below:

— Greater discussion, dissemination and reflection on the results of the project in different nursing scenarios: schools, faculties, associations, conferences, forums, professional associations and National Tuning Centres in the different countries.
— In some countries, knowledge and dissemination of the Tuning Latin America project is still at an incipient stage. However, it is gathering pace because of the position and importance it offers as a methodological strategy in an analysis and discussion of the nursing panorama in Latin America.

— It has promoted participation in the international network, a required characteristic in today's world.
— It has promoted academic dialogue and meetings between countries for reflection on what the teacher must be and do.
— Generic competences have allowed for a trans-disciplinary approach.
— Some countries are applying mobility in Nursing education, in areas such as student and teacher mobility, dual degrees and transferable credit systems.
— Research has intensified in the participating countries with a view to generating educational innovations by integrating competences.

The Latin American network of the project began its work in Costa Rica and is advancing in the area of virtual communication, with strengthened group work in Brussels. Once again, the third meeting in Mexico highlighted strong identification with the project, professional and personal links within the discipline and links between the participating disciplines from each country, thus consolidating the commitment to meet the challenges for continuity of the work in Latin America.

Conclusions

These conclusions are given by context, process and result of the project. Over the last two decades of the twentieth century, Latin America has been the scene of major social changes. There is a growing desire and commitment among the countries of the region to construct shared solutions to their common problems, among which one of the most important is poverty, seen as an emblematic phenomenon resulting from social inequality, and making a third of the population vulnerable to social risk, especially women and children.

The agreement signed at the Americas Summit «Goals and Objectives for the Millennium» includes Nursing —a professional discipline with a strong ethical commitment to the defence of human life— alongside other historical subjects in the challenge of reducing poverty in the continent by 2015.

Against the backdrop of a continent-wide paradigm shift, nursing —as an area of knowledge that articulates skills from basic, humanist and social sciences— has built new ways of looking and acting in the approach to comprehensive care of individuals, families and communities, governed by exercises of interdisciplinarity and intersectoriality and guided by genuine respect for the cultural diversity of this society.

The theoretical orientation, both in the production of knowledge and in the provision of services, needs to adopt and build a reference point, to highlight the many dimensions that influence these problems, and which can are be a source of solutions.

It should be remembered, too, that Nursing is one of the life forces of contemporary society, as a social group that has been affected by the historical process of women's organisation and action in the struggle for gender equality, in the area of user safety and in human rights.

The Tuning Latin America project enriched and reinforced an existing shared experience, begun by the Latin American nursing community in the 1980s in all nursing programmes in Latin America. This project was coordinated by education associations from the different countries and the Latin American Association of Nursing Schools and Faculties (ALADEFEE), and this commitment was reiterated at pan-American conferences and talks on nursing. The Tuning Latin America project is an important agent for galvanising the process of mobility among nursing students and professionals in the region, thus contributing to professional education at undergraduate, graduate and lifelong learning levels. It is necessary to:

- Publicise the results of the nursing report, over the websites of participating universities, schools and associations.
- Establish multi-centre research projects and search for financing, to make it possible to continue the work begun to monitor competences, efficiency of methodologies, and projection in higher education.
- Encourage publication of the advances made in nursing and other journals in order to make nursing education in Latin America more visible, with Tuning Latin America taken as a reference point.
- Continue working effectively with the National Tuning Centres in each country to strengthen the processes of quality in higher education.

4.6. PHYSICS

Introduction and presentation of the area

The first general Tuning Latin America Project meeting for the subject area of physics was held in San José, Costa Rica, from 22 to 24 February, 2006. The countries represented in the work group were, and remain, Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Guatemala, Honduras, Mexico, Peru and Venezuela.

The group analysed the professional profiles and study plans of undergraduate education programmes in physics in the twelve participating countries. The analysis showed considerable diversity, both in the names given to programmes and in the degrees conferred. In general, all programmes take between 4 and 5 years and successful candidates have traditionally been known as physicists, who work in a number of areas (examined in the next section under the headings of Traditional Physics, Applied Physics, and Educational Physics). In the light of the specific situation in each region, the group decided to concentrate on programmes in Traditional Physics. The variety of Applied Physics programmes, and the different country regulations governing Educational Physics meant that the timeframe within which we had to work did not permit an analysis of these two types of programmes in any meaningful way.

The subject specific competences of the subject of Traditional Physics were identified, and a line of work began looking at aspects of teaching, learning and assessment.

The final report of this study was presented at the general meeting held in Mexico from 21 to 23 February 2007. For this volume, reporting the results from all subjects, a summarised version was drafted. An extended version is currently being prepared and will be posted on the project website and published.

Map of the discipline

This section of the report is not intended to offer a comprehensive description of the situation of Traditional Physics in each of the participating countries. Creating such a map would require a degree of information gathering, systemisation and critical analysis that goes well beyond the scope of this project. What follows should rather be seen as a synthesis of the key features of undergraduate education in Traditional Physics in Latin America.

The undergraduate programmes analysed generally allow a graduate in physics to choose one of the following options on completion: a) to pursue postgraduate studies; b) to work in fields related to physics; or c) to teach at secondary or higher level. The degrees obtained and the duration of the programmes vary from country to country.

Broadly speaking, there are three types of education programme. We will use here the terms «Traditional Physics» to refer to programmes whose aim is to develop general or traditional physics; «Applied Physics» refers to programmes that prepare physicists to work in physics-related applications in the areas of science, technology, engineering, etc. and «Educational Physics» are those intended to prepare students for teaching physics at secondary level. Table 1 offers a synthesis of the situation by country.

The degrees awarded to those graduating in Traditional Physics are known as *Licenciado en Física* (Argentina, Bolivia, Chile, Cuba, Guatemala, Honduras, Peru and Venezuela), *Físico* (Colombia, Ecuador and Mexico) and *Bacharel en Física* (Brazil).

The general aim of Traditional Physics programmes is to produce professional physicists who will work in scientific research, technological development, manufacturing and services, and teaching at university level. They all include a basic grounding in theoretical physics, experimental physics and mathematics, in order to develop specific skills in the area of research and its applications. Such programmes are designed to enable the student to pursue graduate studies, with specialisation, at master's and doctorate levels.

Education in Applied Physics in Latin America can lead to various other degrees, as shown in Table 2.

Tuning A Latina INGL.indd 153 19/7/07 10:45:22

Table 1

Types of Physics education programme in each country

Country	Traditional Physics	Applied Physics	Educational Physics
Argentina	X	X	X[a]
Bolivia	X		X[a]
Brazil	X	X	X[b]
Chile	X	X	X[b]
Colombia	X	X	X[a]
Cuba	X	X	
Ecuador	X	X	X[a]
Guatemala	X		
Honduras	X		
Mexico	X	X	X[a]
Peru	X	X	
Venezuela	X	X	X[a]

X[a] Programmes coordinated by other faculties, schools or departments.
X[b] Programmes coordinated by the Physics departments or schools.

Table 2

Examples of areas of education and degrees in the field of Applied Physics

	Medical Physics	Geophysical	Engineer Physicist	Biophysicist
Argentina	X	X		
Bolivia				
Brazil	X		X	
Chile			X	
Colombia			X	
Cuba			X	
Ecuador				X
Guatemala				
Honduras				
Mexico			X	
Peru			X	
Venezuela		X		

Degrees in Physics in the region are conferred both by state or public universities and private ones. The academic departments responsible for these programmes in the universities usually offer classes in Physics subjects in other programmes.

Report of the results of the survey on the subject specific competences of the discipline

Tables 3 and 4 show the subject specific competences identified and key figures of participation in the survey, respectively. The academics, employers, students and graduates surveyed in the survey will henceforth be referred to as ACA, EMP, STU and GRA, respectively.

Table 3

Specific competences for graduates in Physics prepared in the present study

V01. Capacity to pose, analyse and solve physical problems, both theoretical and experimental, through the use of numerical, analytical or experimental methods.
V02. Capacity to utilise or develop computation systems or programmes for information processing, numerical calculus, simulation of physical processes, or control of experiments.
V03. Capacity to identify the essential elements of a complex situation, make necessary approaches and construct simplified models that will describe it in order to understand its behaviour under other conditions.
V04. Skill in verifying how well models match reality and in identifying their domain of validity.
V05. Skill in applying theoretical knowledge of physics in the undertaking and interpretation of experiments.
V06. Capacity to demonstrate a thorough comprehension of the fundamental concepts and principles of classical and modern physics.
V07. Capacity to describe and explain natural phenomena and technological processes in terms of physical concepts, theories and principles.
V08. Skill in constructing and developing valid argumentations, identifying hypotheses and conclusions.
V09. Capacity to summarise particular solutions, extending them to general principles, laws or theories.
V10. Capacity to develop a clear perception of how apparently diverse situations present analogies making it possible to apply known solutions to new problems.
V11. Skill in estimating the order of magnitude of measurable quantities to interpret diverse phenomena.

V12. Capacity to demonstrate experimental skills and use of appropriate working methods in the laboratory.
V13. Capacity to participate in professional activities related to high technology both in the laboratory and in industry.
V14. Capacity to participate in advising and drawing up science and technology proposals in subjects of national economic and/or social impact.
V15. Capacity to act with professional ethics and responsibility, manifesting social commitment to solidarity and justice, as well as respect for nature and the environment.
V16. Capacity to demonstrate the work habits required in the profession, such as teamwork, scientific rigour, independent learning and perseverance.
V17. Skill in researching, interpreting and using scientific information.
V18. Skill in communicating scientific concepts and results, both orally and in writing, to peers or as a teacher, writer or speaker.
V19. Ability to participate in the preparation and development of physics or interdisciplinary research projects.
V20. Capacity to demonstrate willingness to confront new problems in other fields, using specific skills and knowledge.
V21. Knowledge and understanding of the conceptual development of physics in historical and epistemological terms.
V22. Knowledge of relevant aspects of the process of teaching and learning physics, showing a willingness to collaborate in educating scientists.

Analysis of results

From here on, we will refer to the specific competences in abbreviated form. The twenty-two competences in Table 3 were considered to be of considerable importance. The correlation ratios, shown in Table 5, indicate a high level of agreement between the opinions of the four groups surveyed, with the greatest coincidence between ACA and GRA and the minimum coincidence between EMP and STU.

By analysing the averages we can see that certain competences were rated as most important or least important by one, two, three or all of the groups surveyed. In particular, the following competences:

a) V01 (Pose, analyse and solve physical problems…), V05 (Apply theoretical knowledge…) and V16 (Demonstrate work habits…) were rated among the *six most important* by each of the four groups surveyed.

b) V06 (Demonstrate a thorough comprehension…) is one of the most important for the academics, employers and students; V17 (Researching, interpreting and using scientific information…) was rated amongst the most important by ACA, STU and GRA.
c) V15 (Act with professional ethics and responsibility…) was rated as being of the highest importance by GRA and EMP; competences V03 (Construct models…), V19 (Participate in the preparation and development of projects…), V11 (Estimating order of magnitude…) and V18 (Communicating scientific concepts…) by one group each, namely ACA, STU, EMP and GRA, respectively.
d) V09 (Summarise particular solutions…), V14 (Participate in advising …), V21 (Knowledge and understanding of the conceptual development…) and V22 (Knowledge of relevant aspects of the process of teaching and learning physics…) were considered among *the six least important* by ACA, STU, EMP and GRA; V13 (Participate in professional activities …) was ranked among the least important by ACA, EMP and GRA; and V10 (Capacity to develop a clear perception…) by STU and EMP.
e) V11 (Estimating the order of magnitude…), V12 (Demonstrate experimental skills…) and V20 (Demonstrate willingness to confront new problems…) were ranked as the least important by only one group each, namely STU, GRA and ACA, respectively.

Table 4

Number of answers received to the survey by country and by survey group

Country	Academics (ACA)	Employers (EMP)	Students (STU)	Graduates (GRA)	Total
Argentina	46	18	20	28	**112**
Bolivia	23	20	19	9	**71**
Brazil	9	0	7	7	**23**
Chile	11	0	5	1	**17**
Colombia	48	5	66	15	**134**
Cuba	20	18	32	17	**87**
Ecuador	22	16	20	19	**77**
Guatemala	8	2	8	5	**23**
Honduras	17	3	31	4	**55**
Mexico	7	0	9	0	**16**
Peru	30	26	30	30	**116**
Venezuela	22	3	32	13	**70**
Total	**263**	**111**	**279**	**148**	**801**
Percentage (%) of the total	**33**	**14**	**35**	**18**	**100**

Table 5

Correlation coefficients among the average scores for importance

	GRA	STU	EMP	ACA
GRA	1			
STU	0,89	1		
EMP	0,91	0,81	1	
ACA	0,92	0,85	0,89	1

The instrument also included range methodology. For each competence, the positions assigned by each group surveyed were identified, using both averages, thus assigning a series of four pairs of numbers to each competence. To systemise and condense this information, four categories were created, namely A (competences that scored in positions 1 to 6 in both categories depending on the group in question); B (competences placed in positions 1 to 12 in both classifications, with at least one of them being between positions 7 to 12); C (competences placed below position 18 in both categories, with at least one of them between positions 13 and 18) and D (competences placed in positions 19 to 22 in at least one of the two categories). We then determined the number of times that each competence was placed in each of these categories, for the four groups. By combining the confidence intervals obtained with the first part of the survey and the averages of the range variable, an overall order of importance for all competences was developed, which is shown in Table 6.

Table 6

Specific competences, in overall order of importance developed using the procedure described in the text

Category	Competences
A	1st) V01 (Pose, analyse and solve physical problems…) 2nd) V05 (Apply theoretical knowledge…) and V06 (Demonstrate a thorough comprehension…) 3rd) V03 (Construct simplified models…); V15 (Act with responsibility…) and V16 (Demonstrate work habits…)
B	4th) V02 (Use or prepare programmes…); V04 (Verifying how well models match…); V07 (Describe and explain phenomena…) 5th V17 (Researching, interpreting and using scientific information…); V18 (Communicating scientific concepts…); V19 (Participate in the preparation …)

Category	Competences
C	6th V12 (Demonstrate experimental skills…); V13 (Participate in professional activities…); V20 (Demonstrate willingness…) 7th) V08 (Developing valid argumentations…); V09 (Summarise particular solutions…); V10 (Capacity to develop a clear perception); V11 (Estimating the order of magnitude...).
D	8th) V14 (Participate in advising…); V22 (Basic knowledge of the teaching and learning processes..). 9th) V21 (Knowledge and understanding of the conceptual development…).

In general, the level of achievement of all competences was scored below the corresponding level of importance. Only one of the competences, V01 (Pose, analyse and solve physical problems…) was awarded an average mark of over 3 for achievement by all four groups. The correlation coefficients, shown in Table 7, indicate a high level of concordance of opinions, with the maximum agreement between STU and GRA and the minimum between EMP and STU.

Table 7

Correlation coefficients among the average scores for achievement

	ACA	GRA	STU	EMP
ACA	1			
GRA	0,933	1		
STU	0,925	0,981	1	
EMP	0,924	0,884	0,876	1

An analysis of the averages scores given by each group indicates that:

a) V01 (Pose, analyse and solve physical problems…), V06 (Demonstrate a thorough comprehension…), V16 (Demonstrate work habits…) and V17 (Researching, interpreting and using scientific information…) are among the *six most achieved* for all groups surveyed; V05 (Apply theoretical knowledge…) was ranked among the six most achieved by the ACA, STU and GRA groups.
b) V08 (Developing valid argumentations…) was ranked among the most achieved by ACA and STU; V11 (Estimating the order of magnitude…) by GRA and EMP; V15 (Act with professional ethics and responsibility…), is ranked in the top group only by EMP.

c) V13 (Participate in professional activities…); V14 (Participate in advising…); V19 (Participate in the preparation and development of projects…) and V21 (Knowledge and understanding of the conceptual development…) are among the *six least achieved*, for all the groups surveyed; V20 (Demonstrate willingness to confront new problems…) is ranked in this bottom group by ACA, GRA and EMP; V22 (Basic knowledge of the teaching and learning processes…) was ranked among the least achieved by ACA, STU and EMP; V02 (Use or prepare programmes…) is among the least achieved for STU and GRA.

The survey also showed systematic differences in the achievement scores awarded by the groups. Specifically:

a) the ACA score is lower than that of the other groups, with three exceptions, of which the only significant one is Competence V02 (Use or prepare programmes…);
b) the GRA score for achievement is generally higher, with five exceptions: Competences V02 (Use or prepare programmes…), V11 (Estimating the order of magnitude…), V13 (Participate in professional activities…), V14 (Participate in advising…), and V15 (Act with professional ethics and responsibility…), which were all scored higher by EMP.

Analysis of the relationship between importance and achievement

This relationship is shown in Figure 1. In particular, the analysis shows that:

a) V19 (Participate in the preparation and development of projects…) was considered important and underachieved by all the groups surveyed;

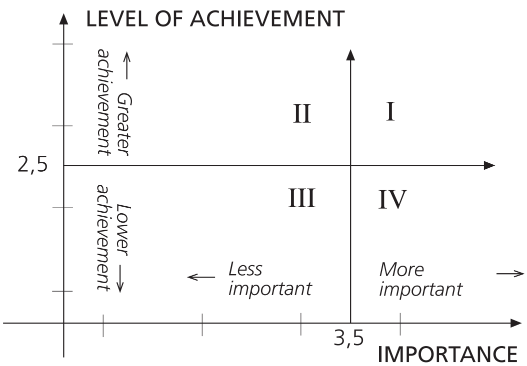


Figure 1

Definition of quadrants for analysing the relationship between importance and achievement

b) V04 (Verifying how well models match…) is considered important and underachieved by ACA, STU and EMP;
c) V02 (Use or prepare programmes…), V12 (Demonstrate experimental skills…), V18 (Communicating scientific concepts…) and V20 (Demonstrate willingness to confront new problems…) were considered important and underachieved by at least two groups;
d) V21 (Knowledge and understanding of the conceptual development…) scored low on achievement and also on importance among all groups; something similar occurs with competence V14 (Participate in advising...).

Discussion

Identification and characteristics of key competences

a) A comparison between the average «importance» score, using the evaluation scale and range, shows unanimous agreement that V01 (Pose, analyse and solve physical problems…) is valued overall as being the most important. Competences V05 (Apply theoretical knowledge…) and V06 (Demonstrate a thorough comprehension…) come second in terms of importance, and Competences V03 (Construct models…), V15 (Act with professional ethics and responsibility…) and V16 (Demonstrate work habits…) are in third place;
b) Of the six top competences in terms of importance, there are four, namely V01 (Pose, analyse and solve physical problems…), V05 (Apply theoretical knowledge…), V06 (Demonstrate a thorough comprehension…), V16 (Demonstrate work habits…) that are also considered to be among the best achieved by all groups, although in general, the score given for the level of achievement is less than that for importance. *These competences are related to basic education in Physics.* Another competence that stands out for the level of achievement assigned to it, is V17 (Researching, interpreting and using scientific information…);
c) For ACA, the level of importance and level of achievement are more closely related than for STU, for example. *This might be interpreted as reflecting ACA perception of their own role as educators. It is reasonable to expect that ACA would feel that they were making an effort to more thoroughly and systematically offer programmes centring on the areas they consider most important.*

Significant differences in the level of importance

There are four competences for which there is a very significant difference between the importance scores of STU and ACA, allowing for a particularly interesting interpretation.

a) The greatest differences are in the group of competences linked to the area usually known as «Science Technology-Society» competences, specifically Competence V13 (Participate in professional activities…); V14 (Participate in advising…); V20 (Demonstrate willingness to confront new problems…) and V19 (Participate in the preparation and development of projects…). The difference in importance was systematically positive, attaining values greater than or equal to three (3) times the typical deviation (σ). *This suggests that STU, in contrast to ACA, consider that it is more important for the profession to have an impact on society, through its application in technology and in solving practical problems.* This conclusion appears to be consistent with the second part of the survey, where the academics placed these competences in positions 10, 12, 19 and 15, whereas the students ranked them in positions 4, 9, 13 and 8;
b) Competence V11 (Estimating the order of magnitude…), has a difference of 3.11 σ. ACA gave it a score of 3.433±0.081 in importance (15th place) while STU scored it 3.181±0.077 (21st place). *This difference may be seen as indicating that in the epistemological perspective of students, physical magnitudes can be determined precisely and the goal of physics is to obtain that value, and for this reason estimation is not considered to be a crucial skill for the physicist*;
c) A similar interpretation could be given for the different scores given to modelling-related competences, namely: V03 (Construct models…) and V04 (Verifying how well models match…). Although in this case the differences —around 1.5 σ— are smaller than in the previous case, they are significant in the respective rankings: ACA ranked these competences in 6th and 8th place, and STU in 10th and 11th. An analysis of the range shows a similar shift for competences V03 and V04: academics ranked these competences in 2nd and 9th place, and STU in 3rd and 11th.

Significant differences in the level of achievement

a) In level of achievement, the correlations between ACA, STU and GRA are somewhat higher, and ACA are the most negative group with regard to the level of achievement. *Indeed, except for Competence V02 (Use or prepare programmes…) ACA are more demanding and critical in their scoring*;
b) There is one group of competences which ACA have scored below 2.3, namely (in increasing order of achievement): V14 (Participate in advising…), V13 (Participate in professional activities…), V21 (Knowledge and understanding of the conceptual development…), V22 (Basic knowledge of the teaching and learning processes…), V20 (Demonstrate willingness

to confront new problems…) and V19 (Participate in the preparation and development of projects…). This group of competences includes the four Science Technology Society competences we spoke about in the previous section, which suggests a similar interpretation. *If ACA consider that the degree does not qualify them to participate in complex processes of research and development, it is very reasonable to assume that they consider this professional dimension to be of secondary importance when compared to learning the conceptual contents of the subject.* It is plausible that ACA might presume that without a knowledge of these basic areas of content, STU are very unlikely to be able to become successfully involved in projects;

c) EMP consider that Competences V11 (Estimating the order of magnitude…), V12 (Demonstrate experimental skills…) and V15 (Act with professional ethics and responsibility…) are better achieved than the other three groups do. These competences are related to experimental skills and professional ethics;

d) The fact that competence V02 (Use or prepare programmes…) was given the lowest «achievement» scores by STU and GRA suggests a rather more elaborate interpretation. In general terms, the groups surveyed may be divided chronologically into two sub-groups. ACA and EMP are probably most aware of the practical limitations of their area, and value achievement within it more critically, while STU and GRA, because of their youth, tend to have more positive expectations of nearly all the competences. *However, it is also plausible to think that these younger groups are also the ones that have the clearest perception of the rapid changes in software and hardware technology, and for that reason, tend to assess the education they receive more critically, i.e., the level of achievement of competence V02* (*Use or prepare programmes*…).

Reflections and examples of teaching, learning and assessment of competences

Encouraged by the results of the validation process for the competences in Table 3, it was decided to analyse this list of subject specific competences in order to establish common features, so that they could be divided up into separate categories. It was also decided to make an exploratory analysis, centring on the subject specific competences that represent two of these categories. We analysed first the subject specific competences set out for the physics area, using a model that distinguishes three main categories and two sub-categories. We then summarised the results of the analysis and offered some preliminary conclusions and recommendations for future work.

Systemisation of the subject specific competences

The central hypothesis of this analysis is that the twenty-two subject specific competences can be structured into a non-exclusive scheme of categories, since all the competences identified are interdependent, and achieving them necessarily involves inter-relation for professional good practice, with the result that they influence and modify each other as they advance towards achievement. The systemisation proposed distinguishes three main categories and two sub-categories, viz.:

I. Cognitive competences: those that characterise graduates' disciplinary knowledge, which is underlying in the systemic competences;

II. Methodological competences: those that characterise «physical know how», theoretically and experimentally. These, in turn, might be divided into two sub-categories:

- **Instrumental competences:** those that are identified as a series of abilities and skills in the use of procedures applicable to scientific work.
- **Systemic competences:** those that involve the interaction of cognitive and procedural elements, with high degrees of complexity.

III. Occupational and social competences: those that make up the methodological competences and generic competences, and appear in the professional act, in interaction with the contexts in which this action is performed, and under the influence of personal and community values.

Table 8 offers a distribution of the subject specific competences for physics graduates, using the categories and sub-categories suggested above.

Reflections on teaching and learning of cognitive competences

Competence V06 (Demonstrate a thorough comprehension…), which was rated as the second most important, may be considered to be the core of the group of cognitive competences. For this reason, this analysis centres on this subject specific competence, without ignoring its inter-relations with the other ones. This competence was defined at the Costa Rica meeting as being the mastery of the corpus of basic theoretical knowledge that comprises the discipline, typical of undergraduate level, and which is implemented through a series of compulsory subjects, whose contents are similar in all study programmes and all countries. Mastery of this knowledge can also be seen in the other subject specific competences included in the model, for example, in Competence V07 (Describe and explain phenomena…), which can, in turn, be re-expressed as the capacity to interpret phenomena by applying the conceptual tools provided by physics.

Epistemological and cognitive considerations on the teaching of physics

Over recent decades, a profound debate bas begun on the way of teaching the conceptual content of physics and of experimental sciences in general, taking into account both the philosophy and history of science and the discoveries made in the field of cognitive and developmental psychology. There are many opposing positions, due to the complexity of the issues and the diversity of the perspectives from which they are approached. Nonetheless, there is a significant degree of agreement among scholars on the importance of turning the students, individually and collectively, into active participants in their own learning process.

Attempts to achieve a «conceptual change» (resolution of conflicts between common and scientific thinking, which unilaterally emphasises the students' independent laboratory work) and «discovery-based teaching», have been disappointing. This does not mean that is necessary to return (or stick) to purely verbal teaching; as we shall see, the current trend in teaching practice in physics is to reappraise the experimental dimension of scientific education and integrate it within a theoretical and mathematical dimension.

Considerations on problem-based learning and the posing of models

Another aspect of science teaching/learning that has received particular attention from specialists, is research into *problem solving*, or problem based learning, which can be traced to another of the subject specific competences, V01 (Pose, analyse and solve physical problems…) —which is precisely the one seen as most important in the survey—. Experience has shown that emphasis by teachers on resolving typical problems and requiring independent work from students in this area has not generally led to greater problem solving skills and conceptual understanding. Once again, this indicates that there is a need to review the traditional approach of the theoretical courses on the curriculum.

At present, the dominant trend is to approach the learning of concepts and theories of physics and problem solving in terms of the development of modelling skills. This approach involves learning the competence discussed directly with that of other subject specific competences, particularly competences V03 (Construct models…) and V04 (Verifying how well models match...). in particular, this requires guiding students to view physics as the art of modelling, and help them acquire a network of conceptual elements, which are not currently the object of teaching, such as the components of a physical model, the different types of conceptual models and mental models (idealization of a pendulum as an isolated object hanging from a rope without mass, etc.); mathematical models (the differential equation of the simple pendulum); pictorial models or maps (graphs and iconic descriptions that represent the structure and movement of the pendulum in different ways); inter-relations between models, which can be developed for a single system (varying depending on the type of model and the idealizations performed); the use of models to predict and explain; etc.

Reflections on the teaching and learning of methodological competences

The following analysis concentrates on Competences V05 (Apply theoretical knowledge…) and V12 (Demonstrate experimental skills…), which, given their impact on the experimental education of a physicist, are considered to be representative of this category.

Factors that affect the achievement of these competences

These competences mark one of the fundamental differences between education in physics and practically all other disciplines except chemistry and to a certain extent some of the engineering disciplines. The need to achieve these competences, means that the physics degree requires a relatively high degree of investment in infrastructure and amenities, something which is often not available. However, this is not the only factor that affects achievement of the selected competences. Indeed, the study made by the physics group suggests that it is important to bear in mind that:

Table 8

Systemisation of the subject specific competences for graduates in Physics in accordance with this study

Category	Competences Incorporated in the Category
Cognitive competences	V06. Capacity to demonstrate a thorough comprehension of the fundamental concepts and principles of classical and modern physics. V07. Capacity to describe and explain natural phenomena and technological processes in terms of physical concepts, theories and principles. V17. Skill in researching, interpreting and using scientific information. V21. Knowledge and understanding of the conceptual development of physics in historical and epistemological terms. V22. Knowledge of relevant aspects of the process of teaching and learning physics, showing a willingness to collaborate in educating scientists.

Category		Competences Incorporated in the Category
Methodological competences	Systemic competences	V01. Capacity to pose, analyse and solve physical problems, both theoretical and experimental, through the use of numerical, analytical or experimental methods. V03. Capacity to identify the essential elements of a complex situation, make necessary approaches and construct simplified models that will describe it in order to understand its behaviour under other conditions. V04. Skill in verifying how well models match reality and in identifying their domain of validity. V05. Skill in applying theoretical knowledge of physics in the undertaking and interpretation of experiments. V08. Skill in constructing and developing valid argumentations, identifying hypotheses and conclusions. V09. Capacity to summarise particular solutions, extending them to general principles, laws or theories. V10. Capacity to develop a clear perception of how apparently diverse situations present analogies making it possible to apply known solutions to new problems. V11. Skill in estimating the order of magnitude of measurable quantities to interpret diverse phenomena.
	Instrumental competences	V02. Capacity to utilise or develop computation systems or programmes for information processing, numerical calculus, simulation of physical processes, or control of experiments. V12. Capacity to demonstrate experimental skills and use of appropriate working methods in the laboratory.
Occupational and social competences		V13. Capacity to participate in professional activities related to high technology both in the laboratory and in industry. V14. Capacity to participate in advising and drawing up science and technology proposals in subjects of national economic and/or social impact. V15. Capacity to act with professional ethics and responsibility, manifesting social commitment to solidarity and justice, as well as respect for nature and the environment. V16. Capacity to demonstrate the work habits required in the profession, such as teamwork, scientific rigor, independent learning and perseverance. V18. Skill in communicating scientific concepts and results, both orally and in writing, to peers or as a teacher, writer or speaker. V19. Ability to participate in the preparation and development of physics or interdisciplinary research projects. V20. Capacity to demonstrate willingness to confront new problems in other fields, using specific skills and knowledge.

a) Most students entering physics, prefer theoretical physics to experimental physics, probably influenced by physics teachers, who often express the same preference. This may be due to the very small role played by experimental physics in secondary-level teaching, due both to a lack of resources and to a lack of preparation among teachers. Other aspects that have affected the emergence of scientific vocations, such as the fact that the life and work of the great experimental physicists is not sufficiently well known, may also have contributed to this trend;
b) Laboratory classes are often seen by the students as being unmotivating. In some cases at least, this may be due to the obsolescence of the equipment, and in other cases, to the fact that practicals tend to involve following a series of guidelines set out in a book;
c) The lack of suitable laboratories has in some cases led to the use of «virtual laboratories». However, this must be considered to be an unsatisfactory solution to the problem. Although information technology is now a key ingredient for experimentation in physics, the use of real facilities is essential if students are to gain the skills, working methods and proper attitudes for working in the laboratory;
d) In the least developed countries, there is a particularly high proportion of theoretical physicists. This influences the perception of physics (which might initially be seen as being a science with few applications) and physicists (who might be perceived as having limited social usefulness). On the contrary, in countries with greater technological development, there are areas for professional inclusion, where the work of the experimental physicist can achieve greater visibility and social appreciation.

Proposals and recommendations for improvement

To help achieve the selected competences, the group feels that:

a) Study programmes should strike a suitable balance between education in Experimental Physics and Theoretical Physics;
b) Laboratory subjects should constantly strive to design new experiments and upgrade existing ones;
c) Subjects taught exclusively in the classroom should strive to associate «pen and paper» practical work with activities in laboratories or elsewhere, so that the student does not end up thinking that there are «two physics»;
d) Students should play a more active role in the laboratory class: the work should be based on minimum guidance from the teacher, to encourage the student to view the laboratory as an open space for investigation, within a framework of intellectual freedom and practice for proposing, deciding and testing. This requires redesigning the activities and the role of the teachers;

e) There should be appropriate education spaces for analysing cases of science history, that will a clear understanding of the role of the experiment in modern science in general, and in physics in particular. It would also be a good idea to introduce spaces of higher education related to the role of measuring techniques and advanced instrumentation in developing today's technology, and in turn, the technological impact on science itself.

Conclusions

Regarding the undergraduate education programmes in Physics in Latin America

If we compare the situation described in this report with that for European countries participating in the Physics area of the Tuning project, we find similarities and differences in education programmes and degrees. The similarities can be put down to certain specific characteristics of the discipline, whereas the differences appear to have their origin in the decision, taken in Europe, to create an area of higher education, paralleling economic and social integration of the European Union. Latin America is still taking the first steps towards integration and this is reflected in the disparity of its systems and educational policies. Despite this diversity of situations, leaving aside the teacher training programmes in physics, we can see a progressive move towards differentiation between two key groups of degrees. On the one hand, an education in Traditional Physics, based on programmes whose duration and degrees vary from country to country, and on the other education programmes in Applied Physics, associated with to a great number of recently created degree courses, which seek to meet the multiple needs emerging out of the processes of economic development and growth in each of the Latin American countries.

Regarding the results of the survey and its implications

One important conclusion of this study is that the model of subject specific competences for the Latin American professional in Physics proposed by the work group (Table 3), has proved to be valid. The competences proposed were given a score of more than 3 by all groups surveyed, except for Competence V21 (Knowledge and understanding of the conceptual development…). Competence V01 (Pose, analyse and solve physical problems…) was considered to be the most important competence and the one that has attained the greatest level of achievement. This initially suggests that the universities of Latin America are working hard to achieve the educational objectives related to a basic education in Physics. At the same time, two of the competences considered to be important, but underachieved —Competence V04 (Verifying how well models match…) and V19 (Participate in the preparation and development of projects…)— are related not so much to the acquisition of basic knowledge, as to the adaptation of models to real situations and to the performance of research projects. In the light of these results, it would be natural ask whether this discrepancy between importance and achievement might be seen as indicating that the connection between the university and the socio-economic and technological reality is perceived as being deficient. Likewise, one might well ask whether it would be advisable to promote new ways of bringing the teaching staff of Latin American universities up to date with technological developments, and encourage greater exposure among academics to the socio-economic problems of their countries and of Latin America in general.

Regarding possible applications of this model

The results obtained have raised two great expectations. The first is the possibility of using the model constructed in this project to guide and orient the universities of Latin America for analysis, design and implementation of the physics curriculum. This derives from the fact that the model makes it possible to deal more efficiently with aspects such as the characterisation of the outgoing profile of Physics graduates, through clearer descriptions of what may be expected from a graduate in the initial exercise of his or her profession.

The second expectation, closely linked to the first one, is that this model may serve as a reference point for analysis and reformulation of learning objectives, during the design of programmes for training physicists. In this regard, the results of this study clearly indicate that a profound conceptual education in Physics is a fundamentally important feature of any programme for educating physicists, but they also show that it has a relevant role in training future graduates to take up careers that are not exclusively restricted to research in Physics, but also in areas related to applied research and technological development.

Proposals to extend the research

This study has established the basic aspects of a group of three competences considered to be of key importance in training physics graduates. However, no attempt has been made, as at other phases of the Tuning Latin America project, to position the acquisition of subject specific competences at certain stages of the student's education, by analysing the role of theory, laboratory or problem solving classes, the courses and other educational areas where they are conducted. These aspects clearly need to be dealt with in a way that goes beyond the purpose and scope of this study. For this reason, and in order to lay the foundations for a later study of the subject specific competences for the area, we present below a series of questions related to the twenty-two subject specific competences in this model. Particularly with regard to cognitive and methodological competences, we feel the following questions need to be answered:

a) **Are they unrelated or transversal competences?** Transversal competences are understood here to be competences whose acquisition is distributed throughout the curriculum, while unrelated ones are those developed over one or two years;
b) **With what area of physics are they related, and at what level?** Here we are referring to areas such as Classical Mechanics, Modern Physics, etc. and to questions such as the year of the career in which they are covered, and the relationship between the achievement expectations and the student's degree of development and maturity;
c) **How can the learning of these competences be assessed?** Theoretical and methodological differences need to be established with the traditional methods for assessing contents-based learning;
d) **How should the learning time for these competences be established?** This question refers to the problem of establishing, with reasonable precision, the total time a student needs to give to learning each of the competences;
e) **In what way must the teaching methods be modified, in order to favour the learning of these competences?** Here we are referring to the need for a profound debate on the best way of allowing teachers and management staff from the universities of Latin America to gain a realistic view of the implications of using competences as a tool for curriculum analysis and design and for assessing the learning of physics in undergraduate studies.

4.7. GEOLOGY

Introduction

The geology area group of the Alfa Tuning Latin America Project was set up in 2006, and was made up of representatives from universities in the following countries: Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Honduras, Peru and Venezuela. Over successive meetings (Costa Rica, Brussels and Mexico), the group

— Analysed and discussed the situation of the subject area in the different countries.
— Analysed the generic competences drawn up at previous stages of the project.
— Established the subject specific competences and the methods for assessing them.

— Conducted a survey on the subject specific competences in the respective participating universities with statistical analysis of the data.
— Analysed the results of the surveys.
— Constructed teaching/learning strategies for a subject specific competence.

This document summarises the chief results achieved to date by the project, looking only at aspects related to the undergraduate courses in this area.

Map of the area

There are 68 university schools of geology in the participating countries: Argentina (14), Brazil (22), Chile (4), Colombia (7), Cuba (2), Ecuador (6), Peru (10) and Venezuela (3). Another is currently being set up in Honduras. The great majority of these are public.

There are two undergraduate programmes Geology and Geological Engineering, in most of the participating countries. The two programmes are equivalent with the exception of Colombia and Venezuela. Programmes last 5 years, except in Chile where they are of six year.

The curricular structure is very similar in all countries and consists of three phases: basic, professional and applied. A final thesis is required to complete the degree.

The basic phase includes content from the fields of physics, mathematics, chemistry, humanities and languages; the professional includes subjects specific to the area, conducted in classrooms, laboratories and in the field; the applied phase covers different subjects linked to exploration, use and harnessing of mineral, water and energy resources; geological risk analyses and environmental studies.

The degrees conferred are: *Geólogo, Licenciado en Geología* and *Ingeniero Geólogo* [Geologist, Degree in Geology and Geological Engineer, respectively]. Historically, courses in geology in Latin America were run by departments of Exact and Natural Sciences or Engineering.

There are other degrees related to the area of geology, such as:

— Geophysics (Argentina, Brazil, Peru, Venezuela).
— Geochemistry (Argentina, Venezuela).
— Petroleum Engineering (Argentina, Brazil, Colombia, Ecuador, Peru, Venezuela).
— Palaeontology (Argentina).
— Mine Engineering (Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Peru, Venezuela).

Geologists normally work in public and private companies and institutions involved in the exploration, harnessing and management of mineral, water and energy resources, as well as in geological risk analysis, environmental studies and civil engineering. They also work as academics and/or researchers in educational institutions and institutions of science and technology.

Report of results of surveys

A qualitative (as opposed to quantitative) analysis is given here of the results obtained from the survey conducted in a total of 9 Latin American countries, on 4 groups of people (academics, students, graduates and employers) related to the area of Geology. The survey focused mainly on analysing the level of importance and achievement these groups of people ascribe to 18 subject specific competences, which were considered valid for any graduating student by the group of participating universities.

A total of 1246 surveys were returned, demonstrating the interest aroused in the work and the commitment to participate in it. This constitutes a sufficiently large sample to ensure the applicability of the results obtained (Table 1).

Table 1

Size of the sample on survey of subject specific competences

Area	Academics	Employers	Students	Graduates	Total
Geology	277	202	347	420	1,246

The survey on subject specific competences in the area of geology is a very relevant one, because many of the countries in the region are currently engaged in deliberation on the education process. It is worth noting that this is the first time that such a study has been made of geology degrees in Latin America.

As part of the process of assessing competences all the agents involved in the field of geology, including employers, were asked to appraise the basic education of a geologist *vis-à-vis* the real needs of the setting and of Latin American countries.

At the same time, it also proved important to have a broad spectrum of countries and institutions and to bring out interim reports to consolidate these results. Efforts have been made to improve the teaching of geology in some countries (forum of geology educators, redesign of curriculum), in which the methodologies and results of this project could be particularly useful.

One specific feature of the teaching of geology is that academics traditionally educate for both vocational and research fields within national systems, unlike some other undergraduate studies.

However, with regard to the methodology used to draw up the survey, it must be noted that many of those polled did not understand the concept of a competence. The survey was conducted primarily by e-mail and in face-to-face sessions.

The universities responsible for organising the surveys generally found greater difficulty in surveying employers —and in some cases academics—.

Likewise, some of those surveyed stated that some of the competences were either similar or difficult to differentiate between. Specifically, participants in Brazil cited the Portuguese translation as being one of the difficulties in the process.

The process has really identified trends, rather than producing hard statistics, given that sampling is not random and there is no systematic bias influencing the information. There is a 95% likelihood of a sample lying between the lower and higher limits. Size is also important, and the more similar the sample, the less any small changes are likely to have a significant effect on the results.

The aim was to obtain sample results from one university in each country, with the exception of Argentina and Brazil, each of which had two universities involved. Chile and Ecuador applied the surveys in several university departments. The result was a very high level of participation in the results from students and graduates in Chile, and from students and academics in the case of Ecuador. Amongst the other groups surveyed, the distribution was more uniform. Honduras does not at present have any university schools of geology and the survey there was carried out among two groups, academics and employers interested in the future creation of a geology degree, who were not necessarily professionals in the area (Table 2).

Table 2

Number of surveys by Country and Group

Country	Academics	Employers	Students	Graduates	Total
Argentina	30	26	28	36	120
Brazil	46	36	58	48	188
Chile	20	16	75	166	277
Colombia	20	28	31	33	112
Cuba	17	14	21	24	76
Ecuador	43	23	62	44	172
Honduras	53	21	0	0	74
Peru	24	17	31	19	91
Venezuela	24	21	41	50	136
Total	**277**	**202**	**347**	**420**	**1,246**

There follows an analysis of the results of the survey into the importance of the competences, based on the average values per group for each competence.

Table 3 shows the averages for the 18 competences surveyed, sorted in decreasing order of the average scores given by the academics and Table 4 shows the correlation matrix between the four groups.

The first issue that should be mentioned is that the importance of all competences was scored above 3.3 by all groups, on a scale in which 3 is equivalent to **considerable** and 4 to **strong**. This means that the 18 competences selected were considered relevant and important by the four groups of people linked to the degree.

Table 3

Importance of the competences:
average in decreasing order of academics' score

Num. variable	Competence	Graduates	Students	Employers	Academics
V10	Skill in drawing and interpreting geological cross-sections and maps.	3.845	3.725	3.840	3.801
V09	Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources.	3.776	3.694	3.719	3.765
V08	Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events.	3.750	3.737	3.632	3.735
V16	Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation.	3.796	3.669	3.745	3.724
V17	Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models.	3.768	3.636	3.661	3.709
V01	Ability to apply classification and sorting systems for geological matter.	3.675	3.503	3.559	3.699
V04	Capacity for observing and understanding the environment.	3.721	3.616	3.612	3.662
V06	Capacity to undertake work in good balance with the care and conservation of the natural and social environment.	3.717	3.586	3.686	3.659
V11	Skill in assessing and appraising geological resources and the alterations they have undergone.	3.698	3.556	3.634	3.610
V07	Capacity to pursue professional activity within a framework of responsibility, legality, safety and sustainability.	3.776	3.614	3.699	3.595
V12	Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet.	3.583	3.468	3.466	3.558

Num. variable	Competence	Gradu-ates	Stu-dents	Em-ployers	Aca-demics
V05	Capacity to develop teaching and research methods in geology aimed at furthering career and diffusion of knowledge.	3.547	3.529	3.417	3.547
V03	Capacity to interact in interdisciplinary and trans-disciplinary areas.	3.672	3.347	3.612	3.538
V14	Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters.	3.629	3.500	3.512	3.528
V13	Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources.	3.717	3.492	3.708	3.508
V02	Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes.	3.481	3.311	3.442	3.469
V18	Skill in locating perforation sites for research and operation, and in controlling them geologically.	3.637	3.496	3.575	3.463
V15	Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter.	3.382	3.347	3.387	3.415

Table 4

Correlation matrix among averages

	Graduates	Students	Employers	Academics
Graduates	1			
Students	0.82659102	1		
Employers	0.9361074	0.72460023	1	
Academics	0.81508667	0.86290502	0.71946043	1

Analysis of the importance of the competences, by group surveyed and comparatively

Although all the competences scored above 3.3, it is interesting to analyse them in two groups: those which were rated above 3.7 and the others. In the first category, (i.e. those which are close to the «strong» category), the academics placed the five following competences: V08, V09, V10, V16 and V17. The employers rated a total of four competences above 3.7: V09, V10, V13 y V16. Graduates placed nine competences in this category: V04, V06, V07, V08, V09, V10, V13, V16 and V17. In the case of the Students, only two competences scored more than above 3.7: V08 and V10.

If we compare the four groups which were rated above 3.7 by nearly all groups we can see the importance of competences V09, V10 and V16 (see Table 5). These were:

- V09. Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources.
- V10. Skill in drawing and interpreting geological cross-sections and maps.
- V16. Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation.

The greater importance ascribed to these competences can be closely related to the geologist's basic skills (cartography, exploration, exploitation, management of resources, data gathering, processing and interpretation).

Competence V08 (*Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events*) is considered to be of strong importance by students, graduates and academics. The employers, in contrast, ascribe less value to this competence, possibly because they assume it to have been completed, or because it is more closely associated with processes of research and less directly with the immediate application of results.

Competence V13 (*Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources)* was considered by employers to be one of the most important, whereas for academics and students it is less relevant. This probably reflects to some extent the traditional gap in Latin America between academia and industry, or a certain degree of complacency in the academic world.

Competence V18 (*Skill in locating perforation sites for research and operation, and in controlling them geologically*) is the least important for all groups surveyed, with the exception of the employers. For the employers, indeed, it is one of the important, possibly due to the fact that it is one of the geologist's practical skills in the fields of exploration and mining and is probably most effectively developed during the geologist's working career.

Finally, it is worth noting that none of the groups gives scores of over 3.5 for Competences V15 (*Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter*) and V02 *(Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes)*. These competences are considered to be less important, possibly because of the overlap with civil engineering. In the case of V15, this must be seen as a field of action in which the geologist act most, and the case of V02 is disturbing, given that geologists are not working in tasks of resource planning and management, which do in fact, come within their authority.

The correlation matrix (Table 4) shows values > 0.7, indicating a high level of compatibility among the criteria of the four groups. The compatibility is greatest between Employers and Graduates (> 0.9), slightly less between Students and Academics, Students and Graduates and Academics and Graduates (values between 0.8 and 0.9). The lowest figure is for Students and Employers - Academics and Employers (< 0.8) and strategies therefore need to be discussed for a greater rapprochement between academia and industry and for a more effective inclusion of students in the field of employment.

Table 5

Least and most important competences on average.
Within each group, these are given in decreasing order of importance

Group	Least important	Most important
Academics	**V03** Capacity to interact in interdisciplinary and trans-disciplinary areas. **V14** Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters. **V13** Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources. **V02** Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes. **V18** Skill in locating perforation sites for research and operation, and in controlling them geologically. **V15** Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter.	**V10** Skill in drawing and interpreting geological cross-sections and maps. **V09** Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources. **V08** Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events. **V16** Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation. **V17** Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models. **V01** Ability to apply classification and sorting systems for geological matter.
Graduates	**V18** Skill in locating perforation sites for research and operation, and in controlling them geologically. **V14** Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters. **V12** Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet. **V05** Capacity to develop teaching and research methods in geology aimed at furthering career and diffusion of knowledge. **V02** Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes **V15** Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter.	**V10** Skill in drawing and interpreting geological cross-sections and maps. **V16** Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation. **V07** Capacity to pursue professional activity within a framework of responsibility, legality, safety and sustainability. **V09** Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources. **V17** Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models. **V08** Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events.

Group	Least important	Most important
Students	**V18** Skill in locating perforation sites for research and operation, and in controlling them geologically. V**13** Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources. **V12** Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet. **V15** Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter. **V03** Capacity to interact in interdisciplinary and trans-disciplinary areas. **V02** Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes.	**V08** Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events. **V10** Skill in drawing and interpreting geological cross-sections and maps. **V09** Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources. **V16** Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation. **V17** Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models. **V04** Capacity for observing and understanding the environment.
Employers	**V01** Ability to apply classification and sorting systems for geological matter. **V14** Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters. **V12** Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet. **V02** Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes. **V05** Capacity to develop teaching and research methods in geology aimed at furthering career and diffusion of knowledge. **V15** Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter.	**V10** Skill in drawing and interpreting geological cross-sections and maps. **V16** Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation. **V09** Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources. **V13** Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources. **V07** Capacity to pursue professional activity within a framework of responsibility, legality, safety and sustainability. **V06** Capacity to undertake work in good balance with the care and conservation of the natural and social environment.

In general, there is a high rate of agreement between employers and graduates and between students and academics; to a lesser extent, the agreement between employers and academics and with students, possibly due to the impact of the professional and academic milieus in each case. There is also a temporal and spatial correlation, due to the fact that the students' perspectives of the requirements of the profession develop once they graduate and face a real situation.

The generic competences (leadership, teamwork) do not often appear, since employers presume that these skills have been attained during undergraduate studies.

It was considered very important to build a map of the employment field, to see the influence on interdisciplinary work, since this may not be not sufficiently encouraged in university education.

Research skills are not considered to be important, probably because they involve solutions to long-term problems and only focus on more isolated issues which are of less practical importance for the business and professional work of graduates.

Analysis of the survey of level of achievement of the competences, taking the average values for each group and each competence

Table 6 shows the averages for the 18 competences surveyed, in decreasing order of the average scores given by the academics and Table 7 shows the correlation matrix between the four groups.

Table 6

Achievement of competences:
average in decreasing order of academics' score

Num. variable	Competence	Graduates	Students	Employers	Academics
V10	Skill in drawing and interpreting geological cross-sections and maps.	3.177	3.172	2.969	3.194
V08	Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events.	3.174	3.273	2.955	3.140
V01	Ability to apply classification and sorting systems for geological matter.	2.861	2.810	2.722	2.968
V16	Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation.	2.845	2.869	2.730	2.912
V04	Capacity for observing and understanding the environment.	2.920	3.034	2.699	2.874
V09	Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources.	2.638	2.662	2.585	2.866
V11	Skill in assessing and appraising geological resources and the alterations they have undergone.	2.696	2.720	2.611	2.759
V17	Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models.	2.569	2.715	2.492	2.755
V12	Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet.	2.810	2.872	2.598	2.755
V07	Capacity to pursue professional activity within a framework of responsibility, legality, safety and sustainability.	2.593	2.755	2.479	2.711

Num. variable	Competence	Graduates	Students	Employers	Academics
V05	Capacity to develop teaching and research methods in geology aimed at furthering career and diffusion of knowledge.	2.506	2.500	2.485	2.650
V06	Capacity to undertake work in good balance with the care and conservation of the natural and social environment.	2.478	2.550	2.432	2.601
V15	Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter.	2.250	2.319	2.291	2.517
V18	Skill in locating perforation sites for research and operation, and in controlling them geologically.	2.343	2.338	2.377	2.498
V03	Capacity to interact in interdisciplinary and trans-disciplinary areas.	2.367	2.412	2.266	2.437
V13	Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources.	2.223	2.340	2.202	2.391
V14	Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters.	2.156	2.180	2.179	2.316
V02	Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes.	2.047	2.161	2.052	2.182

Table 7

Correlation matrix among averages

	Graduates	Students	Employers	Academics
Graduates	1			
Students	0.98397877	1		
Employers	0.98712665	0.95696809	1	
Academics	0.9715231	0.9474602	0.9874421	1

In general, the level of achievement of each of the competences is rated lower than its importance, with standard deviations of 0.1. This is due to the fact that the level to which the competences are developed is clearly linked to deficiencies in the development of the processes in each school or faculty.

Few competences scored higher than 3, or «Considerable». Among these are V10 (*Skill in drawing and interpreting geological cross-sections and maps*) and V08 (*Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events*), rated by graduates, students and academics. This means that the level of achievement of only two competences was rated by some groups with a score equivalent to «Considerable». The employers did not rate any of the competences in this category.

Competence V10 state what it is shows a high score for both importance and level of achievement. It is followed by V08 and V16 *(Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation)*, the latter rated >3 by students.

There is a high degree of correlation between academics and employers. Nonetheless, there is disagreement as to the level of achievement of Competence V13 (*Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources*). It may be the case that the academics think that this competence is properly developed in the workplace and not entirely within the educational process.

As the level of experience increases (student - graduate - employer), the level of achievement of competence V04 falls and that of V10 rises.

There is generally a close correlation between the most important competences and those that are ascribed the highest level of achievement.

There is greater correlation among the groups consulted on level of achievement and less on their importance, perhaps due to development in the education process and in professional work.

The competences with the highest level of achievement and greatest importance are considered to indicate areas of core curriculum in geology and the most subject specific competences, which scored lowest on achievement, are those whose development begins in undergraduate studies, but require further consolidation in the professional field.

In general, in the area of level of achievement, there is a high degree of coincidence in the criteria of the different groups with a correlation matrix of >0.9 in all cases.

Analysis of the «importance» versus «achievement» ratio of the subject specific competences

Of the most important competences

— **In the opinion of academics** (Figure 1): Coincidentally, the five most important competences score highest on achievement: Skill in drawing and interpreting geological cross-sections and maps (V10), Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events (V08), Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation (V16), Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources (V09) and Ability to apply classification and sorting systems for geological matter (V01).

This might encourage us to be complacent; however, although, all of these competences score above 3.69 (between «considerable» and «strong»), in terms of importance and although they score highest for level of achievement in university, the latter score stands at around 3 (between 2.8 and 3.3, or «considerable»), which though not «weak», is nonetheless insufficient. According to the academics, therefore, these competences should be improved upon.

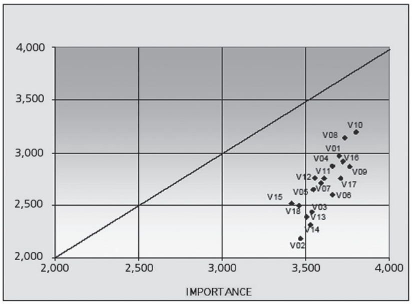


Figure 1
Geology: Academics
Importance/Achievement
comparison (averages)

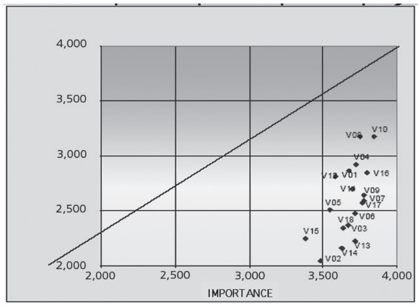


Figure 2
Geology: Graduates
Importance/Achievement
comparison (averages)

— **Four of the five competences considered most important by Graduates** (Figure 2), coincide with the academics' top four. The exception is «Ability to apply classification and sorting systems for geological matter» (V01), which in the case of the students is replaced by «Capacity for observing and understanding the environment» (V04). They all have an importance rating of over 3.7, with achievement scoring around 3, where some are even rated higher than the score given by the academics, with the exception of V04, which this group assigns a level of achievement of 2.92 («considerable»). According to the graduates, then, improvements are needed in the achievement of the competences, especially «capacity for observing and understanding the environment».

— **Students** (Figure 3) coincided with Graduates in 4 of the most important competences and in 3 with Academics. The three groups coincide in the importance and achievement of competences V10, V08 and V16. In the case of competence V04 in which they coincide with graduates, they ascribe it a level of achievement of 3.03, higher than the score of all the groups, i.e. considerably well «developed in the university». In contrast they give a score of 2.66 to «Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources» (V09). The students felt that all the important competences attained a considerable level of achievement in the university, with the exception of V09, which needs to be assessed for future corrective action.

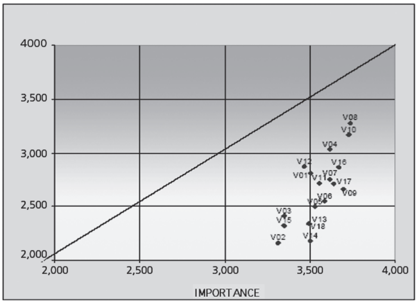


Figure 3
Geology: Students
Importance/Achievement
comparison (averages)

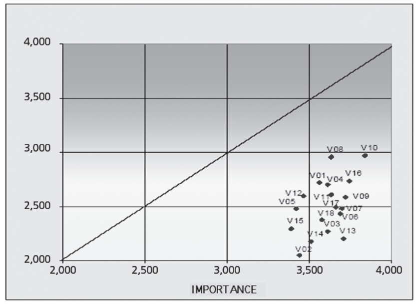


Figure 4
Geology: Employers
Importance/Achievement
comparison (averages)

— **Employers** (Figure 4) coincide with the aforementioned groups on only two of the most important competences (V10 and V16), but like the academics and graduates they include V09 among the five most important, with a level of achievement <2.6 and they coincide with the students on V07 with a level of 2.48. At the same time, they include among the most important «Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources» (V13), with an importance level of 3.70 and an achievement level of just 2.20.

Our analysis shows that of the most important competences, the following need a little more attention in Latin American universities:

V09 Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources.
V04 Capacity for observing and understanding the environment.
V07 Capacity to pursue professional activity within a framework of responsibility, legality, safety and sustainability.
V13 Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources).

Nonetheless, it is interesting, and should be a source of satisfaction for all, that the four groups agree that the level of achievement of «Knowledge in the area of study and the profession» in our universities is more than «considerable».

Regarding the least important competences

It should be noted that these competences are still considered important. All were rated by the 4 groups with a score of >3.3, placing them in the «considerable» importance bracket. Nonetheless, some points should be made:

— **Academics** think that the five least important competences and the ones with the least level of achievement, are: «Capacity to undertake and evaluate technological and/or geotechnical studies on geological matter» (V15), «Skill in locating perforation sites for research and operation, and in controlling them geologically» (V18), «Ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes» (V02), «Skill in planning, executing, managing and overseeing projects and services aimed at prospecting, harnessing and utilising natural non-renewable resources» (V13) and «Capacity to provide bases for territorial planning and the prevision, prevention and mitigation of geological risks, natural and man-made disasters» (V14). Of all of these, V02 is given a very low score on achievement in the university (2.18).The remainder score above 2.3 but below 3.0, which suggests that they need further development in the university.
— **Graduates,** like the academics, gave similar scores for competences V15, V2, V14, and V18, which they ranked below 2.34 on achievement, and also included «Capacity to interact in interdisciplinary and trans-disciplinary areas» (V03), with a value of 2.36.
— **Students** also indicated that improvement was needed in achieving competences V02, V15, V14, V03, V18 and V13, all of which they rated below 2.5.
— **Employers** agreed with the previous groups in rating Competences V15, V14, V02 and V18, V13 and V03 as the least achieved and least important.

We can conclude that all the variables studied require improvement to some extent or another.

Analysis of the ranking of competences

Considering the most important competences identified by all the groups surveyed, together with the academic criterion of the work group, a reduced group of common competences (core curriculum) can be identified:

V10 Skill in drawing and interpreting geological cross-sections and maps.
V09 Ability to undertake geological studies to find, exploit, conserve and manage water and energy resources.
V16 Rigour in sample-taking and data gathering, and in their processing, analysis and interpretation.
V08 Skill in describing and analysing the relations of elements present in rocks and in their internal and external structures, in order to interpret the evolution and sequence of geological events.
V17 Capacity to gather, process and interpret data from different sources, using qualitative and quantitative techniques to construct geological models.
V04 Capacity for observing and understanding the environment.

V01 Ability to apply classification and sorting systems for geological matter.
V12 Capacity to perceive and understand the spatial and temporal dimensions of geological processes and their effects on the planet.

Analysis of the competences suggested by those surveyed

In the light of the extensive list of suggestions for competences made by people surveyed, we need to explain that:

- Some are truncated or incomplete or are difficult to read and/or understand. We recommend that greater space be left for suggestions, in the future.
- Those surveyed listed tools, subjects, techniques, desires, needs, etc. that do not correspond to subject specific competences (it might have been a good idea to clarify the concept of «competence» in the survey; the face-to-face surveys offered more chance to explain the meaning of the term).
- Various competences were suggested which are already included in the list.
- Generic competences (leadership, etc.) were mentioned
- Competences and/or aspects were mentioned that do not correspond to geologists or are not exclusive to the functions of the geologist (climate change, etc).

Examples of teaching, learning and assessment of subject specific competences

Competence V10 «***Skill in drawing and interpreting geological cross-sections and maps»*** was selected for this exercise, because the groups surveyed considered it to be the most important and to have a high level of achievement.

Definition of the competence: capacity to represent in graphic form the geological information acquired in the field, allowing a reading and interpretation of geological events.

Geological mapping (map and cross-section, generally in two dimensions) is the essential element for representing and storing information on the distribution, composition and structure of surface rocks. Based on this and information obtained in the field, office and laboratory, three-dimensional interpretative models are constructed. Generally, this process involves creating a topographical map, followed by a geological one (base and successive versions in greater detail). Once this has been done cross-sections are made followed by an interpretation of the geological history or events of the region.

In order to develop this competence, the teacher needs to provide the student with a set of knowledge and abilities, in successive and increasingly complex stages. This process must be interactive.

First of all, notions of physical geography and systems of coordinates and trigonometry that are needed to use and prepare a topographical map (Level 1) must be understood. The teacher then needs to provide additional information (geomorphology, petrography, structural geology and historical geology. (Level 2). Teacher and students then travel to the field to make observations, survey features, gather information and make a preliminary (basic) geological interpretation. This will seek to resolve the queries that have been raised.

It is possible that this interpretation may raise some unresolved queries and/or contradictions. In this case, the teacher has to discuss these possibilities with the students and encourage them to consider the need to gather new complementary information, which will help minimise these problems. Other field trips have to be made (with different itineraries and to perform other observations and sampling), which will generate a greater variety of studies and analysis, allowing for an interpretation which will be presented in a detailed geological map, as well as different cross-sections based on it (Level 3). These sections are constructed with particular attention to contacts and dips in the units mapped. These interpretations relate all the information obtained, which will serve as a basis for determining the geological history of the area.

It should be noted that in the course of this process, students must be made aware that, as the volume of data increases, the interpretations postulated and the final products (map(s) and/or cross-section(s)) come closer to the real situation. It is also important to get across that some of the geological concepts taught are changing as new discoveries are made, and that the methodology that will be used will depend on the objectives that have been set.

Over recent years, is has become common practice for the resulting information to be presented in the form of theme maps (planimetric/altimetric, geomorphological, structural, of alterations and mineralizations, environmental, etc.), and for it to be presented in geographic information systems (GISs).

These stages, or levels, are listed in the table below:

Levels	Indicators	Descriptors
1. Master the basics of map reading.	1. Understands the physical components of a map (physical geography).	1. Does not know the basics of a map.
		2. Partially identifies basic components of a map (coordinates, scale, equidistance, geographical and magnetic north, paths, settlements, etc).
		3. Understands the components of a map (gradient, drainage, topography, hydrography, etc.).
		4. Masters and interprets the constituent elements of a topographical map (planimetry-altimetry).
	2. Uses a map in the field.	1. Can read and interpret coordinates. Masters the concept of reference system used (Datum - GPS).
		2. Differentiates areas with rocky outcrops and other covered areas, e.g. soils.
		3. Knows basic elements of geomorphology and petrography.

Levels	Indicators	Descriptors
2. Analyse basic geological maps and cross-sections.	1. Understands geological maps and cross-sections.	1. Masters descriptive geometry.
		2. Identifies and recognises geomorphological components.
		3. Differentiates between igneous, metamorphic and sedimentary rocks.
		4. Acquires notions about structural features (fractures, folds, etc.)
		5. Knows concepts of historical geology and stratigraphy (succession), as well as basic notions of palaeontology and geochemistry.
3. Prepare geological maps and cross-sections of varying complexity.	1. Uses basic geological mapping tools and instruments.	1. Acquires abilities for analysis and interpretation of aerial photographs and satellite images for the purposes of creating a base map.
		2. Acquires abilities for using topographical instruments (compass, alidade, theodolite, total station, GPS, etc.) for the purpose of map making.
		3. Uses techniques of topography (polygonal, levelling, radiation, etc.).
	2. Data gathering.	1. Identification and measurement of geological and structural features (outcrops, contacts, direction and dip of the units, etc.).
		2. Classifies the main varieties of rocks, types of alteration and/or mineralization.
		3. Performs sampling of sediments, soils, water, rocks, etc. Assesses size and quantity of samples, and equidistances between them.
		4. Uses geophysical techniques (geoelectrics, magnetometry, etc. - indirect methods) and exploration (wells, drilling, etc. - direct method - samples) for obtaining information on the subsoil.
		5. Represents the field information in a notebook (position; type and description of samples; studies and analysis —chemical, mineralogical, petrological, calcographic, among others— to be practised on those samples; contacts; relative ages; fossils; etc.).
	3. Represents the information in graphic form and constructs cross-sections.	1. Prepares the map on paper and/or using computer assisted drawing software (CAD).
		2. Illustrates samples and cross-sections.
		3. Prepares legends and theme maps.
		4. Prepares cross-sections with information on activities, in the field laboratories and studio (interpretation).
	4. Interprets and represents the information obtained.	Uploads the information obtained on a SIG. Prepares an explanatory report of the map and/or cross-section.

The descriptors established in Section 1.1: «does not know, partially identifies, understands and masters and interprets», should be considered in the other sections (1.2 - 2 - 3 and 4).

Conclusions

The value of having a joint reflection from all the agents involved in the field cannot be disputed. Nonetheless, it is considered to important to extend this process to other universities and countries, with a view to the possibility of exchange and degree validation throughout Latin America.

The methodology and results may help strengthen the processes of curricular reform, in which most of the geology schools in Latin America are involved. The project is felt to be sufficiently disseminated to obtain results in each country and correlate them with those obtained in this project.

The great importance ascribed to the competences by those surveyed confirms their relevance. Nonetheless, the perceived level of achievement is lower than the importance for all competences.

The competences with the highest level of achievement may contribute to a core curriculum in geology and the most subject specific competences which scored lowest on achievement are those whose development begins in undergraduate studies, but which require further consolidation in the professional field.

It is interesting —and satisfying— to note that the four groups agreed that «Knowledge in the area of study and the profession» is being achieved in our universities, albeit at the lower end of the «considerable» bracket.

Based on the results, we have proposed the minimum competences to be developed among students at undergraduate level.

It is important to consider strategies for a greater rapprochement between academia and industry and for a more effective integration of students into the professional field.

4.8. HISTORY

Introduction

There is a long tradition of university history teaching in Latin America. History has always played a substantial role in the curriculum of various degrees, such as Law, Sociology, Anthropology and International Relations among others. During the twentieth century it also emerged as a major degree in its own right in faculties of Humanities or Philosophy and Arts. In most cases, this emergence was the product of a gradual process of differentiation from programmes that included history as a central subject, or as orientation for final year theses. The process by which history departments and degree broke away from these original degree courses spanned a period from the end of the nineteenth century to very recent periods.

In this report, the history committee of the Tuning Latin America project has gathered information on the structure and basic content making up the degree at this time. The information presented refers exclusively to the undergraduate level. Eleven countries are represented in the report: Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Mexico, Peru and Venezuela. The summary below sets out the work carried out over five meetings, the first of which was held in Buenos Aires in March 2005.

In general terms, history degrees in the region share a relatively uniform structure: four or five years in duration, with a spectrum of content that combines subjects related to professional education, national, regional and European history, and a collection of different complementary subjects. There are of course national variations which are indicated in each case. We have also identified a common pattern in the name and nature of the degrees awarded (in most cases, «*Licenciatura*» (BA) y *Profesorado* (teaching qualification)) although, as we shall see, the content and meaning of these diplomas is not always the same.

The report offers: 1) A map of the subject area, made up of a panorama of the dominant trends, continued by a short summary of the situation in each country; 2) A short presentation of generic competences and a detailed examination of subject specific competences in the area, with an analysis of the results of the survey on priorities and levels of achievement, which was completed by students, academics and graduates in the eleven countries; 3) Examples of teaching and learning activities for three generic competences and three specific ones; 4) Conclusions.

Map of the subject area of History

There are various academic programmes related to the area of History, with different objectives in their professional education. In principle, in all the participating countries there is a degree known as a «*Licenciatura*» (BA) in History, but in most of them, there are also programmes with variants related to teaching and orientation towards social sciences. In Argentina, for example, there is a «*Profesorado*» (teaching qualification) in History; in Chile, «*Pedagogía en Historia*»; in Ecuador and Venezuela a «*Licenciatura*» in Education Science with a mention in history, in Mexico and Peru a «Licenciatura» in history teaching, and in Venezuela and Colombia there is a «*Licenciatura*» in Social Sciences. Other cases include Colombia, where there is a degree course («*carrera*») in History, and Costa Rica and Brazil which offer a «*Bachillerato*» in History.

In most cases, the degree courses have a duration of between four and five years; in Guatemala there are also intermediary degrees of three years with supervised teaching practice oriented towards future secondary teachers.

In general, these degrees lead to the conferral the title of «*Licenciado*» in History, as is the case in Cuba, Ecuador, Guatemala, Mexico, Peru and Venezuela. There is a range of different specifications and professional activities: in Argentina and Chile, for example, the options are «*Licenciado*» in History and Teacher of History, but despite the distinction in orientation, in practice «*licenciados*» and teachers lead to very similar careers in teaching (secondary level and university) and research. In Brazil, the profession most directly associated is that of «*Licenciado*» in History, which allows holders to teach or, like the title of «*Bachiller*», to work as consultants in television, newspapers, museums and others. In Colombia the degrees obtained are Historian, Professional in History, *Licenciado* in History and *Licenciado* in Social Sciences, with the distinctive feature that the first two of these —Historian and Professional in History— are meant to produce historians with an emphasis on research; whereas «*licenciaturas*» in History or Social Sciences concentrate on educating school teachers. In Costa Rica, the undergraduate degree is the «*Bachillerato*» of Teaching in Social Sciences, Education in History, Geography, which entitles holders to work in research, teaching and consultancy.

With the degrees conferred by the universities of the region, graduates can in practice work as teachers, researchers or both at the same time. As well as these two principal areas, in the job market graduates are needed to act as cultural, journalistic, political and diplomatic advisers; there are also career openings in the civil service, as well as in institutional management or consultancy in archives, libraries, museums and other similar institutions. Over the last decade new career opportunities have opened up in areas such as tourism, communication, cinema, television and video games among others.

Although there is no typical curriculum covering the different academic programmes in history in the eleven participating countries, the curriculum generally encompasses core components that suggest that they are oriented towards various areas of specific education. In most countries the basic content is related to General History, History of America, National History, Regional History and Thematic History. This basic content is generally complemented by areas of professional education oriented towards theory of history, methodology of research and historiography.

There are several complementary subjects, which vary depending on the speciality or working field of the lecturers, as is the case in Argentina, Colombia, Brazil and Chile, among others. In Mexico and Costa Rica subjects are offered dealing with Information and Communication Technology as support for academic work and research. Most degrees contain an element of research, areas of advanced study and elective and optional subjects.

In the particular case of Cuba there is a single curriculum drawn up by a National Commission made up of teachers, students and research centres. Over recent decades, this commission has changed its methodology and now surveys graduates.

The degrees related to the area of History end with the presentation of a final assignment which has to be assessed by an appropriate jury and in some cases must be complemented by a *sustentación* or oral dissertation, as in the case of Colombia, Guatemala and Venezuela, or with teaching practice.

Despite this relative uniformity, there is a great divergence in the number of programmes in each country, ranging from over six hundred in Brazil to just one in Ecuador.

Another feature of the academic structure that is relevant to designing exchange programmes is the existence of two different models of academic calendar. In Argentina, Chile, Brazil, Ecuador and Peru the year runs from March to December, with the winter vacation in July or August, and the summer one in January and February. Colombia also uses the «southern» calendar, with activities running from January to December. In Venezuela, Costa Rica, Guatemala, Cuba and Mexico, however, the academic year follows the calendar of the northern hemisphere, running from September to June, with a winter vacation in December and a summer one in July and August.

Generic and subject specific competences

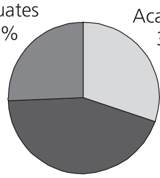
The final results of the surveys show a very high level of participation among the different groups in each of the universities participating in the Tuning Latin America project. This was relevant in evaluating the (ideal) importance and (real) level of achievement of each of the generic competences proposed by the history area for the region.

Generic competences relating to the environment, a second language, interpersonal skills, the use of new technologies and the international context were not viewed as being as relevant in the process of educating a historian contrary to what the history group of had originally thought when generic competences were first drawn up. Nonetheless, taking into account the convergence and interconnectivity of nations and peoples in certain common interests related to the environment, communication and new technologies, it is important for these competences to be given an important place in the structure of the study plans of history degrees in Latin America.

Other generic competences were considered not be equally important by the groups surveyed and by the members of the Tuning Latin America history group. Competences such as ethical commitment, the capacity for abstraction, analysis, and synthesis, and commitment to quality, were considered to be transcendental and necessary by the four groups surveyed, in particular, because they match the profile required for any career in history at this time.

Specific competences in the area of History

The three groups selected for the survey on subject specific competences were: academics (30% of the total), graduates (26%), and final year students (44%). This sample was obtained from the survey carried sent to universities in ten countries in Latin America; in turn, the representatives of these institutions conducted surveys in other universities. The graph below gives a breakdown of the survey.



Participation by sector in the survey

The questionnaire used followed the guidelines set out in the Tuning methodology; each sector surveyed (academics, graduates and students) was asked to rate the importance and level of achievement of each of the competences, using a scale of 1 to 4 (1 none; 2 weak; 3 considerable; 4 strong).

Altogether a list of 27 subject specific competences was drawn up (coinciding with the number of generic competences), containing the competences considered essential for educating historians for a professional career. They were presented in the following order in the questionnaire:

No.	Subject Specific Competences
1	Understanding the social role of the historian.
2	Understanding of the fact that historical debate and research is permanently developing.
3	Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy.
4	Knowledge of national history.
5	Ability to design, organise, and develop historical research projects.
6	Critical knowledge of the relationship between current and past events and processes.
7	Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.).
8	Ability to read historiographic texts and documents in another language.

No.	Subject Specific Competences
9	Knowledge of methods and problems of the different branches of historical investigations: economic, social, political, gender studies etc.
10	Knowledge of local and regional history.
11	Ability to take part in interdisciplinary research work.
12	Ability to recognise, contribute to, and participate in socio-cultural community activities.
13	Ability to use tools to compile information, such as bibliographical catalogues, archive inventories, and electronic references.
14	Knowledge and respect for points of view deriving from different cultural, national, and other backgrounds.
15	Critical knowledge of the general diachronic framework of the past.
16	Knowledge of native languages, if necessary.
17	Knowledge and ability to use theories, methods, and techniques from other social and human sciences.
18	Critical knowledge of different historiographic perspectives from different period and contexts, including current debates.
19	Knowledge of universal or world history.
20	Ability to communicate and argue orally and in written form in the native language of the relevant country, in accordance with usual terminology and techniques of the profession.
21	Ability to apply historical education techniques and methods.
22	Ability to transcribe, summarise, and catalogue information in appropriate forms.
23	Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research.
24	Ability to define research terms which can contribute to historiographic knowledge and debate.
25	Knowledge of the history of America.
26	Ability to coherently organise complex historical information.
27	Ability to comment on, annotate, and correctly edit texts and documents in accordance with the critical norms of the discipline.

For the academics, graduates and students the competences that scored highest in importance were numbers 23, 2, and 4.

23 *Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research.*
2 *Understanding of the fact that historical debate and research is permanently developing.*
4 *Knowledge of national history*.

One interesting aspect that deserves attention is that for the academics the most important competence —and the one that requires greatest attention for professional practice was Number **20** *Ability to communicate and argue orally and in written form in native language*, which is closely linked to the integration of the profession into the job market and to the specific nature of the discipline itself.

In contrast, for the graduates and students the most important competences (in addition to 23, 2, and 4) were those related to *Ability to design, organise, and develop historical research projects* (5), and *Critical knowledge of different historiographic perspectives from different period and contexts, including current debates.*(18).

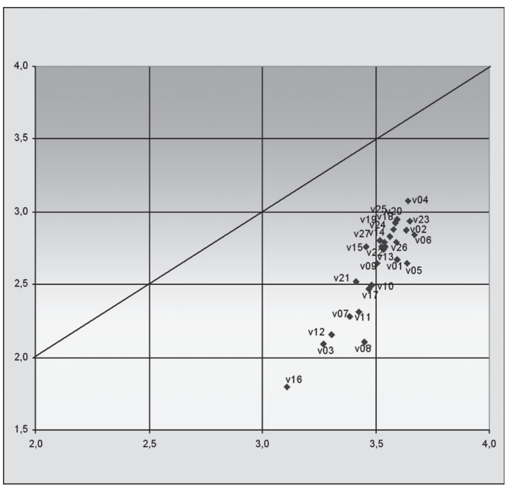


Figure No. 1

History: Students
Importance/Achievement comparison (averages)

Finally, and no less significantly, the most important competence for the students —they partly coincide with the academics— is the *Critical knowledge of the relationship between current and past events and processes* (6).

If we look at the other end of the scale, we can see a high level of agreement among the three groups as to the least important competences. In this case, academics, graduates and students identified four of them in common as being less relevant; there is therefore greater coincidence among the competences considered least important:

3 *Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy.*
7 *Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.).*
12 *Ability to recognise, contribute to, and participate in socio-cultural community activities.*
16 *Knowledge of native languages, if necessary*.

Likewise, academics and graduates coincided in ascribing least importance to *Ability to read historiographic texts and documents in another language* (8), and *Knowledge of local and regional history* (10). The students were the only group to ascribe less importance to the competences most closely related to the present characteristics and demands of the employment market: *Ability to take part in interdisciplinary research work* (11), and *Ability to apply historical education techniques and methods* (21) —which constitutes the most important area of employment for historians—.

A synthesis of both perspectives can be seen in the table below, which shows the least and most important competences in the opinion of each group.

Least and most important subject specific competences

Group	Least important	Most important
ACADEMICS	**8.** Ability to read historiographic texts and documents in another language. **10.** Knowledge of local and regional history. **7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **16.** Knowledge of native languages, if necessary.	20. Ability to communicate and argue orally and in written form in the native language of the relevant country, in accordance with usual terminology and techniques of the profession. **23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **2.** Understanding of the fact that historical debate and research is permanently developing. **26**. Ability to coherently organise historical information. **4.** Knowledge of national history. **6.** Critical knowledge of the relationship between current and past events and processes.

Group	Least important	Most important
GRADUATES	**7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **10.** Knowledge of local and regional history. **8.** Ability to read historiographic texts and documents in another language. **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **16**. Knowledge of native languages, if necessary.	**23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **4.** Knowledge of national history. **5.** Ability to design, organise, and develop historical research projects. **24.** Ability to define research terms which can contribute to historiographic knowledge and debate. **2.** Understanding of the fact that historical debate and research is permanently developing. **18.** Critical knowledge of different historiographic perspectives from different period and contexts, including current debates.
STUDENTS	11. Ability to take part in interdisciplinary research work. 21. Ability to apply historical education techniques and methods. **7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **16.** Knowledge of native languages, if necessary.	**6.** Critical knowledge of the relationship between current and past events and processes. **23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **4.** Knowledge of national history. **1.** Understanding the social role of the historian. **2.** Understanding of the fact that historical debate and research is permanently developing. **5.** Ability to design, organise, and develop historical research projects.

The graduates considered other competences to have the greatest level of achievement: *Understanding of the fact that historical debate and research is permanently developing* (2), and *Knowledge and respect of points of view deriving from different cultural, national, and other antecedents* (14).

The students scored two competences higher for achievement than the academics and graduates: *Knowledge of the history of America* (25), followed by *Ability to communicate and argue orally and in written form in the native language of the relevant country, in accordance with usual terminology and techniques of the profession* (20). We should remember the academics considered this to be the most important subject specific competence, and we can therefore draw inferences between the relevance and demand expressed by the academics with regard to this competence and the high level of achievement confirmed by the students.

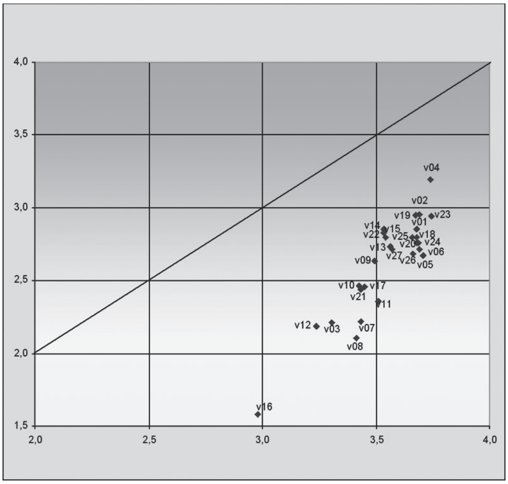


Figure No. 2

History: Graduates
Importance/Achievement comparison (averages)

Least and most achieved subject specific competences

Group	Least achieved	Most achieved
ACADEMICS	**11.** Ability to take part in interdisciplinary research work **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **8.** Ability to read historiographic texts and documents in another language. **16.** Knowledge of native languages, if necessary.	**4.** Knowledge of national history. **23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **19.** Knowledge of universal or world history. **22.** Ability to transcribe, summarise, and catalogue information in appropriate forms. **14.** Knowledge and respect for points of view deriving from different cultural, national, and other backgrounds. **2.** Understanding of the fact that historical debate and research is permanently developing.

Group	Least achieved	Most achieved
GRADUATES	**11.** Ability to take part in interdisciplinary research work. **7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **8.** Ability to read historiographic texts and documents in another language. **16.** Knowledge of native languages, if necessary.	**4.** Knowledge of national history. **19.** Knowledge of universal or world history. **23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **2.** Understanding of the fact that historical debate and research is permanently developing. **14.** Knowledge and respect for points of view deriving from different cultural, national, and other backgrounds. **22.** Ability to transcribe, summarise, and catalogue information in appropriate forms.
STUDENTS	**11.** Ability to take part in interdisciplinary research work. **7.** Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.). **12.** Ability to recognise, contribute to, and participate in socio-cultural community activities. **8.** Ability to read historiographic texts and documents in another language. **3.** Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy. **16.** Knowledge of native languages, if necessary.	**4.** Knowledge of national history. **19.** Knowledge of universal or world history. **23.** Ability to identify and appropriately use sources of information: bibliographies, document, oral testimony etc., for historical research. **25.** Knowledge of the history of America. **20.** Ability to communicate and argue orally and in written form in the native language of the relevant country, in accordance with usual terminology and techniques of the profession. **2.** Understanding of the fact that historical debate and research is permanently developing.

Summing up, there was a very high degree of correlation between the academics, graduates and students in the competences said to have the lowest level of achievement namely:

- **16** *Knowledge of native languages, if necessary*.
- **8** *Ability to read historiographic texts and documents in another language*.
- **3** *Ability to use specific techniques needed for the study of documents from particular periods, such as palaeography and epigraphy.*
- **7** *Ability to manage information and communications technology so as to be able to produce historical facts, or facts related with history (for example, statistical or cartographical methods, databases etc.).*
- **12** *Ability to recognise, contribute to, and participate in socio-cultural community activities.*

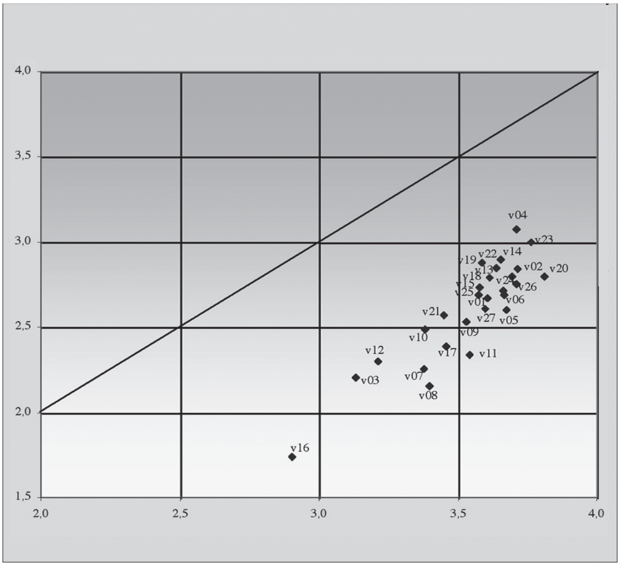


Figure No. 3

History: Academics
Importance/Achievement comparison (averages)

Figure 3 compares the importance and achievement of all the competences surveyed. To some extent it can be said to show the relevance of each competence, while indicating which competences, given their importance, should be covered in the curricular structure for education historians.

It is interesting that the competences that scored highest in terms of importance and achievement were (4) *Knowledge of national history*, (23) *Ability to identify and appropriately use sources of information*, and (20), *Ability to communicate and argue orally and in written form,* which stand out from the rest.

(16), *Knowledge of native languages* is considered to be among the least important competences. Academics, graduates and students coincided in ascribing it both low importance and level of achievement.

Finally, most of the answers were grouped into two nuclei of competences; the first —of greater numerical importance and the highest value if we weight the averages— included sixteen competences; while the second contains seven, of relatively less importance.

Taken together, there are more similarities than differences between the answers from the three groups polled, confirming the relevance of the competences selected. From the point of view of importance, it was clear that the competences related directly to the discipline share the theme of national history, along with others relating more to the development of theoretical and instrumental skills without ignoring references to the scientific and civic values. This corroborates the belief that the combination of attributes represented by the professional competences involves areas of knowledge and its achievement that are abreast with changing circumstances and attitudes in the education process and fundamentally, in society and the workplace.

Approaches to teaching, learning and assessment

Methods of competence-based teaching, learning and assessment are a basic feature in the process of exchanging the traditional paradigm of education for a new one that centres primarily on students and their capacity to learn. They provide resources for achieving the desired learning outcomes.

The exercise below gives definitions, levels of progress towards achieving the competence, means of developing it and methods of assessment for three generic competences and three specific ones.

For these purposes, we took six of the most significant competences, based on the results obtained in the surveys:

1) Generic competences:

   a) 1. Capacity for abstraction, analysis, and synthesis.
   b) 2. Ability to apply knowledge in practice.
   c) 26. Ethical commitment.

2) Specific competences:

   a) 4. Knowledge of national history.
   b) 2. Understanding of the fact that historical debate and research is permanently developing.
   c) 23. Ability to identify and appropriately use sources of information: bibliographical, documentary, oral testimonies, etc. For historical research.

1. ***Generic competences***

a) *1. Capacity for abstraction, analysis, and synthesis*

DEFINITION

Skill that consists of breaking down and separating up elements, which in the case of history, are empirical and conceptual. These are then compared, related and categorised, based on an explanatory or comprehensive position, and then put together again in the form of new knowledge or a reinterpretation.

Levels of progress

Includes a logic that goes from simple to complex whereby the student will progress as follows:

— Identifies elements, discriminates and establishes central ideas.
— Compares, interrelates and sorts by importance.
— Recomposes, reinterprets, deduces and concludes.

Forms of development

The competence is achieved through a systematic process involving the entire curriculum. It can be developed in many areas and fields and therefore involves all subjects. It includes activities that lead to the development of skills such as, discrimination, arranging in order, identifying central ideas, recomposing, reinterpreting and establishing conclusions. For example, preparation of glossaries, text commentaries, participation at forums, discussions, drafting reports, etc.

Methods of assessment

Performance of written work, participation in discussions, oral presentations, etc.

b) *2. Ability to apply knowledge in practice*

Definition

Skill or talent that allows the student to use knowledge in problem-solving. He/she is thus capable of building bridges between knowledge and its practical application.

Levels of progress

Indicators of achievement are the satisfactory development of the levels of knowledge, understanding and application.

Forms of development

Includes activities through which knowledge is learnt that will help understand real situations. Understanding allows problems to be detected and explained, in order to go on to establish solutions. Its development requires readings, discussions, debates, a search for explanations, etc. Research is a fundamental instrument for developing that understanding. It must of course follow a pattern of increasing complexity: from the preparation of small notes to complex assignments.

Methods of assessment

Methods that allow achievement of the progress levels to be identified: text commentaries, participation in discussions, oral dissertations, oral and written exams, etc.

c) 26. Ethical commitment

Definition

Responsibility to act in accordance with the values and principles of society. Also involves satisfying the values and principles of the scientific discipline and professional practice to which they belong.

Levels of progress

Identification, familiarisation, promotion of values.

Forms of development

Activities that allow the individual to identify, familiarise him/herself with and promote the values. Readings, case studies, debates, movie discussions, theatrical performances, involvement in collective coexistence and social outreach activities, etc.

Methods of assessment

Qualitative assessment which includes testing the degree of commitment and new manifestations of conduct in accordance with the values and principles of his/her social and professional milieu. Evidence includes the individual's solidarity with his/her companions, responsibility in achieving tasks and exercises, services he/she offers the community, etc.

2) ***Specific competences***

a) *4. Knowledge of national history*

Definition

Understanding of the nation and society according based on a critical understanding of the past.

Levels of progress

— Chronological development of the nation.
— Greater understanding of economic, social and political processes (includes phenomena related to social cohesion, identity and self-esteem, etc.).
— Inter-relation of internal processes and the global area.
— Critical knowledge of historiography.

Forms of development

Activities that stimulate historical thought related to the national area. Critical reading, creation of timelines, oral and written commentaries, summaries, essays, seminars, forums, debates, etc.

Methods of assessment

Assessment must match the level of the teaching and learning processes. Its progressive development may include questionnaires, essays, summaries, critical reading, commentaries, debates, oral and written exams, etc.

b) *2. Understanding of the fact that historical debate and research is permanently developing*

Definition

Competence requiring an awareness that the discipline of history changes as each present re-evaluates the past. This encompasses changes in problems, debates and methodologies. The advances made by a generation serve as the basis for beginning a new development, and thus the construction of the science and its debates are ongoing and extend continuously over time.

Levels of progress

— Need for a reflection on the individual or collective past.
— Knowledge of historiographic trends.
— Situating authors within these trends.
— Comparison of different trends.

Forms of development

Incorporates the historiographic debate throughout the degree. Development of exercises that stimulate academic debate with a bibliographical and/or empirical basis.

Methods of assessment

Activities that make it possible to establish levels of participation, knowledge, argument, eradication of relativism and dogmatism, etc. These include verification of reading, debates, forums, critical reading, presentation of oral and written reports, etc.

c) *23. Ability to identify and use sources of information appropriately: bibliographies, documents, oral testimony etc., for historical research*

Definition

Skill that requires knowledge and imagination for systemising different ways of researching the historical sources.

LEVELS OF PROGRESS

- Progressive use of secondary sources (bibliography), documentary sources and oral sources.
- Ways of addressing the sources.
- Discovery of new sources and uses.

FORMS OF DEVELOPMENT

Development of this competence is essentially practical; the purpose is to learn by doing. Includes the student's approach to the sources and guidance on treatment and use.

METHODS OF ASSESSMENT

Methods that make it possible to establish a knowledge of the different types of source, the ways of using them and suitable sorting of the information (order, classification and relationship).

Conclusions

Finally, the History area of the Tuning Latin America project would like to offer the following conclusions:

1. Although the analytical approach we have used to reflect on the area of history in Latin America has tended to emphasise differences between countries and even between universities within each country, it is important to stress that there is a common substratum throughout the region, which manifests itself in aspects such as:

    - A more or less uniform curriculum, generally based on the areas of «Universal History» (the name generally used for Western History), History of the Americas, National History, Theory and Methodology.
    - University degrees in history are generally between four and five years long.
    - The degree conferred is that of «Licenciado» [Graduate], «Profesor» [Teacher] or «Bachiller» [Bachelor] in History, or «Historian», but this apparent diversity hides a similar academic and social recognition.
    - The degree mainly qualifies the holder for research and/or teaching in History, and in many cases also for management/consultancy in cultural, documentary (libraries and files), journalistic, political, diplomatic, publishing and audiovisual areas.

2. There is broad consensus as to the importance of both the generic and the subject specific competences. The great majority of academics, stu-

dents, graduates and employers in the field of history in all countries where the survey was conducted ascribed significant importance to all the competences; this means that we are not talking about important competences versus insignificant ones but rather some competences which were felt to be more important than others.

3. There is also general agreement (at least among the teachers participating at the General Meetings of the Tuning Latin America project) that it is a good idea to organise university teaching of History into student-centred processes, rather than centring them on the teacher or university. In this area, the current situation in Latin America appears to vary greatly, with universities that have made great progress in this direction, and others —perhaps the majority— which are still focusing the teaching-learning process almost exclusively from the point of view of the teacher or institution.
4. The participants in the project also agreed that «Competence-based education» is a good instrument for re-focusing this process on the student, and at the same time, bringing about profound changes.
5. There was also a consensus on the importance of measuring students' progress in their own professional education. Here again, the concept of «academic credits» seems suitable; this system to some extent already exists in most Latin American countries (though not all and certainly not in all universities).

   In practice, however, the «credit» is not currently a unit that is really measured, or one that allows students to work in different universities. Until such time as there are uniform criteria for the meaning of credits and until these are applied to the students' work (before that of the teachers, for example) the concept of the «credit» can contribute little to the transformation of university education in the region. This, then, is an outstanding task of great importance.
6. It has been detected that in Latin America there is a great diversity in the way academic periods are organised. Some universities operate by academic «years», others by 6-, 4- or 3- month periods («semesters», «quatrimesters» and «trimesters»). Although there was no general agreement on this point, most feel that these differences in academic calendars would make it difficult to «tune» the different universities or countries. Another suggestion, therefore, is to examine the possibility of synchronising these calendars and acting accordingly.
7. Academics from the area of history who participated in the Tuning-Latin America project are greatly interested in making a significant contribution to improving the quality of university education in the region and they believe that the Tuning concept and methodology can be an effective instrument for achieving this. They also agree that the achievements to date are merely the beginning of a process, which will only meet its objectives if it is implemented in a large number of Latin American countries and their universities, whose education

programmes need to be improved and whose results must be open to comparison. The participants are determined to keep in contact with each other and with their National Tuning Centres and to continue working for the common goal. While they do require external help in achieving this, no asset will be of greater importance than their own commitment and their work. They see Tuning as a project that opens new doors to the future.

4.9. CIVIL ENGINEERING

Introduction

The Civil Engineering work group of the Tuning Latin America project, was made up of 21 universities and institutes from 18 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic and Venezuela. During the survey process, academics and students from 86 faculties or schools were surveyed, together with employers and graduates from each of the countries. Work began on 22 February 2006, at the General Meeting held in San José, Costa Rica.

In Latin America, a civil engineer is defined as being a professional with broad mastery of the basic sciences and engineering sciences, allowing him or her to develop engineering solutions to problems of transport, housing and buildings, hydraulic or sanitary infrastructure. The civil engineer must be capable of designing, calculating, planning, supervising and managing the implementation of these arrangements.

In general, the civil engineer must be qualified to offer technically feasible solutions taking into account constraints of an economic, social and environmental nature. Most civil engineering programmes in Latin America, offer students a complete education, allowing them to:

— Conceive, analyse, calculate and design civil engineering works, such as buildings, bridges, dams, and to analyse the nature and quality of the materials, type of foundation terrain, natural effects, such as winds, seismic activity, temperature or corrosion, among others.
— Plan and direct the construction of civil work.
— Coordinate and supervise projects, having the criteria to seek, obtain and correctly assimilate advice from specialists in different branches of engineering.

It is important to note that the civil engineering work group has limited all its discussions to the first level degree («Licenciatura» (BA) or undergraduate studies). No degree profiles, competences or teaching-learning experiences were analysed at postgraduate level.

Map of the discipline

The degree most commonly conferred is that of civil engineer. In most Latin American countries, this degree qualifies holders for professional work, although in most cases, they also have to be registered in the Professional College or Association and/or pass an exam (in Mexico). In most countries (15), the degree is five years long; the exceptions are Mexico, where degree length varies from 3.5 to 5 years, the Dominican Republic, from 3.5 to 4.5 years and Chile, where it is a six year degree.

Some countries also confer the title of Construction Engineer [*Ingeniero/a Constructor* or *Ingeniero/a de la Construcción*], which is substantially equivalent to that of civil engineer. Some schools or departments of civil engineering also confer other related degrees, such as that of Environmental Engineer, Hydraulic Engineer, among others, which involve a level of specialisation within the more general field of civil engineering. However, the group concentrated on identifying specific competences in the degrees of civil engineer and Construction Engineer.

The education of the civil engineer includes the following aspects:

- *Education in basic sciences:* includes knowledge of mathematics, physics and chemistry, among others.
- *Basic professional education*, covering subjects such as: mechanics, fluid mechanics, resistance and materials sciences, thermodynamics, soil mechanics, geomatics, geology, drawing and graphic communication, computer studies and environmental science, among others.
- *Professional education*, stage at which students acquire the knowledge and skills for: analysis and design of structures (in concrete, wood, metal and masonry); conception and design of projects for harnessing water resources, water supply and sewerage systems; design and projection of roads (streets, paths and roads); managing construction equipment; project and site management and supervision.
- *Socio-humanistic and supplementary education:* this area covers the complete, education of the graduate in ethics and values, as well as aspects of human resource, material and financial management and administration, economic engineering, entrepreneurship.

The civil engineer can work in any public or private enterprise devoted to the management, design, construction, operation, maintenance or supervision of infrastructure work, in urban or rural areas. A fairly complete list of the professional civil engineer's field of action has been drawn up by the Argentinean Ministry of Culture and Education[39], which establishes that they must capable of working in areas related to the following tasks:

[39] http://www.cpicd1.org.ar/Noticias_Publicas.html?sec=8

— Study, feasibility, project, direction, inspection, construction, operation and maintenance of:

- Buildings, for whatever purpose, with their complementary works.
- Resistant structures and works of civil engineering and art of any kind.
- Works of water regulation, capture and supply.
- Irrigation, runoff and drainage works.
- Hydro mechanical facilities.
- Works devoted to the harnessing of hydro power.
- Works of river correction and regulation.
- Works devoted to the storage, channelling and distribution of solids and fluids.
- Road and rail works.
- Works of urban and rural sewerage.
- Port works, including airports and all those related to river, maritime and air transport.
- Works of urban development, in areas related to urban street plans and the organisation of public services associated with hygiene, roads, communications and energy.
- All of the above works with the addition of seismic prevention, where applicable.

— Studies, tasks and advice related to:

- Soil mechanics and rock mechanics.
- Topographical and geodesic work required for the study, design, direction, inspection and construction of the works referred to in the previous paragraph.
- Planning of transport systems in general.
- Transport studies in transport routes and cities.
- Planning of use and administration of water resources.
- Hydrological studies.
- Issues of legal, economic, financial and organisational engineering, related to the items above.
- Arbitration, surveying and valuations related to the above items.
- Hygiene, safety and environmental pollution related to the above items.

Specific Competences

The civil engineering work group identified nineteen specific competences, as essential to the description of the civil engineer. These competences constitute those that are expected of a graduate at first level.

Table 1

The specific competences identified by the work group were:

1. Ability to apply knowledge of the basic sciences and sciences of civil engineering.
2. Ability to identify, evaluate and implement the most appropriate technologies for the context in hand.
3. Capacity to create, innovate and undertake to contribute to technological development.
4. Capacity to conceive, analyse, calculate and design civil engineering works.
5. Skill in planning and programming civil engineering works and services.
6. Capacity to build, supervise, inspect and evaluate civil engineering works.
7. Capacity to operate, maintain and rehabilitate civil engineering works.
8. Skill in evaluating the environmental and social impact of civil works.
9. Capacity to model and simulate civil engineering systems and processes.
10. Capacity to direct and lead human resources.
11. Skill in administering material resources, teams and equipment.
12. Capacity to understand and associate legal, economic and financial concepts in decision-making, project management and civil engineering works.
13. Capacity for spatial abstraction and graphic representation.
14. Capacity to propose solutions that will contribute to sustainable development.
15. Skill in preventing and evaluating accidents and risks in civil engineering works.
16. Skill in handling and interpreting field information.
17. Skill in using information technologies, software and tools for civil engineering.
18. Capacity to interact with multidisciplinary groups and come up with integral civil engineering solutions.
19. Skill in employing quality control techniques in managing civil engineering materials and services.

With regard to the generic competences, the work group accepted the 27 identified and validated in the first phase of the Tuning Latin America project, considering the following to be particularly important for the civil engineer:

Table 2

Most directly relevant generic competences

— Capacity for abstraction, analysis, and synthesis.
— Ability to apply knowledge in practice.
— Knowledge regarding the area of study and related professions.
— Ability to identify, pose, and solve problems.
— Ability to use information and communication technology.
— Ability to make decisions.
— Ability to work as part of a team.
— Ability to formulate and manage projects.
— Ethical commitment.
— Commitment to quality.

The specific competences were validated through a series of questionnaires. Each of the universities participating in the work group was responsible for surveying at least 30 people from each of the four agreed categories: Students, Graduates, Employers and Academics. The survey only included: students at the end of the professional cycle; graduates with more than two years practice; academics, teaching subjects in the field of professional education. The surveys were conducted on-line and in face-to-face sessions.

The survey asked subjects to rate the importance and level of achievement achieved for each of the competences on a scale of 1 to 4. The survey, responded to by a total of 3507 academics, students, graduates and employers from 18 countries in Latin America and the Caribbean, served to validate the relevance of the competences chosen.

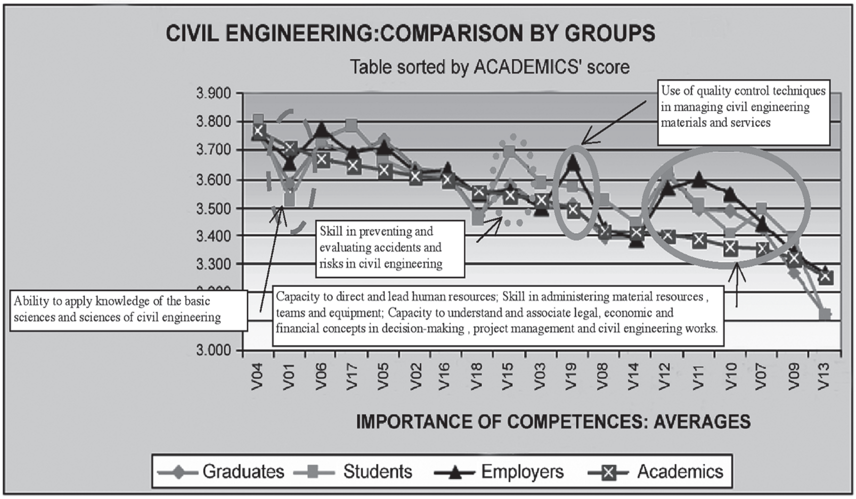
The answers broke down as follows: 21.4% from academics (752); 13.5% from employers (473); 38.5% from students (1352) and 26.6% from graduates (930).

The results of the survey shows differences between the level of importance and level of achievement. The importance of all competences was rated above 3, whereas the scores for level of achievement ranged from 2 up. This can be put down to several factors. Nonetheless there is a clear need to improve the education of the civil engineer in order to ensure that the specific competences are achieved.

Having said this, we need to bear in mind that there are specific competences where level of achievement depends mainly on the education in the universities and others where it also depends on professional experience. The former must be ensured using appropriate teaching methodologies, whereas the latter needs to be improved through processes that give the student a closer idea of real working conditions.

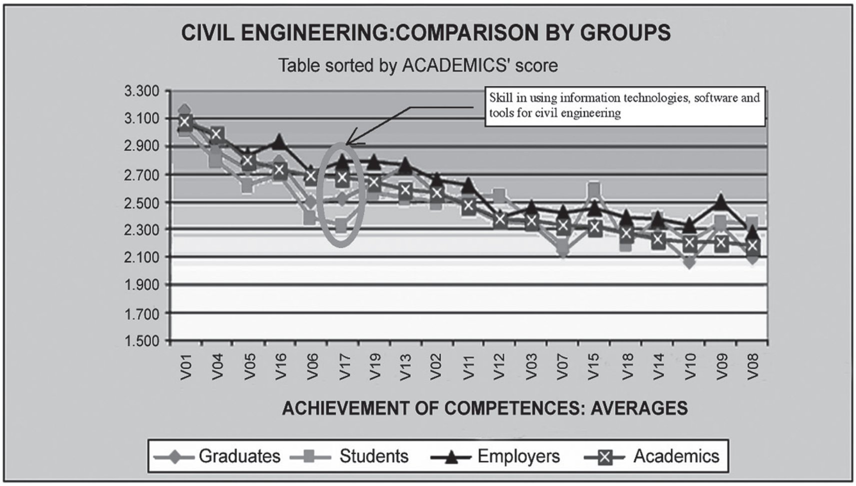
A number of aspects emerged from an analysis of the results:

— The 19 specific competences identified by the civil engineering group were rated as important or very important by all 4 groups surveyed (all obtained average scores of over 3 on a scale of one to four). There are also high levels of correlation between the responses from the different groups, the highest being between the importance ratings of employers and graduates (0.94). The lowest level of correlation was on the importance ratings of academics and students (0.79). These correlation levels are shown in the graph below:



Graph 1

Civil Engineering: Comparison by groups.
Table sorted by ACADEMICS' score



Graph 2

Civil Engineering: Comparison by groups.
Table sorted by ACADEMICS' score

With regard to the importance (Graph 1):

— The four groups agreed in rating the following four competences among the six most important:

- Capacity to conceive, analyse, calculate and design civil engineering works.
- Skill in planning and programming civil engineering works and services.
- Capacity to build, supervise, inspect and evaluate civil engineering works.
- Skill in using information technologies, software and tools for civil engineering.

— The four groups agreed in rating the following among the six least important (comparatively, since as we have said, all were rated as being important):

- Capacity to operate, maintain and rehabilitate civil engineering works.
- Capacity to model and simulate civil engineering systems and processes.
- Capacity for spatial abstraction and graphic representation.

— It is interesting to note that the employers and graduates scored the importance of the competences related to management and quality higher than the academics (see Graph 1). These are:

10. Capacity to direct and lead human resources.
11. Skill in administering material resources, teams and equipment.
12. Capacity to understand and associate legal, economic and financial concepts in decision-making, project management and civil engineering works.
19. Skill in employing quality control techniques in managing civil engineering materials and services.

— Students and graduates give less importance to Competence number 1, *Ability to apply knowledge of the basic sciences and sciences of civil engineering*, than academics and employers; this reflects a tendency among students to undervalue the importance of basic education within the degree, which later proves to be of great importance in their professional work.

— Graph 1 also shows that students gave a higher rating than the other groups to the importance of Competence 15, *Skill in preventing and* *evaluating accidents and risks in civil engineering works*, which would appear to suggest a greater awareness of the importance of risk management among younger people.

With regard to achievement (Graph 2):

— In general the scores for achievement were lower than for importance. Achievement of nearly all competences was rated between 2 and 3.
— There is also a high degree of correlation between the scores given by academics and employers (0.96). The lowest correlation was between employers and students (0.78).
— In general, the employers' rating of achievement was higher than the other groups. This indicates better achievement of some competences than academics and students realise.
— All groups agreed in rating the following competences as being among the six with the highest levels of achievement:

- Ability to apply knowledge of the basic sciences and sciences of civil engineering.
- Capacity to conceive, analyse, calculate and design civil engineering works.
- Skill in planning and programming civil engineering works and services.
- Skill in handling and interpreting field information.

— All groups also agreed in including the following among the six least achieved competences:

- Capacity to interact with multidisciplinary groups and come up with integral civil engineering solutions.
- Capacity to direct and lead human resources.
- Skill in evaluating the environmental and social impact of civil works.

— For all groups, the following competences are the ones with the closest relationship between level of achievement and importance:

- Ability to apply knowledge of the basic sciences and sciences of civil engineering.
- Capacity for spatial abstraction and graphic representation.

— In general, the competences that scored highest on achievement are those traditionally more widely addressed in the civil engineering curriculum.
— Graph 2 shows a lower perception of achievement of Competence 17, *Skill in using information technologies, software and tools for civil engineering, among students and graduates*, than among academics and

employers. This difference might be explained by the generation gap between the groups, since students and graduates are more exposed to and familiar with ICT and may therefore have greater expectations with regard to this competence.

— No new specific competences emerged from the list of suggestions, given that none of them offered any new elements. They either consisted of rewritings of existing ones or part of the generic competences. This serves to further validate the list of specific competences identified.

Competence-based learning, teaching and assessment: Examples of Good Practice

The civil engineering work group discussed and analysed several experiences of competence-based learning, teaching and assessment being carried out in the region, and proposed methodological considerations that are applicable to some specific and generic competences that the group considers to be particularly important.

They chose the generic competence: «*Ability to identify, pose, and solve problems*» as being particularly relevant and important to the professional quality of the civil engineer. The group's analysis is summarised in the table below:

Table 3

Analysis of generic competence:
Ability to identify, pose, and solve problems

This competence requires effective articulation of different skills, including:

1.a. Capacity to identify and pose problems.

This capacity involves, among others:

- **1.a.1.** Being capable of identifying an existing or future situation as being problematic.
- **1.a.2.** Being capable of identifying and organising information that is relevant to the problem.
- **1.a.3.** Being capable of assessing the particular context of the problem and including it in the analysis.
- **1.a.4.** Being capable of delimiting the problem and formulating it clearly and precisely.
- **1.a.5.** Being capable of performing the design of the solution.
- **1.a.6.** Being capable of preparing reports, diagrams, graphs, specifications and communicating recommendations.

1.b. Capacity to perform a creative search for solutions and select the most suitable alternative using their own judgement.

This capacity involves, among others:

1.b.1. Being capable of using what is already known; identifying what is relevant to know, and have strategies for acquiring the necessary knowledge.
1.b.2. Being capable of generating different alternatives for solving a problem that has already been formulated.
1.b.3. Being capable of developing professional criteria for assessing the alternatives and selecting the most suitable one in a particular context.
1.b.4. Being capable of understanding the implications of the proposed solution for the environment and society.

Methodology:

The methodology to be applied can be analysed in two senses:

— As the acquisition of tools that need to be learnt to then be integrated into the development of the competence (e.g. use of logic for developing the problems, analysis of systems, forms of communication, methods of research, etc.).
— As the integration of these tools into the development of the competence, to which end problematic situations can be presented to be worked on by the students. These problematic situations can be approaches to problems already identified, which have to be resolved, or approaches to situations in the field of engineering, where the problem first has to be identified and then solved.

Time:

This competence in particular can be developed from the beginning of the degree, though naturally with increasing levels of complexity.

Assessment:

The indicators of achievement of the competence are shown in the fact that:

— The student displays independence in tackling the problem.
— The student is capable of identifying the variables that define the problem.
— The student is capable of recognising what he/she does not know and knows where to go to make up the shortfall.
— The student is capable of offering different well grounded solutions.
— The student is capable of presenting and defending the solution chosen.
— The student is capable of presenting reports.

The levels of achievement that the student needs to achieve in the competence will be set in accordance with the time it is deemed to take to achieve.

The group also selected the following specific competences: «Capacity to conceive, analyse, calculate and design works» and «Capacity for spatial abstraction and graphic representation». The group's reflections on these competences are set out in the table below.

Table 4

Analysis of two specific competences

Specific competence: «Capacity to conceive, analyse, calculate and design civil engineering works»

DESCRIPTION

«Conceive and analyse»
«Calculate and design»

TEACHING METHODOLOGY

- Workshop
- Introduction of case studies
- Resolving cases
- Guided project work

ASSESSMENT

Design of comprehensive project with the corresponding analysis of viability, continuously assessed, which must be submitted orally and in written form, before a tribunal.

Specific competence: Spatial abstraction and graphic representation

DESCRIPTION

Involves the capacity of:

- Understanding and representing in graphic form a civil engineering work or associated physical phenomenon.
- Visualising a given graphic in three dimensions.
- Using sizes properly.

METHODOLOGY

- Contact course in technical drawing and descriptive geometry.
- Use of this form of expression throughout the student's education.

RESOURCES

- Free drawing.
- Development of the concept of scale in the representation graphic.
- Use of mock-ups.
- Association of graphic representation with real objects.
- Computer-assisted drawing.

TIMES

- The competence is achieved and developed gradually from the time when the student is first admitted.

ASSESSMENT

- The drawings and diagrams are clear, precise and representative.
- The construction and detail plans are understood and feasible.

Included in the appendices are specific examples sent in by several universities to complement the work group's discussions.

Conclusions

During the process of discussion and analysis of the generic and specific competences, and the results of the validation process, the work group reached agreement on a number of points, as follows:

- — The survey process fully validated the importance of the 19 competences identified.
- — The fact that the 3507 people surveyed have not suggested any new specific competences further ratifies the proposed list.
- — The fact of having agreed on these specific competences marks a step towards comparable education among the different countries in the region which could facilitate student mobility. Nonetheless, the mobility of professionals will ultimately depend on the legal conditions for professional work and the migratory requirements of each country.
- — Although the programmes are based on common competences, mechanisms of quality assurance need to be established, at both country and regional level, to verify achievement of all the required competences.
- — Differences in the evaluations of the level of achievement should serve as a sign that further work is required in developing these competences in the curricula.
- — The results of the survey can be analysed by each institution as an instrument for identifying weak points that need to be attended to through curricular structure and implementation.
- — Degrees in civil engineering must seek to integrate both generic and specific competences, with a common focus on professional practice. Graduates must be trained to demonstrate their competences in any Latin American country.
- — Competence-based education poses a new challenge of interdisciplinary integration.
- — The process backed by Tuning is very valuable in terms of the knowledge it offers on the way degrees are developed in each country, laying the foundations for reaching meeting points that will aid the mobility of the degrees conferred.

Appendices

The following is additional information and examples of good practice proposed by participating universities in the work group. The contributions come from the Universidad Católica «Nuestra Señora de la Asunción», Paraguay which identifies specific competences for specific subjects within civil engineering degree. The School of Exact Sciences, Engineering and Surveying of the Universidad Nacional de Rosario, Argentina, sent an example of curricular activity from the civil engineering degree for developing generic and specific competences. Finally, we offer a specific exercise, from the subject of Fluid Mechanics, developed by the Instituto Tecnológico de Santo Domingo, Dominican Republic. These contributions are set out in Tables A.1, A.2 and A.3, respectively.

Table A.1

WORKSHOP WITH TEACHERS
COMPETENCES IN THE AREA OF CIVIL ENGINEERING

Universidad Católica Nuestra Señora de la Asunción, Paraguay
International consultancy service: Dr. Mariana Martelli (Chile)
Asunción, February 2006

Some examples of specific competences by subject:

1) Technology of Concrete
   - Design mixtures of concretes for obtaining pre-established performance levels.
   - Assess qualities of materials with expeditious experimental procedures and technological laboratory procedures.
2) Pathologies of Constructions
   - Apply the logical method of research to construction faults.
   - Select construction materials and systems for repairs and/or structural reinforcements.
   - Assess the costs (social, economic, etc.) of a lack of durability in constructions.
3) Structures in reinforced concrete
   - Define the needs of the project.
   - Design the structural system.
   - Decide what materials to use.
   - Specify the operative actions.
   - Calculate the stresses.
   - Size the structural elements.
   - List the structural elements and their reinforcements.
   - Draw up technical specifications.

Table A.2

EXAMPLE OF CURRICULAR ACTIVITY FOR DEVELOPING GENERIC AND SPECIFIC COMPETENCES FROM THE DEGREE IN CIVIL ENGINEERING

School of Exact Sciences, Engineering and Surveying
Universidad Nacional de Rosario
Argentina
Engr. Jorge Adue- Engr. María Teresa Garibay

The degree in civil engineering at the School of Exact Sciences, Engineering and Surveying of the Universidad Nacional de Rosario (Argentina) has a 5-year study plan, divided into 10 semesters, with a total workload for the degree of 3950 hours. This plan has been in operation since 1996. In designing this study plan, it was decided to create curricular spaces where students would work on solving problems similar to those that a civil engineer faces in his/her professional career, applying the knowledge they have shown to know in the different subjects. In other words they have already shown a «knowledge»; now this curricular space allows them to integrate «knowledge» with «know how». The result was that five «Project» subjects were developed as a need to integrate knowledge (knowing) with the competences (*savoir-faire* and *savoir-être*), that any graduate in civil engineering must have. These subjects were included from the sixth semester to the last, in consecutive form. Each «Project» has a workload of 5 hours a week, giving a total of 80 hours per semester. Each «Project» analyses and develops different problems related to the career and each emphasis one of the areas or specialities of the profession in particular (hydraulics, transport, structures in concrete, metal, etc.).

In these curricular spaces, students study the function and technical, economic and environmental viability necessary for designing civil engineering works, based on a critical analysis of the information that is available or can be generated, integrating the knowledge the students possess when beginning the corresponding course. Students come up against the real professional world, since they have to go to different public and/or private bodies to gather information, obtain licenses, check current standards governing the project under study, talk to employees and employers, as they will have to do in their future career. They have to work in a team of their peers, selecting the information and compiling it in a report, containing texts, graphs, etc.

The entire task is supervised by teachers specialising in each of the areas studied. The teacher's function in this space is to act as a guide and facilitator of the task being carried out, with the student as the main protagonist.

Description of the «Projects»

Project I (sixth semester): this subject focuses on subjects of architectural and structural design, installations and construction materials, through the performance of a specific project in the area of construction.

The theme of the architectural project is defined by the head of department. These are projects that could be developed on free land in the city of Rosario, and consist of drawing up the preliminary design and plan for a small site, with the cost subject to the given budget.
The work consists of various stages:

- Analysis of a similar project provided by the head of department.
- Processing of projects with provincial and municipal authorities.
- Planning of activities and the critical path of the project.
- Estimate and budget for the work, within an established total amount.
- Work schedule and investment plan.

Typical projects include:

- Neighbourhood club.
- First Aid Room.
- Small school.
- Kindergarten.
- District library.
- Sports centre.
- District centre or associations.

Project II (seventh semester): This is primarily related to hydraulics, and focuses on the work of regional planning, with preliminary project studies and analysis and assessment of alternatives.
For example, for a given district in the city of Rosario, students analyse the basic work required, i.e. infrastructures have to be designed and budgeted such as:

- Water mains.
- Gas mains.
- Runoff water drains.
- Sewerage network.

Project III (eighth semester): The project focuses on a project with development centring on the area of transport.
The assignment consists of performing the design and budget for a section of route assigned by the team of specialist teachers, for which purpose the student will have to use previously acquired knowledge to carry out the following tasks from a technical point of view:

- Design the typical cross section and geometry of the axis of the road work, including junctions, signs, and other accessory works.
- Carry out the necessary field work to execute the road design.
- Compute and evaluate the basic work and any complementary works.

Project IV and Project V (ninth and tenth semester): in these two curricular spaces several problems are presented with complex themes, proposed by the teachers specialising in these areas; the students, in groups, choose the project they want to work on.

This framework includes a multidisciplinary project, integrating the different areas of the degree.
The tasks to be carried out in «Project IV» come in the form of a preliminary design, with analysis of economic feasibility and sensitivity to variables, and technical, legal and environmental feasibility of the subject in question.
«Project V» involves making the complete master plan for the alternative selected, including:

- Descriptive and calculation reports.
- Detailed drawings.
- Specifications for licensing.
- Estimate and budget.
- Alternatives for financing and presumed profitability.
- Site planning.

It should be noted that in carrying out the «Projects»

- Students deal with specific cases from the profession which involves the real needs of the setting.
- Knowledge is put to use.
- The concept of learning through successive steps is used, which involves the appearance of project tasks in intermediary steps, not only in order to «learn by doing», but also to identify limitations and make any future learning more meaningful.
- The available technology is used, grounded on realistic criteria.
- A variety of projects is presented, to try to cover the greatest number of aspects and problems.

Throughout this activity, students

- Develop competences for group work, through workshop-type activities in small groups, without excluding individual work.
- Develop competences related to timing, as they have to meet stipulated deadlines.
- Are capable of having a critical and flexible attitude that allows them to assess their own work.
- Are capable of taking on a subject they have not previously tackled for themselves, which will allow them, in the future, to constantly keep abreast of new subjects as their speciality requires.
- Are capable of searching for original solutions to different situations.
- Are capable of making a commitment to constantly updating their knowledge.
- Are capable of communicating effectively in oral and written form.
- Are capable of considering the economic, social and environmental impact of the projects they are involved in.
- Are capable of using different problem-solving tools.
- Face real social situations.
- Reassert their choice of degree.

Table A.3

Final Assignment in Fluid Mechanics

Area of Engineering
Instituto Tecnológico de Santo Domingo —INTEC—
Prof. Indhira De Jesús

Description of the Work:

Each team submits a proposal on how to solve the problem that they are given. This proposal will be submitted in two phases. First, the group will present their conceptual design, including the theoretical framework, analysis of alternatives and alternative to the proposed solution. The group must then present a scale prototype, and the calculation reports establishing the efficiency and effectiveness of their design. If the complexity of the idea makes it impossible to prepare a working prototype, they must present a model showing how it should work (the model may be virtual).
The work to be presented must be delivered in writing, in no more than 15 pages (12-point, single space, margins of 1 inch), with any appendices that may be necessary. Each team will make a 10 minute presentation.
The prototype and design report will be submitted to the fluid mechanics laboratory. The design report must be submitted in writing. The working of the prototype will be assessed (or the theoretical operation will be explained using the model). A presentation in PowerPoint or similar may be included. The teams must be ready to make their presentations at the designated time. The members of the Governing Board will not tolerate a lack of punctuality. All prototypes and/or models must be to laboratory scale. Each team is responsible for ensuring that they have everything they need for the presentation (extensions, tanks, fluids, datashow, laptop, etc.)

Problem 1: The company you work in has adopted an extremely pro-ecological policy and has asked its engineering team to design a way of raising the hydraulic fluid stored for use in the plant's machinery, to a tank placed on the roof of the building (take the height of an industrial pavilion), using a mechanism that does not consume electricity or fossil fuels. The board has made it a condition that the alternative must be more economical than the conventional system.

Problem 2: You are a group of engineering students participating in a real-life experience to assist the development of rural communities. The community where you have been assigned needs a low cost alternative for producing oil from oil-bearing seeds. Your team must present the board of an international development bank that will finance the project, with a viable alternative, that can be installed, run and maintained by the community.

Problem 3: As part of a second team of students participating in the experience described in Problem 2, you have the task of proposing a technically feasible and low cost alternative, for generating electricity to light the homes in the community. The source must be renewable and non-conventional. You know that the bank that will provide the financing favours wind or water-powered generator.

Given that there are two teams working to solve each problem, the governing board has hired a team of advisors (which will be made up of the same members for the three problems). This team will submit a written report, with technical and economic arguments, recommending which of the two solutions posed should be considered in each case. The report must specify the strengths and weaknesses of each proposed alternative. The preliminary report will be delivered to the Governing Board in writing one week after the presentation of the first part of the team's work. The final report of the team of advisors will be presented orally and in writing (it may include a PowerPoint presentation), following the presentations from the teams of designers.

Assessment criteria:

For the work of the design teams:

- Quality of the analysis of the problem posed and the possible alternatives for solving it.
- Quality of the research into the bibliography and previous experiences to establish the conceptual framework of their proposals.
- Creativity of the alternative solutions.
- Potential for technical and economic viability of the proposed alternatives.
- Potential for technical and economic viability of the alternative selected.
- Extent to which the proposed solution matches the specifications given for the problem.
- Quality of the prototype or model (including the level of detail of the work).
- Evidence that the team masters the basic principles of fluid mechanics as applied to the solution to the problem.
- Ability to work as part of a team.
- Work ethic.

Bonus (5% extra): if the prototype works (or if it is an exceptionally good model)!!!!

For the work of the Advisors to the Board of Governors:

- Quality of the analysis of the problems posed and their possible alternative solutions.
- Capacity for analysis and constructive criticism.
- Quality of the research into the bibliography and previous experiences on which they base their recommendations.
- Clarity and precision in presentation of their ideas.
- Consistency and support for their technical arguments.
- Evidence that the team masters the basic principles of fluid mechanics as applied to solving the problems posed.
- Professionalism in the presentation of their reports.
- Objectivity and ethics.
- Teamwork.

Bonus (5% extra): If they can present a better alternative to that presented by the teams for any of the problems (only the theoretical reasoning; no prototypes are required)!.

4.10. MATHEMATICS

Introduction

This report offers a summary of the work carried out by the Mathematics group in the Tuning Latin America project. Within the project, the group prepared a description of the area of mathematics in the countries and universities participating in the project, and its principal features; generic competences for professionals, subject specific competences for mathematics and examples of how to teach and assess these competences amongst students.

The document consists of five parts:

1. Map of the Mathematics subject area, offering a general overview;
2. Analysis of the results of the survey on generic competences associated with university professions, highlighting how the generic competences were viewed, from the point of view of those directly involved with mathematics;
3. Analysis of the results of the survey on subject specific competences for the profession of mathematician;
4. Description of examples of how to form and assess these competences among students studying a degree in mathematics;
5. Conclusions.

The members of the group recognise that an educational model based on the development of competences among students can contribute to achieving a more comprehensive and multi-faceted education of future professional mathematicians. While at the same time fostering better communication among higher education institutions, facilitating mobility of teachers and students (based on recognition of equivalences between studies in different universities) it can also foment projects for improving the quality of study programmes.

They also believe that the development of mathematics in the region has been accompanied by increased concern in the way it is taught. An example of this concern is that changes have been proposed to study programmes in most countries to encourage the development of problem-solving skills in the present context, encouraging students to present solutions, advance them and use them in new situations for the professional future.

Questions such as: what mathematical knowledge should a student acquire in the degree?; what competences should be developed?; how can technology contribute to the development of the required competences? are all concerns of the academic community, which wants to offer programmes with the necessary quality to allow graduates to find work in a market that increasingly requires them to have different skills related to the mathematical ideas involved in different areas of knowledge.

The job market has little to offer those who do not have the capacity to understand, criticise, generate and defend new ideas. Regional scarcities in areas such as employment, health, education and recreation, requires us to educate aware and committed individuals with the quality of their knowledge and with ethical values, with interests that go far beyond simply being qualified for a career which, in any case, may change several times during their lifetime.

The mathematics group is convinced that it will be beneficial to make further progress in this regard amongst the different groups of academics, thus fulfilling their responsibility to educate future professional mathematicians, and help create a society that is fairer and has a greater spirit of solidarity.

Map of the subject area of Mathematics

The following paragraphs briefly outline the position of mathematics in 12 of the 19 countries participating in the Tuning Latin America project.

A number of degrees are associated with mathematics in the universities of Latin America. In all countries except Ecuador, Colombia and Brazil, the first degree is known as a *licenciatura*. In Ecuador and Colombia, the qualification conferred is «Mathematician» (*matemático/a*), and the term «*licenciatura*» is used only for teacher training studies. In Brazil, there are two degree options: «*bachillerato*» and «*licenciatura*» and in both cases, graduates receive the title of «Mathematician». A «*licenciado*» in mathematics is eligible to work as a school teacher while a «*bachiller*» in mathematics will be a future researcher, working in universities or research centres.

In general, these professions are given very varied names, due to the number of different programmes on offer in the subject area (see Table 1), for example: *Licenciatura en Ciencias (Matemáticas), Licenciatura en Matemática, Licenciatura en Matemáticas, Licenciatura en Matemáticas Aplicadas, Bachillerato en Matemática y Bachillerato en Matemáticas Aplicadas, Ingeniería en Matemáticas, Licenciatura en Ciencias Físico-Matemáticas, Licenciatura en Ciencias Matemáticas, Licenciatura en Estadística, Licenciatura en Ciencias Estadísticas. Licenciatura en Ciencias Actuariales* and *Actuaría*. Degrees take between four and six years. There is no standard requirement to prepare a thesis or mini-thesis to obtain a degree. Cuba is the only country in the region that has a unified study programme throughout the country, and where the subject is studied in three universities - although in each university the basic curriculum is complemented by a specific one, which may include subjects that are not available in the other universities.

The range of names for degrees geared towards education is just as large, and includes *Licenciatura en Docencia Matemática, Licenciatura en Enseñanza de las Matemáticas, Licenciatura en Matemática Educativa, Profesorado de Enseñanza Media Especializado en Matemática, Profesorado en Enseñanza Media y Superior de Matemática, Profesorado de Enseñanza Media Especializado en Matemática y Computación, Profesorado de Enseñanza Media Especializado en Matemática y Ciencias Físicas, Licenciatura en Ciencias de la Educación mención Matemática, Licenciatura en Ciencias de la Educación mención Matemática y Física, Licenciatura en Ciencias de la Educación, mención Informática y*

Matemática and *Profesorado Especialidad Matemática*. These degrees take between three and five years.

From the outset of the project, the Mathematics group decided to focus on programmes intended to produce professional mathematicians (whose professional profile is not necessarily restricted to maths teaching at any level). The number of public or private universities offering studies in this area in each country varies greatly, reflecting the different population sizes and land areas of the countries in the region. Table 1 shows the number of maths programmes on offer at different levels.

Table 1

Country	Total population (million)	Programmes for educating mathematicians	Master's degrees in Mathematics	Doctoral programmes in Mathematics
Argentina	39.3	26	6	7
Bolivia	9.4	4	2	0
Brazil	187.5	865	33	15
Chile	16.2	14	11	5
Colombia	46	18	6	3
Cuba	11.3	1 (in 3 Univ.)	3	1 (national)
Ecuador	13.2	7	2	1
Guatemala	12.6	2	1	0
Mexico	106.1	37	11	9
Panama	3.2	2	2	0
Peru	27.9	10	5	2
Venezuela	26.5	9	9	3

While the study of mathematics has been cultivated for many centuries, it was in the twentieth century that the first maths programmes were developed in universities (e.g. Mexico, 1939; Cuba, 1962, and Ecuador, 1973). In Argentina, mathematics saw major growth from 1917 on, with the emergence of professional mathematicians. Before that, the degrees that did exist in several countries were geared towards training maths teachers at primary or secondary level or were associated with the engineering schools, which were mainly oriented towards training school maths teachers. As time passed, a number of specialist institutions were set up, some dedicated to preparing teachers and others to educating mathematicians to encourage the development of both pure and applied mathematics; mathematical research centres have also been set up in the most advanced countries in the region.

In Brazil, the universities have responsibility for training secondary school maths teachers; other countries have recently established policies to enable universities to participate in education programmes for new teachers at this level, and for existing ones to upgrade and obtain a university degree.

There has been major growth in the number of maths degrees on offer in the great majority of countries. In some cases these have been created and are being run without suitable conditions to operate in.

Naturally, mathematics also plays a role in the education of future professionals in all fields, although in many cases, such mathematics courses do not fall not under the responsibility of mathematicians and the work is shared by engineers or physicists. The departmental system is found in some or all universities in Brazil, Cuba, Mexico and Venezuela but it is not generally a feature elsewhere.

There is great concern as to the quality of mathematics education. For example, in Cuba an entry system has recently been established with special requirements for the degree in mathematics, differing from the entry system for higher education, which has been in place since the 1980s, and which makes it possible to select students with the best skills for studying the degree. In Colombia, there is a certification process for establishing levels of quality and an exam has been introduced to measure the graduates' quality.

The place of research in mathematics and its impact on the education of mathematicians and maths teachers varies considerably. There is a large number of study plans at university level that are not accompanied by master's degrees and doctorates, as Table 1 shows. The establishment and growth of graduate studies in mathematics throws up major challenges for research in Latin America. Even in countries where research does exist and is well consolidated, it may not have nationwide coverage, and while there are large groups of academics in some areas of mathematics, other areas have very few specialists while some specialisms are simply not cultivated. Some countries in the region encourage graduate studies through agreements with European and other Latin American universities. One of the greatest problems faced by many countries is the difficulty that young people who gain a doctorate abroad have in returning to their country of origin to work in the profession and contribute to the development of mathematical research in their home country.

In nearly all countries, the universities, together with the research institutes and the various scientific societies, promote the dissemination of knowledge and the exchange of mathematical work, inside and outside the country, and hold regular meetings and scientific conferences on a national and international scale, in different specialist branches of mathematics, of great current interest: Optimisation, Dynamic Systems, Differential Geometry, Algebraic Geometry, Numerical Mathematics, Probabilities and Statistics, Ordinary and Partial Differential Equations, Approximation of Functions, Algebraic Representations, and many others.

Countries such as Cuba and Brazil have established government policies for defining the maths curriculum and compulsory subjects or areas have been established in the study plans. In Brazil, the study plans must meet the curricular guidelines established in November 2001, which define the profile of the graduate to be produced and specify competences for all subjects on the curriculum. It is worth noting that these competences were drawn up by mathematicians from throughout the country. In Cuba, since 1982, the basic curriculum for the degree in the three universities includes three years of general education and two years of specialist education, which contribute to the relative specialisation of a mathematician with a broad academic profile. In Colombia, the minimum compulsory content of programmes, particularly in mathematics, are established by decree of the National Ministry of Education. The Colombian Association of Schools of Exact and Natural Sciences establishes the theoretical framework for the quality exams in mathematics and sets out the principal components common to all maths programmes. In Bolivia, the independent body that offers the general framework of operation is the Executive Committee of Bolivian Universities. In Panama, degrees in maths education and mathematics share one part in common. In Venezuela, work is now at a very advanced stage to create a common core in all degrees.

In nearly all countries, the universities are autonomous and draw up the curriculum for first degrees, master's degrees and doctorates themselves. They are governed by their own university by-laws and voluntarily submit to processes of self-assessment, external assessment and accreditation, tasks which may be decentralised from the ministries responsible for education. However in Brazil and Venezuela, although the universities are autonomous, their programmes are subjected to approval and assessment by the ministries responsible for higher education, which verify their social relevance and seek to ensure quality; in Brazil in particular, the Ministry of Education chooses the mathematicians who will be in charge of making the assessments. In Cuba, since the creation of the Ministry of Higher Education in 1976, authorisation is required from it to create or alter the study programme or plan of a university degree. The design of the corresponding curriculum is drafted by the National Degree Commission, which includes lecturers from the three universities, specialists from research centres and institutions related to the profession and outstanding students. The study plan officially approved by the Minister of Higher Education sets out the disciplines in it, their corresponding subjects, the final exams, the periods of work experience and research, the means of completing studies and the workloads and distribution by year of all these activities. In Cuba, as in other countries in the area, there is also a system of assessment and accreditation for all processes in higher education (first degrees, master's degrees, doctorates, departments, faculties and institutions) which base these processes on internal assessment (voluntarily decided), and a group of external assessors (academic peers) proposes the accreditation of the programme (or declares its excellence). These levels are then ratified by the National Accreditation Board. In some countries, there are also professional registration bodies, which answer to the ministries responsible for education, as is the case in Bolivia and Mexico.

In all countries there are programmes that include compulsory and optional subjects, and in some, there are also core subjects, which foster flexibility in the plans. Some include work experience. All programmes teach subjects that are compulsory in different contexts depending on the orientation and objectives. These include successions and series, continuity, differentiation and integration of functions of one and various real variables, integers of line and of surface, systems of linear equations and matrices, vectoral spaces and linear applications, vectors and own values, linear differential equations and systems of linear differential equations and their applications, analytical functions, complex integration, random variables, space of probability, distribution and density functions, sampling, statistical inference, basic set theory, relations and applications, divisibility, division and Euclidean algorithms, elementary algebraic structures such as integers, module *n* integers, rational, real and complex polynomials, groups and elementary plane and space geometry.

Throughout the participating countries the means of assessing students' performance and of verifying compliance with the requirements for obtaining a university degree vary greatly. The student workload is calculated in different ways in study plans; some have a system of credits, which are weighted in different ways in each university; in others, only effective class hours and the number of subjects to be covered are counted and in general it is the responsibility of the higher education institutions to establish methods for recognising partial or complete studies taken in other institutions.

The main professional openings for the mathematician are those in teaching at pre-university level and teaching and/or research in universities and research centres. In general, it is in the academic sector, in universities, where mathematical research is conducted, although, from the second half of the twentieth century, mathematical research centres began to spring up in many countries in the region. Mathematicians are also employed in research centres dedicated to other branches of knowledge that require advice on modelling and calculations in their experiments.

However, professional niches have also opened up in public and private sector companies, which consider it helpful to have mathematicians in their development centres. Outside academia, the main fields of work are the services industry (in insurance and financial companies, banks, and in economic management; public health statistics; national census offices; modelling of industrial and engineering processes) and also to a lesser extent, in government sectors focusing on public health, economic planning and monitoring of energy resources.

Report of the Mathematics area on the survey on generic competences

The Mathematics group of the Tuning Latin America Project presents an analysis of the results of the Latin American survey of 27 generic competences in the area of Mathematics. The questionnaire was returned by 248 academics, 148 employers, 872 graduates and 620 students, to give a total of 1888. In some cases, the surveys come not only from the area of influence of the participating university for each country, but from various programmes from different universities in the same country.

Importance of the competences

All 27 competences were considered important: out of a possible maximum score of 4, the lowest average values given for importance were all above 2.8. Nonetheless, the minimum values in the area of mathematics are lower than those in the general survey, especially among academics (see Table 1). Moreover, no competence obtained an average of 4 among any group, suggesting that no competence is unanimously considered to be the most important.

Table 1

Importance of the competences. Minimum average values

	Employers	**Students**	**Graduates**	**Academics**
All areas	3.111	3.223	3.255	3.321
Mathematics	3.036	2.975	2.973	2.812

In terms of the order of importance of the competences: in the area of mathematics, all four groups rated *capacity for abstraction, analysis, and synthesis* and *ability to learn and update learning* as being among the six most important. *Capacity for investigation*; *ability to identify, pose, and solve problems* and *creative skills* were rated among the most important by three of the four groups. *Commitment to quality* was also listed among the six most important by all groups, except the academics, who ranked it seventh in order of importance. This is a reflection of the great concern for programme quality in all Latin American countries, and the need to achieve high standards of quality in educating future graduates.

There are many similarities between the competences seen as being the most important in all areas in general and within the area of Mathematics. The main differences are in the score given to *ethical commitment,* which was given the highest average rating among employers, but placed ninth by each of the remaining three groups in the area of Mathematics. However, when looking at the overall results for all subjects, this competence is rated among the first six. A similar situation can be seen with *ability to make decisions*, *creative skills* and *capacity for investigation* which were given much grater importance in the area of mathematics. The competence *capacity for abstraction, analysis, and synthesis*, listed among the most important by all respondent types in mathematics, was only scored among the first six by academics in the overall results.

The competences rated as being most important in the area of mathematics included those that can be conveyed or taught during a mathematics programme, and which, as well as being desirable in a any university graduate, are skills that are characteristic of the mathematician's profession.

The competences that scored lowest in terms of importance were generally those most closely related to social commitment. Nonetheless, these competences were still rated positively, with average values of over 2.8. The relative position of these competences in the area of mathematics is due to the greater priority given by those surveyed to competences more directly related to the profession of the mathematician.

In terms of the general evaluation of the importance of the generic competences, there is a high degree of similarity between the average scores of academics, graduates and students, with correlation matrices of over 0.943. Correlation values of below 0.733 between employers and the other groups suggest a different view of the importance of the competences by the employers.

Achievement of competences

Turning to the level of achievement of the competences, the four groups in the Mathematics area were more optimistic than other areas, with the minimum values higher than those from all subjects taken together (see Table 2).

Table 2

Achievement of competences. Minimum average values

	Employers	Students	Graduates	Academics
All areas	2.061	2.027	1.907	1.980
Mathematics	2.090	2.105	2.065	2.008

The general average score for level of achievement is one point below the average for the level of importance. The same situation can be seen when we analyse the results from all subjects. A practically linear relationship can also be observed between importance and achievement; competences rated most important by each group are in general those that are considered to have the greatest level of achievement.

There is a high degree of agreement among academics, graduates and students on levels of achievement, with correlation values of over 0.941. The employers stand out from the other three groups, although the correlation values between this group and the others are much higher than for the Importance scores, indicating greater uniformity in the level of achievement perceived by the four groups surveyed.

Classification of the competences

The results of classifying the competences in the area of Mathematics into a hierarchy are very similar to the results of the evaluation of the importance of the competences in this area. These results also show a high degree of coincidence with the results of the classification for all areas taken together.

Conclusions

It is important to note that the 27 generic competences listed were all considered important by the four groups surveyed in the subject area. What is interesting about these results is that they reflect the challenge facing higher education institutions in developing these competences among future graduates, when the average scores do not show a distinct classification of the extent to which they need to be developed.

The fact that among all the groups surveyed, the average level of Achievement score was, competence by competence, one point below the average Importance score indicates that those surveyed recognise that a lot of work remains to be done and achieved in the field of higher education in mathematics. It can be seen, moreover, that the order in which the competences were ranked, in terms of Level of Achievement, is greatly influenced by the order in which they scored on Importance.

Report of the Mathematics area on the survey on subject specific competences

On 24, 25 and 26 of August 2005, the Second General Tuning Latin America Project Meeting was held in Belo Horizonte, Brazil. Representatives from the fifteen Latin American universities in the mathematics area, having analysed the proposals for subject specific competences submitted by each university, drew up a final list of 23 competences for the area:

1. Understanding of the basic concepts of higher mathematics.
2. Ability to create and develop logical arguments with a clear identification of hypothesis and conclusions.
3. Ability to correctly express oneself in mathematical language.
4. Capacity for abstraction, including logical development of mathematical theories, and relationships between them.
5. Ability to formulate problems in mathematical language, such that their analysis and solution are facilitated.

6. Knowledge of the historical evolution of the fundamental concepts of mathematics.
7. Ability to begin mathematical investigations under the guidance of experts.
8. Ability to formulate optimisation problems, and take decisions and interpret solutions in the light of the individual situations of particular problems.
9. Ability to contribute to the construction of mathematical models from a basis of real situations.
10. Ability to use computational tools of numerical and symbolic calculations for posing and solving problems.
11. Skill in quantitative reasoning.
12. Ability to understand problems and abstract their essential elements.
13. Ability to take qualitative information from quantitative data.
14. Willingness to face up to new problems in different areas.
15. Ability to work with experimental data and contribute to their analysis.
16. Ability to communicate with other non-mathematical professionals, and aid them in the application of mathematics in their respective areas of work.
17. Ability to work in inter-disciplinary teams.
18. Ability to present mathematical reasoning and conclusions clearly and precisely, in an appropriate form for the audience at which they are aimed, both orally and in written form.
19. Basic knowledge of the teaching and learning processes of mathematics.
20. Full understanding of basic mathematics, which are what should be included in pre-university teaching.
21. Ability to participate in the development of pre-university level training programmes in mathematics.
22. Ability to detect inconsistencies.
23. Knowledge of English for reading, writing, and presenting documents in English, as well as for communication with other specialists.

For the survey on subject specific competences in the area of mathematics, the representatives from the 15 participating universities decided to consult groups of academics, graduates and students.

A summary of the results of the survey of perceived importance and level of achievement of the competences in the area of mathematics is given below. These results were analysed and discussed by the mathematics group of the Tuning – Latin America project at the third general project meeting, held in San José, Costa Rica, from 22 to 24 February 2006.

The survey was conducted among 415 academics, 304 graduates and 679 students, giving a total of 1398. In some cases, the surveys come not only from the area of influence of the participating university for each country, but from various maths programmes from different universities in the same country.

Importance of the specific competences

The 23 competences were all considered important. Table 1 shows the minimum and maximum average scores for importance. Particularly interesting is the high degree of importance rated by all competences. Competence 1, «*Understanding of the basic concepts of higher mathematics*», was rated as being the most important by the three groups surveyed, with very high average values.

Table 1

Importance of the competences. Maximum and minimum average values

	Academics	**Graduates**	**Students**
Minimum average values	3.020	3.027	3.028
Maximum average values	3.865	3.807	3.762

There is significant agreement between the three groups as to the importance of the different competences, with a correlation matrix between average importance ratings of over 0.9.

In terms of the order of importance, we have subdivided the competences into three lists. List 1 includes competences with above average scores, and shows the seven top positions in order of importance in the three groups (see Table 2). List 2 includes competences with intermediary values and List 3 shows the last 6 places in the order of importance (see Table 2).

Only two competences were placed in different lists by different groups, reflecting greater disagreement among the groups as to the importance of these particular competences. *Ability to formulate problems in mathematical language…*(5), was rated fourth by the academics; but rated 9th and 12th respectively by graduates and students. *Ability to begin mathematical investigations …*(7), was ranked 4th most important by students and 7th and 14th by graduates and academics respectively. Nonetheless, these differences in the order of importance are seen to be not so significant when we analyse the average values.

Table 2

Subject = competences in lists 1 and 3 for each group
(within each group, these are given in decreasing order of importance)

	Competences with high averages	**Competences with low averages**
Academics	1, 2, 3, 5, 12, 18, 4	8, 19, 11, 15, 21, 6
Graduates	1, 3, 12, 2, 4, 18, 7	8, 11, 15, 19, 6, 21
Students	1, 12, 2, 7, 3, 18, 4	15, 8, 11, 19, 21, 6

Tuning A Latina INGL.indd 235 19/7/07 10:45:50

The position of *ability to work with experimental data …*(15), *ability to formulate optimisation problems …*(8) *and ability to contribute to the construction of mathematical models …* (9) may be due to the fact that these can be of great importance in programmes with a particular emphasis and not so important in the general set of programmes. Nonetheless, it is significant to note the importance score for *basic knowledge of the teaching and learning processes of mathematics*,(19), *knowledge of the historical evolution of the fundamental concepts …*(6) and *ability to participate in the development of pre-university level training …*(21), given that one of the main career opportunities in mathematics is teaching.

Achievement of competences

The average values for level of achievement were lower among the three groups surveyed. Table 3 shows the minimum and maximum average scores for level of achievement. In the three groups, the competence that scored highest for achievement was also the one that scored highest for importance, namely Competence No 1 «*Understanding of the basic concepts of higher mathematics*». Students were far more critical of the level of achievement of the competences.

Table 3

Achievement of competences. Maximum and minimum average values

	Academics	**Graduates**	**Students**
Minimum average values	2.220	2.242	2.168
Maximum average values	3.243	3.395	3.192

In general terms, the average score for level of achievement of the competences is one point below the average Importance score, a tendency which is repeated amongst all three groups surveyed. Like the generic competences, the distribution of the variables shows a practically linear relationship between importance and achievement for the great majority of the competences, given that many of the competences selected as being most important within each group are in general considered to have a greater level of achievement. Nonetheless, some competences, within each group, perform differently. For example, *skill in quantitative reasoning* (11) is rated last in importance by all groups, but has a relatively high level of achievement in the three groups. The competences *knowledge of English …*(23) and *ability to work in inter-disciplinary teams* (17) scored relatively high on importance among graduates and academics, and yet rate low on level of achievement among both groups. A similar situation can be seen amongst students, where the competences *ability to begin mathematical investigations …* (7) *and ability to communicate with other non-mathematical professionals …*,(16) are considered very important, but score very low on achievement.

In terms of the evaluation of the level of achievement of the competences, the situation is similar to that for importance, with correlation values of over 0.89 among academics, graduates and students.

Conclusions

The 23 subject specific competences in the list produced in the area of Mathematics were considered important for the education of a mathematician; all competences scored highly, out of a maximum score of 4, with the lowest average values above 3.

There is a close relationship between the opinion of the three groups surveyed, in terms of both importance and achievement. Based on the average scores, the competences can be divided into three lists: those rated among the first seven on importance, those with intermediary values and those in the last six places in order of importance.

As in the case of the generic competences, the average achievement ratings of the subject specific competences was below the average importance ratings.

In the region analysed, most mathematicians work in the area of pre-university education, university education and/or research. Work in research rarely interacts with other sectors. The place given to Competence No 19 is therefore interesting, given that one of the main career opportunities for maths graduates is in education.

Appendix

Average ratings for importance and achievement
of subject specific competences in the area of Mathematics

No	Competence	Academics		Graduates		Students	
		Imp	Real	Imp	Real	Imp	Real
1	Und. of the basic concepts of mathematics.	3.865	3.243	3.807	3.395	3.762	3.192
2	Ab. to create and develop logical arguments …	3.787	2.994	3.721	3.292	3.635	2.999
3	Ab. to correctly express oneself in ...	3.763	2.987	3.752	3.314	3.562	2.951
4	Capacity for abstraction, including logical …	3.631	2.826	3.714	3.193	3.527	2.950
5	Ab. to formulate problems in mathematical …	3.717	2.798	3.657	3.102	3.473	2.779
6	Kn. of the historical evolution of fundamental …	3.020	2.220	3.160	2.351	3.028	2.217

No	Competence	Academics		Graduates		Students	
		Imp	Real	Imp	Real	Imp	Real
7	Ab. to begin mathematical investigations …	3.446	2.559	3.665	2.720	3.565	2.303
8	Ab. to formulate optimisation problems …	3.278	2.509	3.385	2.638	3.303	2.548
9	Ab. to contribute to the construction …	3.502	2.431	3.595	2.662	3.525	2.616
10	Ab. to use computational tools of numerical …	3.324	2.553	3.421	2.601	3.338	2.524
11	Skill in quantitative reasoning.	3.229	2.656	3.348	2.934	3.231	2.662
12	Ab. to understand problems and abstract …	3.684	2.808	3.734	3.215	3.638	2.926
13	Ab. to take qualitative information …	3.338	2.572	3.452	2.749	3.332	2.624
14	Willingness to face up to new problems …	3.454	2.466	3.487	2.601	3.478	2.403
15	Ab. to work with experimental data …	3.220	2.411	3.318	2.451	3.331	2.287
16	Ab. to communicate with other non-math …	3.409	2.321	3.537	2.411	3.500	2.212
17	Ab. to work in inter-disciplinary teams.	3.491	2.356	3.523	2.346	3.353	2.168
18	Ab. to present mathematical reasoning …	3.655	2.688	3.682	2.884	3.558	2.545
19	Basic knowledge of the teaching …	3.265	2.470	3.276	2.480	3.229	2.565
20	Full understanding of basic mathematics …	3.515	3.000	3.569	3.074	3.458	2.929
21	Ab. to participate in the development of …	3.114	2.400	3.027	2.242	3.097	2.544
22	Ab. to detect inconsistencies.	3.545	2.739	3.564	2.923	3.488	2.766
23	Knowledge of English for reading, writing, …	3.583	2.498	3.661	2.467	3.383	2.516

Some examples and reflections on ways of teaching and assessing generic and specific competences

Beginning at the Third General Meeting, held in San José, Costa Rica, from 22 to 24 February, 2006, the mathematics group worked together, analysing and deliberating to try to describe activities that might be carried out by the teacher and students to achieve a specific competence and how this might be assessed. For this purpose, one generic competence, *Ability to identify, pose, and solve problems* and one specific one, *Understanding of the basic concepts of higher mathematics* were chosen. Before the exercise itself began, a series of preliminary considerations were drawn up, which the group feels are worth sharing here.

Preliminary considerations

Normal practices in the teaching of mathematics can vary greatly from university to university, and may depend on many different factors, ranging from the number of students to be attended to, to the availability of human and physical infrastructure, the academic profile of the teachers in a department and the number of part-time teachers who can be incorporated into the teaching and learning tasks. Nonetheless, it is important to stress that each of these traditional practices (dissertation, lecture, class practice, seminar, workshop, laboratory or others), has a place in the competence-based model; what we need to determine is what strategies can be, and are in some cases more efficient. Each university establishes the balance of the different educational strategies that will enable it to ensure that the competences are developed among the students and in doing so, takes into account the size of the groups, the number of teachers, and the number of groups and assistants.

We would like to stress the importance of considering teaching/learning methods and their respective assessment, consistent with the expectations related to such competences and the need to make a change. Such a process can only be achieved based on a reflection on educational practices and an awareness of the need for them and their real potential. In competence-based teaching and learning, the work and time required by the teachers may change or even increase; the possible forms the competences take may involve changes in university processes or organisational structures, particularly in the ways teachers are employed, in associated activities and in the way teachers are paid for such activities. In short, it will probably be necessary to amend educational policies or establish new ones in the institutions.

All of this will require that each institution, in accordance with its mission, strategic objectives and particular features, establish through the study plan, the programmes for each subject and their educational model and the level of development of each of the competences, generic and specific, they want their graduates to acquire. The group therefore felt that implementation of a teaching model based on the formation of generic and specific competences should be tackled at three levels:

i) At institutional level, establishing policies to make the methods of teaching, learning and assessment effective, based on the development of competences, and applying them to all the generic or subject specific competences. Teacher awareness and training schemes relating to competence-based teaching/learning need to be implemented and incentives provided for teachers to participate in them; promote teaching activities that will generate these competences among the students and create teachers' networks to share these experiences.
ii) At the level of curricular design, where generic competences are qualified in accordance with the professional profiles and subject specific competences that characterise the professions are stated explicitly, the model and subject programmes will set the targets to be achieved and guide the systems for steering, developing and assessing the content in accordance with the targets set. There will also be associated systems that make it possible to monitor the achievement of the competences among students at different levels. The study programmes will empha-

sise what is essential in each one by selecting from among the skills and competences required to join the different courses.

iii) Teacher-student interaction, where the teaching, learning and assessment methods are based on generic and specific competences, take concrete forms through the curriculum developed in class (in the broadest sense of the word: classroom, laboratory, workshops, professional practice, extracurricular activities).

In the specific case of mathematics, it is important to note the great variety of targets proposed in plans and study programmes. Several authors suggest that there are overlaps between many of these targets if they are interpreted properly and reasonably. It is true that they need to be taken as a whole, identifying those that in each case are covered in the different disciplines of the programmes as effective actions for mathematical knowledge.

The scope of these targets will depend to a great extent on ensuring methodological approaches that inspire the curiosity and motivation that are necessary for learning, and which will lead the student to become involved and to recognise the importance of his/her university education. Here, the mathematics group feels it is necessary to propose activities that will foster a move from a mechanical knowledge of rules of calculation for performing operations of different types and the mastery of different algorithms to a position in which they are effectively used in everyday situations and in real practice. We believe that this is one of the primary measures that need to be considered in order to bring advanced and sophisticated knowledge of mathematics to a level of due appreciation and use among graduates. We are convinced that it will only be possible to bring about the proposed changes in teaching/learning practices and assessment if we manage to convince the academic community of the importance of and need to make the changes.

The examples given below are primarily designed for activities at the level of teacher-student interaction, although many of the guidelines given are also valid for structuring actions at other levels (particularly, at the level of curricular planning).

Analysis of the competences selected

The group recognised that the development of a competence, be it generic or specific, in a mathematics curriculum (and probably also in any other degree), is naturally (and simultaneously) associated with the development of other competences. This document therefore gives some examples of activities which, in the group's judgement, foster development of different competences (generic and specific) at the level of teacher-student interaction. We have sought to describe experiences that by promoting the development of one competence, can be used to develop several competences simultaneously and set out some general indicators, that can be used to assess their development, experiences which to a great extent form part of the teacher's day-to-day experience.

a) *Analysis of a generic competence: Ability to identify, pose, and solve problems*

The development of this competence is linked, for example, to the following:

- *Capacity for abstraction and analysis;*
- *Knowledge of the area of study and related professions;*
- *Capacity for investigation;*
- *Ability to learn and update learning;*
- *Creative skills;*
- *Capacity for teamwork;*
- *Capacity for oral and written communication.*

The *ability to identify, pose, and solve problems*, in the case of a mathematics student, this is developed systematically throughout the study programme. This competence is generated through:

- setting problems that are resolved by means of joint discussions on the resources used (definitions of concepts, properties and theorems);
- the presentation of problems in as general a form as possible, to encourage creativity in the use of different tools;
- proposing activities that will contribute to extending and consolidating the knowledge acquired, such as the questions and problems that amplify a solution that only produces one result, or the presentation of materials from which the student can extract a problem (for example, as well as asking students to calculate a derivative, applying arguments that will make it possible to see whether the student has grasped the meaning of the concept. This can be done by suggesting a practical application, in which the derivative is interpreted as a reason for change; or presenting examples of its application, where such interpretations are necessary, in such as way that student can discover them);
- proposing tasks as mean of promoting reflection and interaction that lend continuity to the learning process;
- continuing the discussion and the process of fine tuning of the questions posed in assessment activities (based on the student's doubts, responses and suggestions, the teacher opens spaces for constructing knew knowledge in problem-based action which systemises, observes, questions, comments on and provides help, analyses errors, helping identify difficulties and also the way the student views the concepts involved in the programming of new learning strategies);
- encouraging study in books through guidelines that are complemented with discussions among the students (for example, applying a selection

of exercises, from among those proposed, whose solution is based on a given text, property or formula);
— promoting the reconstruction of concepts, and reintroducing concepts that are supposed to have been already acquired, in an attempt to fill gaps in contents that are a prerequisite for the construction of new knowledge.

Through tasks, exams, individual or team participation, oral or written assignments (all activities that belong to a range of traditional resources available) achievement of the following indicators can be monitored to assess development of the competence:

— contextualization of the problem;
— identification of the constraints of the problem and possible tools for resolving it;
— the correct use of the selected tools;
— obtaining a solution;
— and the interpretation of the result can be obtained within the context of the problem, and the posing of new problems, deriving out of the proposed problem.

b) *Analysis of a specific competence: Understanding of the basic concepts of higher mathematics*

Development of this competence is associated, for example, with the following subject specific competences:

— *Ability to create and develop logical arguments with a clear identification of hypothesis and conclusions;*
— *Ability to express oneself correctly in mathematical language;*
— *Knowledge of the historical evolution of the fundamental concepts of mathematics;*
— *Ability to contribute to the construction of mathematical models from a basis of real situations.*

This competence is also developed systematically throughout the study programme, and is generated through:

— motivation, by constructing different examples that may help approach the concept under study, by presenting its historical development, and presenting it in intuitive and formal form;
— through active participation of the student at all points in the educational process, through previously oriented readings related to the subjects of study; during the systemisation of the concepts, at which point the teacher helps the student to organise the concepts studied, to discuss their scope and extension; by building counter-examples, and inviting students to discuss the concept and identify its location and relationship in the different areas and in the different levels in which it is

applied; through the supply of materials, which exercise understanding, use, mastery and application of the concept. It is also a good idea to encourage the posing of possible extrapolations or new situations; present examples that make it possible to recognise paradoxes that arise out of application of the concept; propose examples that allow inconsistencies arising out of mechanical application of the concept to be recognised, encouraging discussions on the central ideas and posing meaningful questions applying to the concepts addressed.

Through tasks, examinations, participation, oral and written assignments, it is possible to monitor achievement of the following indicators, allowing development of the competence to be assessed for each specific area:

— understanding of the concept;
— recognition and identification;
— use, transmission and application;
— relation with other items, and
— extrapolation.

The mathematics group noted that it is also valid to go in the opposite direction: in other words, describing experiences and setting out indicators, so that, when actions are carried out that the teacher works with his/her students, it is possible to monitor whether the competences targetted are being developed.

In subjects with theoretical content from the basic cycle the classic situation of the teaching-learning process involves the teacher giving a theoretical class and a corresponding practical class under the supervision of the lecturer him/herself or a team of auxiliary teachers. We feel that this arrangement could be very valuable and suitable for teaching a large group of competences. Specifically, the teacher can mention the historical evolution of the subject in question, clearly set out the mathematical reasoning, clearly identify the hypotheses and conclusions, relate the concepts developed to other branches of mathematics and other subjects already acquired by the students; present problems and build the appropriate mathematical model for solving it and pose possible applications of the concepts taught. It may also be appropriate to include some texts in English on the recommended bibliography, to familiarise students with relevant terminology. These activities are taken from the day-to-day work of the teacher and allow different competences to be developed simultaneously among the students. We then have to consider whether changes are needed in order to develop the competences.

While this is all very fruitful, it is believed that this interaction is considerably fortified when the student plays a more central role. It is essential for the practical class, or practical section of the class, to be developed with a large degree of student interaction. It is there that exercises of different types can be raised for the student to resolve, mainly ones that demand a certain degree of abstraction and skills in logical reasoning (of the «Demonstrate that...» type). In others, specific problems have to be resolved, by applying a suitable model and analysing the relevance of the solution found. Students can be encouraged to do some of the exercises in oral or written form, so that they learn to express themselves correctly. They can also be encouraged to suggest possible applications or new situations, related to a given problem. In the case of more applied subjects, in addition to the above exercises, examples and exercises should be included that encourage skills in quantitative reasoning, modelling real situations, capacity to solve problems and interpret their solution in a suitable context, and problems that can only be solved using computer tools.

Final considerations

Methodological proposals based on the transmission of decontextualised information do not in themselves ensure that students are capable of using the information properly in other situations, analysing new problems, integrating multidisciplinary knowledge or preparing new projects and proposing technically and economically competitive solutions.

In environments in which students are passive subjects in the learning process, it is very difficult for them to develop interpretation skills, spatial, logical and mathematical reasoning, reading and interpretation of graphic designs and images, synthesis of information or reasoning—which are some of the competences set out in this project.

In environments where it is the teacher's knowledge and the structure of the content that are valued, respecting the schedule of the discipline, the student may fail to become personally involved and end up questioning the relevance of the course and may not see any point in the concepts being taught.

However, in learning environments that operate through actions motivated by an interest in learning, students become involved and show willingness. As a result, the student, whatever his or her area of interest, recognises the importance of reasoning, analysing and arguing clearly, defending points of view, setting out ideas, while at the same time using the information and the technology.

We shall try to describe some methods used, depending on the educational and pedagogic purpose pursued, highlighting assessment as a formative process, and even as a learning resource.

Based on these considerations, problems can be posed in teaching activities for discussion, as a means of promoting student participation, so that they build their own learning method. The possibility of changing the traditional system depends on both students and teachers being convinced of the benefits of changes and this will require a broad rethinking of the role they both play. The constructive approaches suggest that the teacher must act as a guide, questioning, arguing and accepting constructive suggestions, rejecting negative attitudes, valuing all responses in an environment of respect, humility, and trust. It is important to remember that teaching means ensuring that someone else learns; this involves using the students' questions to turn the curriculum into something that makes sense and is satisfying for them. It will be up to the student, as an active agent, to become involved and try to recognise the benefits of participating. One of the possibilities consists of creating learning environments that use web resources and enable the development of collaborative learning, based on reflection and interaction.

The student's active participation should be fostered at all times, with prior readings related to the subjects of study, when the concepts are systemised, where the teacher helps the student to organise the concepts studied. Discussion can be prompted on the central ideas and significant questions can be posed that apply to the concepts under study. This will ensure that students value the social application of the ideas, interact and collaborate. Mistakes will be turned into opportunities for development by (re)constructing concepts, with a view to developing skills such as analysing and arguing clearly. These skills are required in the careers the graduates are likely to take up, helping them solve problems and make the transformations related to an improvement in quality of life and sustainable development.

The perspective that can be suggested is to perceive assessment as a formative process that encompasses all the possibilities presented as part of a pedagogic process, whose results will be used for (re)considering pedagogic practice, as a diagnosis in order to identify achievements, challenges and aspects where there is room for improvement, in order to ensure the achievement of learning. When students are able to express themselves with grounded reasoning on a problem, they are on a higher level of understanding, compared to those who barely process the information numerically, by applying an equation or model of operations, which they sometimes carry out through mere imitation.

From this point of view, assessment forms part of a continuous process, a diagnosis of the way learning is developed among students and it offers a reappraisal of pedagogic practice. On many occasions, what is actually transformed is the methodology used in the teaching and learning process, rather than the forms of assessment, and this can compromise the process of change.

Some authors recommend task-based assessment, assignments and other commitments made at the beginning of the teaching and learning process. In this scenario, the student takes responsibility and makes an undertaking to manage his or her own learning.

Teacher and student can discuss the subjectivity of appropriating knowledge. If this reflection is encouraged among students, they will grow as individuals, as critical citizens and will also learn to meet their commitments. In the learning of mathematics, a memorised formula or algorithm can lead to a correct result in the solution of a problem, but it reveals nothing about what the student has developed in terms of cognitive structures, or the acquisition of new knowledge. Assessment must therefore go further than simply ensuring memorisation or the capacity to reproduce knowledge. Assessment must be related to a diagnosis of the student's capacity to find different alternatives, to be creative, or to look for information to build new proposals for resolving problems. Assessment is continuous, because it is a process and must accompany learning at all times. It is the identification of the conquests of real development; it is the mediating and orienting intervention of the teacher and the student.

It is possible to use a written test or other similar activity to analyse the difficulties and obstacles students face. In other words, to transform the written test into a privileged moment of learning, an opportunity for self-assessment, planning and regulation of the student's own learning activity, a basic skill for learning to learn, where this is viewed as the skill of achieving significant learning for oneself, in a wide range of situations and circumstances. This instrument of assessment also sees mistakes as information that will help further develop learning. The comparison between a false hypothesis and its consequences provides new knowledge, and the comparison between two mistakes can lead to the preparation of new ideas.

It is possible to motivate students to reflect on the learning process itself, through what is known as the *bitácora* or compass, a web forum where they post their perceptions of the difficulties they encounter in their studies and the tasks proposed. In this way, they themselves can know and monitor the learning process and identify and examine the mistakes made, seeking to understand what has happened. The purpose, in this case, is to encourage students to reflect and increase their potential, motivating their creativity and autonomy.

Finally, different methodologies for developing and assessing the competences can be ascertained and established. Nonetheless, it should never be forgotten that they must be useful, provide support and never act as strait-jackets. Creativity, the constant analysis of the way teaching, learning and assessment are being carried out, combined with the experience and commitment of teachers, is what makes it possible to determine the best road to progress in this activity.

Note: The full versions of the documents prepared by the mathematics group, which formed the basis for this document are available at http://tuning.unideusto.org/tuningal/

Conclusions

1. This document is the initial proposal of the mathematics group within the Tuning Latin America project, to create a space for convergence of higher education in mathematics. It is felt that a forum for reflection on the mechanisms for implementing competence-based curricular designs is a positive development.
2. It is a reference point for developing competences in higher education and may be implemented in the area of any educational-pedagogic model.
3. It is applicable at various levels: at the individual level of each teacher, at the level of a group of academics specialising in a particular area of mathematics, in curricular design and at institutional level.
4. It expresses a great concern with the results of the process of teaching and learning mathematics in the education of individuals, from primary and secondary education through to higher education.

5. It emphasises that the success of these proposals in higher education depends to a great extent on the quality of the basic maths education of the students entering university. In this sense, it would be a good idea to harmonise the objectives and the actual development of the competences between the systems of primary, secondary and higher education. This will require bridges to be built, backed by public policies, to favour communication between specialists in mathematics, specialists in the field of education and secondary school teachers.
6. It proposes the development and communication of specific experiences, which contribute to improving the professional performance of future graduates in the process of teaching and learning mathematics. It also recognises the predominant role that must be played by the academic units responsible for educating, in the education of maths teachers.
7. It recommends that proposals be implemented on identification and development of the subject specific competences, which are common among the exact and natural sciences, computer studies and engineering, and also in economics and other social sciences.

Finally, the mathematics group would like to say that participating in the Tuning Latin America Project has been an enriching experience for all its members, and one in which they have all learnt from each other. They are determined to maintain and strengthen the network that this project has helped create.

4.11. MEDICINE

Introduction and presentation of the area

The following fourteen countries have been participating in the subject area of medicine in the Tuning Latin America project since 2005: Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, El Salvador, Guatemala, Honduras, Panama, Peru, Uruguay and Venezuela. The Dominican Republic joined in February 2007.

The first formal schools of medicine after Spanish colonization were established to meet the needs of the population and to serve the purpose of regulating the profession by the Vice Royalties. Many of these early schools are still in operation today. Many schools of medicine were created under the auspices of the church and government, the first private ones not appearing until the mid twentieth century.

The approach of the curriculum in most cases is traditional, divided up into subjects and cycles: basic, clinical and work experience. Current international trends in higher education have prompted a move towards a competence-based, student-centred medical education integrating basic and clinical sciences.

At the same time, medical practice has had to coexist with the beliefs, practices and values of the region's autochthonous peoples (a process which has not been free from conflict), giving medicine in Latin America some special features of its own.

The current shift towards a holistic approach to health has made it necessary to build a profile of the doctor who not only attends to illness (diagnosis, treatment, rehabilitation and palliative Care), but works to prevent its appearance and to promote healthy lifestyles among individuals and communities, within the ethical framework of his or her profession.

Map of the Latin America area

This map has been prepared using information provided by the representatives of the 14 countries forming the group for the area of Medicine.

Names of the qualification in Medicine

There is a certain degree of diversity as to the official name given in different countries to the degree of Medicine: *Médico* [Doctor] (Argentina, Bolivia, Brazil); *Médico y Cirujano* [Doctor and Surgeon] (Chile, Colombia, Guatemala, Peru and Venezuela); Médico General [General Doctor] (Ecuador); *Médico General Integral Comunitario* [General Comprehensive Community Doctor] (Venezuela, in the future); *Doctor en Medicina* [Doctor in Medicine] (El Salvador, Dominican Republic and Uruguay); *Doctor en Medicina y Cirugía* [Doctor in Medicine and Surgery] (Honduras and Panama).

Professions for which a graduate in Medicine is eligible

In all countries, a qualification in Medicine entitles the holder to practise general medicine and to pursue graduate studies.

Length of the degree

In most countries, the degree in medicine lasts 6-7 years; 5, in some faculties in Panama and 8, in El Salvador, Honduras and Uruguay. Some countries require compulsory social service (generally 1 year) to complete the degree, and in others this is a requirement for professional practice or for access to graduate studies.

Quotas and admissions

Some faculties have a pre-established number of entry quotas, based on their capacity, whereas others accept all applicants. As a result, annual quotas vary greatly, from 30 to 4,000 students.

Some Faculties, accept without restriction all applicants who have the established academic requirements: Secondary Certificate, *Bachillerato* (Chile), Basic Common Cycle (Argentina, El Salvador), Premedical Course (Venezuela), State Exam for Higher Education (Colombia), Entry Exam for Higher Education (Ecuador).

In cases where the number of students accepted is limited different selection procedures are used: high academic performance in previous studies; general or specific tests established by the university or medicine school (which may include exams of different types, interviews, and psychological and motor-skill tests) and which may be preceded by a preparatory training course (Panama). In Venezuela, the Office of University Sector Planning allocates 30% of the quotas. Some faculties also apply special entry procedures, based on agreements with the university professional associations (Venezuela), or the special consideration conferred on certain groups, such as indigenous peoples (Venezuela, Colombia), or leading athletes and artists (Chile, Venezuela).

Graduation

Two countries have a national graduation examination: Chile and Colombia. Panama and Peru have established one, although it is not yet up and running.

Results of the survey on subject specific competences in the area of Medicine

For the discipline of medicine, a total of 1902 questionnaires were analysed, from the following groups: students (609), academics (518), graduates (448), and employers (327). This distribution shows that in general the targets for data collection in each country were met, with the number obtained standing above the minimum calculated for the anticipated sample, 15 surveys per group surveyed.

List of subject specific competences in Medicine

V01. Capacity to create a medical record.

V02. Capacity to perform a complete anamnesis in any situation, with emphasis on the psychosocial and environmental aspects affecting people's health.

V03. Capacity to perform a complete physical examination including an assessment of the patient's mental state.

V04. Capacity to perform a syndromatic diagnosis and formulate diagnostic hypotheses taking into account the information from the case history, the results of the physical examination and prevalent diseases.

V05. Capacity to consider differential diagnoses.

V06. Capacity to select, indicate and interpret diagnostic tests.

V07. Capacity to indicate and perform the corresponding medical treatments.

V08. Capacity to refer the patient to another level of attention.

V09. Capacity to recognise, assess and categorise medical emergencies.

V10. Capacity to cope with the initial phase of a medical emergency.

V11. Capacity to provide first aid.

V12. Capacity to provide basic life support and cardiac/cerebral/pulmonary resuscitation.

V13. Capacity to provide advanced life support.

V14. Capacity to provide care to patients suffering trauma.

V15. Capacity to select the most appropriate drugs based on the clinical context.

V16. Capacity to prescribe clearly, precisely and safely.

V17. Capacity to recognise and cope with adverse circumstances.

V18. Capacity to communicate effectively in speech, in writing and in non-verbal form taking into account diversity and destructions that may hinder-communication, with: patients, next-of-kin, the healthcare team and the community.

V19. Capacity to communicate the nature and severity of the ailment.

V20. Capacity to obtain informal consent as appropriate.

V21. Capacity to assess for signs of life.

V22. Capacity to perform venous puncture.

V23. Capacity to perform venous cannulation.

V24. Capacity to administer drugs through different paths.

V25. Capacity to perform orotracheal intubation and basic life support.

V26. Capacity to fit catheters.

V27. Capacity to perform ostomy care.

V28. Capacity to perform suprapubic puncture.

V29. Capacity to perform thoracocentesis, paracentesis and lumbar puncture.

V30. Capacity to perform an ECG.

V31. Capacity to attend to a normal childbirth.

V32. Capacity to perform speculoscopy, vaginal examination and cervical smears.

V33. Capacity to perform rectal examination.

V34. Capacity to perform anterior nasal packing.

V35. Capacity to perform emergency haemostatic manoeuvres to stem external bleeding.

V36. Capacity to make sutures, dress wounds and drain abscesses.

V37. Capacity to move, immobilise and transport patients.

V38. Capacity to identify psychological factors (stress, dependency on and abuse of alcohol, narcotics and tobacco).

V39. Capacity to identify social factors (violence, accidents, mistreatment, abuse, marginalization, discrimination).

V40. Capacity to identify economic factors (poverty, inequality).

V41. Capacity to identify environmental factors (pollution, climate, destruction of the ecosystem).

V42. Capacity to analyse critically the scientific literature.

V43. Capacity to apply a statistical analysis of the information.

V44. Capacity to perform evidence-based medicine.

V45. Capacity to use computers.

V46. Capacity to access sources of information.

V47. Capacity to store medical records in complete and secure form.

V48. Capacity to apply ethical principles and analyses in clinical practice.

V49. Capacity to obtain and record informal consent.

V50. Capacity to maintain confidentiality.

V51. Capacity to respect diversity.

V52. Capacity to respect the rights of the patient, the healthcare team and the community.

V53. Capacity to respect and provide care for terminal patients.

V54. Capacity to issue certificates in accordance with statutory requirements.

V55. Capacity to report notifiable diseases.

V56. Capacity to recognise the structure and workings of the health system.

V57. Capacity to administer and manage the different health systems for the population.

V58. Capacity to participate effectively and actively in the healthcare team and in the community.

V59. Capacity to recognise and apply the country's healthcare policies and programmes.

V60. Capacity to recognise and manage resources for healthcare.

V61. Capacity to recognise the epidemiological profile of the population.

V62. Capacity to recognise and apply the principles of health promotion and disease prevention.

V63. Capacity to know, apply, and respect rules on biosafety.

General remarks on format and analysis

In some countries remarks were made on the disease-centred orientation of the competences selected. Some considered the number and level of specificity of the competences excessive.

In the statistical analysis the answers are treated as continuous variables, despite the fact that they are treated in the surveys as being discrete.

Due to the narrow range of possible responses and the way they were distributed, no comparisons can be established for statistical inference.

Analysis of the results of the surveys

Table 1, shows the perceived importance of the subject specific competences, classified by survey group.

Table 1

	Academics	Graduates	Students	Employers
Minimum values	2.82	2.92	3.07	2.69
Maximum Values	3.95	3.97	3.94	3.91

The competences presented were accepted by more than 75% of all those surveyed. A good level of correlation can be seen between the different groups of people surveyed: the lowest correlation, 0.84, is between employers and students and the highest is between academics and employers (0.97).

Group	Least important	Most important
Academics	V13 Capacity to provides advanced life support. V30 Capacity to perform an ECG. V57 Capacity to administer and manage the different health systems... V29 Capacity to perform thoracocentesis, paracentesis… V27 Capacity to perform ostomy care. V28 Capacity to perform suprapubic puncture.	V21 Capacity to assess for signs of life. V01 Capacity to create a medical record. V04 Capacity to perform a syndromatic diagnosis and formulate... V03 Capacity to perform a complete physical examination... V09 Capacity to recognise, assess and categorise.... V52 Capacity to respect the rights of the patient ….
Graduates	V23 Capacity to perform venous cannulation. V60 Capacity to recognise and manage the principles of …. V41 Capacity to identify environmental factors (pollution… V57 Capacity to administer and manage the different health systems... V27 Capacity to perform ostomy care. V28 Capacity to perform suprapubic puncture.	V21 Capacity to assess for signs of life. V01 Capacity to create a medical record. V04 Capacity to perform a syndromatic diagnosis and formulate... V50 Capacity to maintain confidentiality. V07 capacity to store medical records... V09 Capacity to recognise, assess and categorise....

Group	Least important	Most important
Students	V60 Capacity to recognise and manage the principles of …. V43 Capacity to apply a statistical analysis of the information. V41 Capacity to identify environmental factors (pollution… V57 Capacity to administer and manage the different health systems... V27 Capacity to perform ostomy care. V28 Capacity to perform suprapubic puncture.	V21 Capacity to assess for signs of life. V01 Capacity to create a medical record. V04 Capacity to perform a syndromatic diagnosis and formulate... V10 Capacity to cope with the initial phase of a medical emergency. V12 Capacity to provide basic life support and cardiac/cerebral... V07 Capacity to indicate and perform the corresponding medical...
Employers	V30 Capacity to perform an ECG. V57 Capacity to administer and manage the different health systems... V 26 Capacity to fit catheters. V29 Capacity to perform thoracocentesis, paracentesis… V27 Capacity to perform ostomy care. V28 Capacity to perform suprapubic puncture.	V07 Capacity to indicate and perform the corresponding medical... V21 Capacity to assess for signs of life. V04 Capacity to perform a syndromatic diagnosis and formulate... V18 Capacity to communicate effectively in speech, in writing …. V52 Capacity to respect the rights of the patient ….

Most of the competences (45 out of 63) were awarded scores of 3.5 or more (on average), and could therefore be considered to be the most important ones. In general terms, the ones that were awarded lower scores were related to more specific procedures, such as thoracocentesis, paracentesis, ostomy care and suprapubic punctures. This may be linked to the level of complexity of the work of those surveyed (the less complex their work, the less chance of their needing to carry out this type of procedure). Other countries may consider that some of these competences lie in the area of specialities, or in the field of other professions.

Competences related to the medical art (medical record, physical examination, diagnosis, therapeutic plan) tend to be higher scored in the four groups. This is not the case of competences that scored below 3.5, in which similar ratings can be seen among graduates and students and among employers and academics.

Students tend to give less importance than the other three groups to ethical aspects (confidentiality, respect for patients' rights).

Employers tend to give more importance than other groups to competences related to user satisfaction and the absence of problems of a legal nature.

The four groups surveyed ascribed less importance to competences related to the administration of resources and knowledge of the health system. This might result from the different types of health system and constant advances and reforms in the different health systems of the various countries.

With regard to the differences by actors among the six most important competences: the subject of emergency medicine is ranked among the six most important for graduates, academics and students, but not for employers.

Table 2 below shows the minimum and maximum values for level of achievement as perceived by those surveyed:

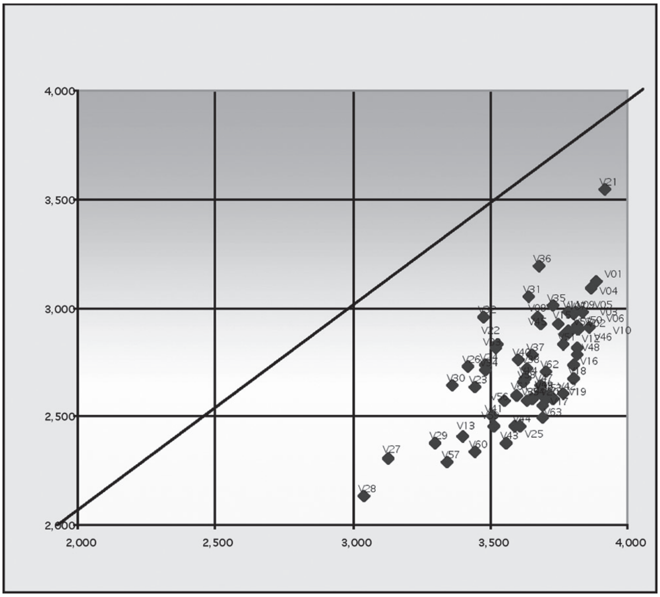
Table 2

	Academics	Graduates	Students	Employers
Minimum values	1.95	1.78	1.74	1.89
Maximum Values	3.66	3.83	3.82	3.55

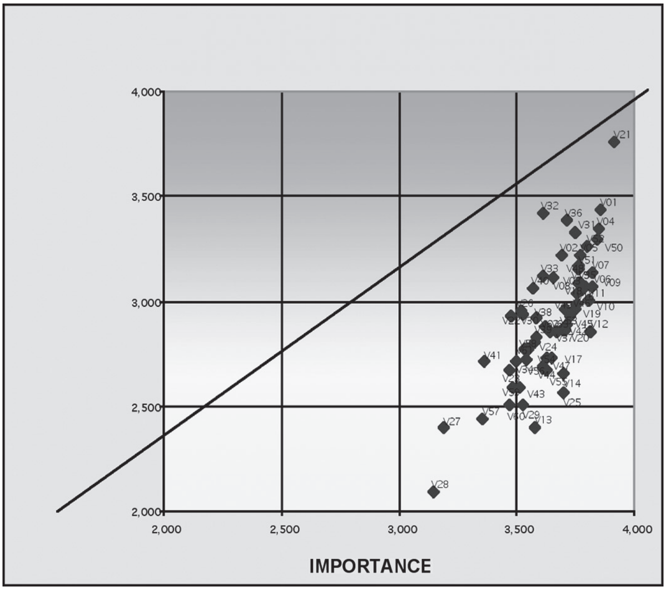
Again the correlations between different groups were good; with the lowest rate, 0.79, between employers and students, and the highest, 0.98, between academics and employers.

Graduates and students gave a higher score for the achievement of the competences, as opposed to employers and academics, who have a different perception. This may be because graduates and students are in constant practice or because they are more benevolent with themselves. Employers and academics tend to play the role of the external auditor in assessing this competence.

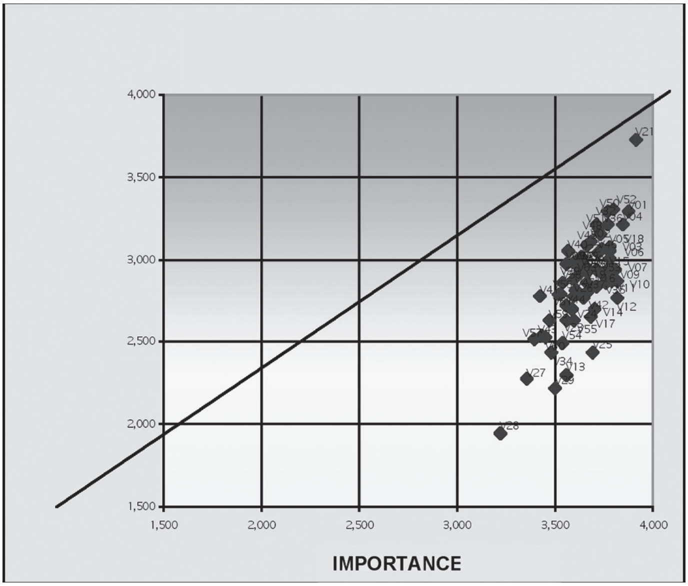
In general, a gap can be seen between the perceived importance of the competences and their level of achievement. This is particularly strong among academics and especially among employers. This phenomenon may be due to one or more of the following causes: cultural tendency to underestimate achievements; gap between what is required and what is achieved, continued use in education of paradigms based on targets and results and not competences.



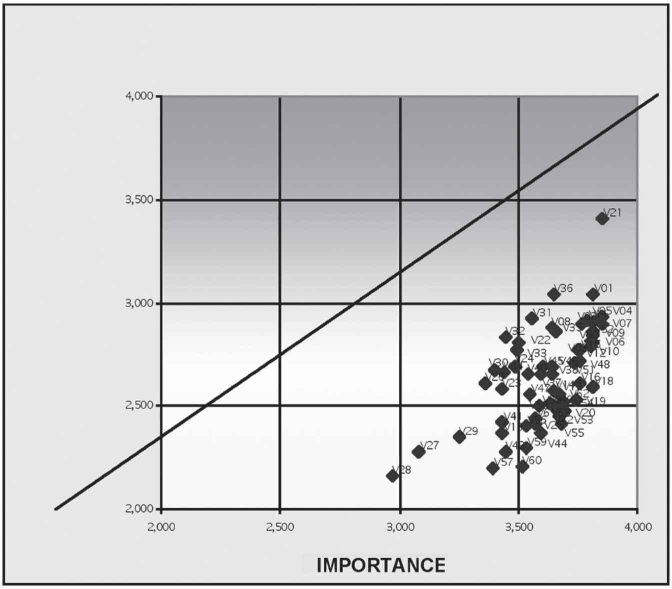
Medicine: Academics



Medicine: Graduates
Importance/Achievement comparison (averages)



Medicine: Students
Importance/Achievement comparison (averages)



Medicine: Employers
Importance/Achievement comparison (averages)

Examples of teaching, learning and assessment of generic and specific competences for the area of Medicine

Ability to learn and update learning

DEFINITION

Capacity to acquire and integrate new knowledge, abilities and skills, attitudes and values and to keep them up to date.

Mastery of this competence is related to: Curiosity. Critical attitude to knowledge and self-assessment. Ability to seek out, select and process information in the individual's native language and in English.

LEVELS

Assumes responsibility for the learning tasks assigned.
Identifies learning needs and undertakes to satisfy them.
Contributes to the creation and dissemination of knowledge

LEVEL OF DESCRIPTORS

Levels of mastery	**Indicators**	**Descriptors**				
		1	**2**	**3**	**4**	**5**
Assumes responsibility for the learning tasks assigned.	Performs the tasks thoroughly, on time and with up to date information.	Does not perform the tasks.	Performs the tasks partially or is late.	Completes the tasks on time but superficially or with out-of-date information.	Complies well and on time, although the information is not well updated.	Complies well, on time and with updated information.
Identifies learning needs and undertakes to satisfy them.	Is aware of his/her limitations and identifies his/her learning needs.	Does not recognise his/her lack of knowledge, improvises responses.	Recognises not knowing, but does not identify what needs to be learnt.	Identifies what needs to be learnt and partially satisfies it.	Identifies what needs to be learnt and learns it.	Constantly looks for new forms of learning.
	Looks for information, selects it critically and ethically and learns it.	Does not look for information.	Looks for information without discriminating its validity, relevance or pertinence or does not use it ethically.	Identifies and selects information and prioritises it.	Acquires information and relates it to other learning.	Criticises the existing information and proposes ways of improving it.

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
	Acquires and processes information in English.	Only acquires information in his/her native language.	Has difficulty processing information in English.	Processes information in English with some limitations.	Learns information in English without problems.	Produces information in English.
Contributes to the creation and dissemination of knowledge.	Contributes to the dissemination of knowledge.	Does not share the information he/she acquires.	Shares information only when required to do so.	Normally shares information he/she acquires on his/her own initiative.	Produces knowledge based on the information he/she obtains.	Disseminates the knowledge he/she produces.
	Creates original knowledge.	Does not participate in creating knowledge.	Participates in research projects.	Designs research projects.	Executes research projects and reports the results.	Publishes in journals.

Exercise of subject specific medical competences

Capacity to create a medical record

DEFINITION

Capacity to record the information obtained in the anamnesis and physical examination and summarise it, taking into account relevant findings.

Mastery of this competence is related to: Capacity to communicate and obtain the anamnesis. Perform a physical examination and distinguish between normal and abnormal findings. Capacity to write coherently and with correct spelling. Capacity to identify the relevant finding for the diagnosis.

LEVELS

Draws up the anamnesis and physical examination
Summarises and organises the information

LEVEL OF DESCRIPTORS

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
Writes up the anamnesis and physical examination.	Writes up the anamnesis.	Does not record relevant information or does so in a disordered way.	Records most of the information but it cannot be easily read.	Records the information fully and coherently but with spelling mistakes.	Records the information fully and coherently without spelling mistakes.	Records the information fully, coherently and efficiently.

Levels of mastery	Indicators	Descriptors				
		1	2	3	4	5
	Writes up the physical examination.	Does not record relevant information or does so in a disordered way.	Records most of the information but it cannot be easily read.	Records the information fully and coherently but with spelling mistakes.	Records the information fully and coherently without spelling mistakes.	Records the information fully, coherently and efficiently.
Summarises and organises the information.	Writes up the summary in a way that facilitates diagnosis.	Does not write up the summary.	The summary is missing important findings.	Presents the relevant finding untidily.	Presents the relevant finding in an orderly fashion.	The summary orients and facilitates the diagnostic approach.

Concluding remarks

Impact of Tuning Latin America on the area of Medicine

— In some countries, the impact has been nationwide, and in others it has been essentially institutional. It also had an effect on a broader Latin American scale, in countries which were not included from the outset of the project.
— The Tuning Latin America project has been a catalyst, creating motivation, expectations, interests, opportunities and hope.
— It has provided basic and accessible knowledge that is easy to understand, related to the methodologies, tools, instruments, for implementing a competence-based curriculum.
— The Tuning Latin America project fostered and galvanised existing projects, accompanying processes of curriculum reform that were already underway.
— One essential aspect was the inclusion of the opinions of the various agents, such as students, employers, graduates and academics.
— It fostered intra- and extra-disciplinary discussion, on a national scale and throughout Latin America.
— It allowed closer rapprochement between countries, offering an opportunity for inter-relationship and joint reflection.
— An intranet was set up for the area, essentially allowing members to share references, presentations and discussion documents.

Difficulties seen in implementing Tuning Latin America

— We have seen that the aspect of publicisation and dissemination still has a long way to go.

— There is still some intra- and extra-institutional resistance, which may be caused by aspects such as resistance to change, or by the fact that it is not the institution that is heading the project.
— Difficulties have been seen in logistical aspects, such as a lack of resources; long distances that make it difficult to arrange meetings, and others.
— A lack of support from authorities, regulatory and/or political bodies has proved to be a hindrance in some countries.
— Similarly, the steering role and leadership that should be provided by the NTCs is seen as being absent or insufficient in some countries.
— It is felt that there is a lack of a clear structure of coordination, for Latin America as a whole, with no relationship with existing associations.

Recommendations

— Provide appropriate instruments for empowering teachers to design, implement and develop competence-based study plans.
— With the support of the European Community, follow up on the project's original proposal which included a discussion on teaching/learning systems, credit systems and standardisation of qualifications.
— As a means of organically consolidating the working dynamics, set up a Latin American Association of Tuning Faculties in Medicine.
— Implement and consolidate electronic communication media, in particular making the intranet resource more useful.
— Find the financial resources necessary to continue with the Tuning Latin America project.
— Important challenges linked to competence-based education include the need to measure the real student workload and foster academic and student mobility.

Conclusions and suggestions

1. By bringing reflection for orienting competence-based curricular reforms.
2. The methodology proposed by Tuning Latin America is simple and accessible to non experts who are committed to reforming higher education.
3. The competences postulated were widely accepted by the four groups surveyed, which indicates that they are identified with what is seen as being the profile of the medicine graduate.

4. Emerging competences associated with the professional practice of medicine, such as those related to the management of health services, bioethics, legal aspects, computing and communication, had the highest dispersion rate, as compared to traditional competences related to the medical act (medical record, physical examination, diagnosis, therapeutic plan), which were those rated highest by the four groups. At the same time, the result of the surveys shows that there is a gap between the importance given to the competence and the level to which it is being achieved.
5. We can therefore conclude that, among other factors and depending on the context, suitable alterations need to be made in the structure, content and assessment processes of the educational programmes.
6. In order to develop the results of the Tuning Latin America project, it is essential to:

   — Disseminate the results obtained to date at local level, in order to gain the commitment of the greatest possible number of agents.
   — Ensure their proper formation, and exchange and disseminate experiences and documents.
   — Guarantee support from the public, academic and political authorities involved.

7. Finally, the timely collaboration of the European Union and the accompaniment of Tuning Europe is considered to be of the greatest importance.

4.12. CHEMISTRY

Introduction

The subject area group of Chemistry was set up in San José, Costa Rica, at the Third General Tuning Project Meeting and first general meeting for new areas, held from 22 to 24 February, 2006. The ten countries participating were: Argentina, Brazil, Colombia, Chile, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela.

The group mapped the Chemistry area in the countries and universities involved, and drew up a list of subject specific competences, defining the professional profile and examples of how to teach and assess these competences among students.

This document is divided into the following parts:

1. Map of the subject area of Chemistry;
2. Subject specific competences for the area of Chemistry;

3. Analysis of the results of the survey on the subject specific competences for the profession of chemist;
4. Examples of the teaching/learning and assessment of these competences among chemistry students.

It is felt that a competence-based educational model helps give students a complete and multidisciplinary grounding. It also facilitates better communication among higher education institutions and mobility of teachers and students, raising the quality of the teaching and learning processes and linking the graduate to his/her community, in such a way that they can respond adequately to the demands of society.

In the region of Latin America and the Caribbean, there is a need to bring about changes that will allow for integration of a core curriculum required to achieve competences common to university education in the field of chemistry. As a result, most countries are working to restructure their graduate profiles, to allow graduates to find the best ways of resolving problems in this new knowledge-based society.

The competence-based and student-centred curriculum makes it possible to integrate demand from industry with academic rigor, thus ensuring the relevance and quality of the education of the future professional in the field of chemistry. Graduates are thus an important source of feedback for designing curricula.

In the area of chemistry competences are strongly based on theoretical and experimental abilities and skills as well as on scientific research.

It is important to stress that the professional chemist must be trained in ethical values and a social awareness in terms of the well-being of society, since chemistry is involved in health, the environment, foodstuffs and industry. In other words, it plays a relevant role in achieving sustainable development.

On this basis, the work group for the chemistry area, working in consensus, established and formulated the subject specific competences, after a broad and intense exchange of ideas during the work meetings and over the virtual platform.

Finally, they reached the conclusion that the generic competences prepared by Tuning Latin America Project at the preliminary meetings were suitable and satisfactory for the professional profile of the Chemist.

Map of the Chemistry Area

The following map was drawn up based on an analysis of chemistry-related degrees in these countries. It shows the great difference in chemistry degrees, an aspect deemed to be important in an analysis of the surveys and which may affect the results.

Table 1

Population data, universities and degrees in the Chemistry area

Country	Population (million)	Universities		Representative degrees	Duration semester
		State	Private		
Argentina	39	34	12	«*Licenciatura*» in Chemistry, Chemical Eng., Pharmacy, Biotechnology, Chemical Analyst, Environmental Chemist, Food Chemist, Biochemistry.	10
Brazil	187	80	72	«*Bacharel*» in Chemistry, Industrial Chemist, Environmental Chemist, Biotechnological Chemist.	8
Chile	16	25	39	«*Licenciatura*» in Chemistry, Chemist, Industrial Chemist, Environmental Chemist, Pharmaceutical Chemist, Extractive Metallurgy, Civil Eng. in Chemistry, Eng. of Execution in Chemistry, Analyst Chemist, Biochemistry.	10
Colombia	46	10	3	Chemistry, Chemical Eng., Industrial Chemistry, Pharmaceutical Chemistry, Food Chemistry, Biochemistry.	10
Costa Rica	4	2	0	Industrial Chemistry, Chemistry, Chemical Laboratory Technician.	10
Ecuador	13	12	6	Clinical Biochemistry, Biochemistry and Pharmacy, Chemistry and Pharmacy, Chemistry, Food Chemistry, Chemical Eng., Industrial Eng., Metallurgical Eng., Environmental Eng., Biotechnology, Food Engineering, Bio analyst.	10
Mexico	106	26	20	Chemistry, Industrial Chemistry, Chemical Eng., Chemical Food Eng., Chemist Biologist Pharmacist, Metallurgical Chemical Eng., Chemical Environmental Eng., Agricultural Chemist.	9
Peru	28	15	15	Chemistry, Pharmacy and Biochemistry, Chemical Eng., Environmental Eng., Mining Eng. and Metallurgy, Industrial Eng., Food Eng., Petrochemical Eng.	10
Uruguay	3	1	0	Chemistry, Pharmaceutical Chemistry, Clinical Biochemistry, Chemical Eng., Food Eng.	10
Venezuela	26	6	2	Chemistry, Geochemical, Pharmacy, Chemical Eng., Food Eng., Bio analysis and Higher Technician in Chemistry.	10

In most of the countries in the group, the first degree in chemistry is a *licenciatura*. In Brazil the term for this concept is «*bacharel*», and in others, it is known by the title shown in Table 1. This report does not extend to the training of chemistry teachers.

A phenomenon has developed in the area of Chemistry in various Latin American countries, whereby the academic programmes have gradually shifted from basic chemistry to applied chemistry. This has led to the creation of a wide variety of areas of specialisation, ranging from chemistry, to degrees with two or three titles in their names, such as Environmental Chemistry, Biotechnological Chemistry and some countries have included chemical engineering with an additional name in their programmes, such as «metallurgical chemical engineering» or «chemical engineering in foodstuffs». In Mexico, there are even programmes covering the areas of Chemistry, Pharmacy and Biology. Table 1 shows the names of the most important degrees in each country.

As Table 1 shows, there is a large number of chemistry programmes and, in some countries, they cover areas ranging from biology to quantum mechanics. The group therefore had difficulty establishing the subject specific competences for the chemistry graduates.

The length of the academic programme varies from 8 to 10 semesters and, in most cases the system is arranged into semesters. Academic performance is assessed in contact time with an equivalence in credits. The credit equivalence varies between countries and institutions. The average number of programme hours is 2500 to 4000.

The processes for admission are similar in most countries, consisting of an admission exam set by the university itself, or by the state. Some countries adopt different processes, such as entry courses.

In all countries in order for the student to graduate they have to complete 100% of the credits in the corresponding discipline. In some institutions, English and social service also form part of the curricular programme. Additionally, in some institutions, students are required to carry out pre-professional or professional practices, scientific initiation or community service.

Teaching of the concepts of chemistry is closely associated with scientific research and postgraduate activities. This activity is a standard part of the student's education in most of the courses throughout the students' education, allowing them to participate in scientific forums on a national and international scale, providing them with the tools to develop the skills characteristic of a professional critic, thinker, creator and entrepreneur.

Graduation requisites vary within each country and between the participating countries, and generally depend on the institution itself. Some requirements for the degree are work experience, thesis, comprehensive or final essay, general average, to pursue graduate studies and refresher courses among others.

Chemistry graduates are qualified to work in several areas, such as scientific research; product development in industry; primary, secondary and higher education; business; government service, agriculture, the environment and health, among others.

The quality of the Chemistry programmes in most participating countries is subject to processes of self-assessment, external assessment and accreditation by bodies of academic peers. These programmes have a limited time of application, after which they again have to submit for assessment. Countries that do not have this mechanism are currently implementing it. In addition, in Brazil, Colombia and Mexico, graduates undergo an assessment of theme content, constructed by the government on a national scale. In some institutions this process is compulsory, in others it forms part of the graduation requirements, and in others it is voluntary.

In Brazil, the curricula follow the guidelines set out in the act governing the directives and bases of national education. These are general and each institution determines the final design, respecting regional differences. In other countries, policies on curricular design and updating are determined by each university, but depend on national policies, which are integrated into the guidelines established by the bodies responsible for external assessments and accreditations by academic peers.

Subject specific competences in the area of Chemistry

As a result of the meeting in San José, Costa Rica, a total of 21 competences were agreed upon. These are set out in Table 2.

Table 2

Subject specific competences in the area of Chemistry

LA	Specific Competences
V01	Capacity to understand and apply knowledge of Chemistry in solving qualitative and quantitative problems.
V02	Good understanding of the fundamental theories, principles and concepts of Chemistry.
V03	Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory.
V04	Capacity to recognise and analyse problems, and to plan strategies for their solution.
V05	Skill at using, applying and developing analytical techniques.
V06	In-depth knowledge and understanding of a specific area of Chemistry.
V07	Knowledge of the frontiers of research and development in Chemistry.
V08	Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists.
V09	Capacity to plan, design and execute research projects.

LA	Specific Competences
V10	Skill at using modern computer and communication techniques applied to Chemistry.
V11	Ability to participate effectively in inter- and transdisciplinary teams working on projects related to Chemistry.
V12	Mastery of Chemical terminology, nomenclature, conventions and units.
V13	Knowledge of the main synthetic routes in Chemistry.
V14	Knowledge of other scientific disciplines necessary for the comprehension of Chemistry.
V15	Ability to present scientific information orally and in writing, to different types of audience or readers.
V16	Skill at monitoring events or changes through the measurement and observation of chemical properties, systematically and reliably gathering data and documenting the events or changes observed.
V17	Knowledge and application of Good Laboratory Practices and Quality Assurance.
V18	Capacity to work with curiosity, initiative and enterprise.
V19	Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of Chemistry.
V20	Skill at applying knowledge of Chemistry for the purposes of sustainable development.
V21	Comprehension of the epistemology of science.

LA: Latin America.

A survey was conducted into the importance and level of achievement of the subject specific competences in the different universities among the following groups: Students, Graduates, Academics and Employers. The results are shown in Table 3.

Table 3

Degrees surveyed

Country	Degrees
Argentina	*Licenciatura* in Sciences Chemistry or Licenciatura in Chemistry.
Brazil	Chemist.
Chile	*Licenciatura* in Chemistry - Chemist
Colombia	Chemist.
Costa Rica	Industrial Chemist.

Country	Degrees
Ecuador	Clinical Biochemist, Biochemist and Pharmacist, Chemist and Pharmacist, Chemist, Food Chemist, Chemical Eng., Industrial Eng., Metallurgical Eng., Environmental Eng., Biotechnology, Food Engineering, Bioanalyst.
Mexico	Chemist, Industrial Chemist, Chemical Eng., Chemical Food Eng., Chemist-Biologist-Pharmacist, Metallurgical Chemical Eng., Chemical Environmental Eng., Agricultural Chemist.
Peru	*Licenciado* in Chemistry,
Uruguay	Chemist, Pharmaceutical Chemist, Clinical Biochemist, Chemical Eng., Food Eng.
Venezuela	Chemist.

The subject specific competences formulated for the Chemistry area were compared against those developed in the European Union, and several were found to match: V01 (*Capacity to understand and apply knowledge of Chemistry in solving qualitative and quantitative problems*), V02 (*Good understanding of the fundamental theories, principles and concepts of chemistry*), V03 (*Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory*), V10 (*Skill at using modern computer and communication techniques applied to chemistry*), V15 (*Ability to present scientific information orally and in writing, to different types of audience or readers*), V16 (*Skill at monitoring events or changes through the measurement and observation of chemical properties, systematically and reliably gathering data and documenting the events or changes observed*), and V17 (*Knowledge and application of Good Laboratory Practices and Quality Assurance*).

This study is essentially exploratory in nature and does not allow us to draw general conclusions based on the results.

Methodology

The methodology developed by the participating universities for conducting the surveys consisted of obtaining a sample as follows:

— 30 graduates.
— 30 employers.
— 30 academics.
— 30 students.

The scale went from 1 to 4, where 1 = None, 2 = Weak, 3 = Considerable and 4 = Strong.

Taking the four groups surveyed, a total of 1512 surveys were received from the 10 participating countries in the chemistry area. The list is shown in Table 4.

Table 4
Number of surveys per group in the chemistry area

Group	No. of surveys
Academics	369
Graduates	444
Students	539
Employers	160
Total:	1,512

Analysis of results

The results of the surveys show different level of response from the groups. From graduates, a minimum of 12 and a maximum of 151 surveys were received, from students, a minimum of 6 and a maximum of 100, from academics, a minimum of 5 and a maximum of 116 and from employers, a minimum of 0 and a maximum of 27. The latter group was the one with the lowest participation, reflecting the effort that needs to be made to work closer with this sector which plays an important role in the education chain and in the application of chemical knowledge.

The generic competences were analysed, and it was agreed that the same ones should be used for the area of chemistry as for other areas which began earlier and were by then at the second stage of the project.

Before beginning a specific analysis we need to stress the correlation in importance ascribed to the competences by the different groups surveyed. There was a particularly strong correlation coefficient between academics and graduates (0.967). The lowest level of correlation, in terms of the importance ascribed to the competences, is between employers and students (0.877). In terms of the level of achievement of the competences, there was a strong correlation between students and graduates (0.9641) and the smallest level of correlation was between employers and students (0.898).

Taking this further a comparative analysis of the groups was made, associating graduates and employers, and academics and students on the basis of their greater interaction in practice, the former in the working environment, and the latter in the university.

Importance of the competences: Graduates and employers

With regard to the importance ascribed to the different competences surveyed, a significant correlation (0.951, see Table 6) was seen between the opinion of the graduates and employers, as can be seen by comparing the competences each group considered most important. This is shown in Table 5.

Competences with scores above the average

Graduates

- Capacity to apply knowledge and understanding in chemistry. (V01)
- Capacity to recognise and analyse problems, and to plan strategies for their solution. (V04)
- Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)
- Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists. (V08)
- Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
- Capacity to work with curiosity, initiative and enterprise (V18)

Employers

- Capacity to recognise and analyse problems, and to plan strategies for their solution. (V04)
- Capacity to apply knowledge and understanding in chemistry. (V01)
- Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)
- Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists. (V08)
- Capacity to work with curiosity, initiative and enterprise. (V18)
- Skill at using, applying and developing analytical techniques. (V05)

It is worth highlighting the similarity of opinion with regard to the five competences with an above-average score. This means that knowledge of the area of chemistry, capacity for problem solving, the interpretation of information, curiosity and initiative and fluency in English are essential competences, and feature among the first six average scores for graduates and employers.

Competences V02 (included among those considered most important by graduates) and V05 (in the employers' top 6 list), may be considered complementary. Graduates feel that this competence should be developed in the professional studies course, while employers see it as being a competence that relates to the application of this knowledge. The six competences of the two groups are important factors to be taken into account in developing study methodologies that will encourage and strengthen them.

Competences with above average scores

Graduates

- — Knowledge of the frontiers of research and development in chemistry. (V07)
- — Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
- — Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
- — In-depth knowledge and understanding of a specific area of chemistry. (V06)
- — Knowledge of the main synthetic routes in chemistry. (V13)
- — Comprehension of the epistemology of science. (V21)

Employers

- — Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
- — Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
- — Skill at applying knowledge of chemistry for the purposes of sustainable development. (V20)
- — Knowledge of the frontiers of research and development in chemistry. (V07)
- — Knowledge of the main synthetic routes in chemistry. (V13)
- — Comprehension of the epistemology of science. (V21)

The level of importance of the above competences is, on average, less that that of the other competences proposed in the survey. Indeed, all the competences considered to be less important than the average scored above 3 among all the groups surveyed. (Remember that on this scale, 3 means Considerable).

As we can see, graduates and employers agreed in identifying the least important competences as:

- — Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
- — Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
- — Knowledge of the frontiers of research and development in chemistry. (V07)
- — Knowledge of the main synthetic routes in chemistry. (V13)
- — Comprehension of the epistemology of science. (V21)

Importance of the competences. Academics and Students

With regard to the importance ascribed to the different competences surveyed, there was a correlation (0.912, see Table 6) between the opinion of the academics and the students, as we can see by comparing the competences each group considered most important.

Competences with scores above the average

Academics

- Capacity to understand and apply knowledge of chemistry. (V01)
- Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
- Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)
- Capacity to recognise and analyse problems, and to plan strategies for their solution. (V04)
- Knowledge and application of Good Laboratory Practices. (V17)
- Capacity to work with curiosity, initiative and enterprise. (V18)

Students

- Capacity to apply knowledge and understanding of chemistry. (V01)
- Knowledge and application of Good Laboratory Practices. (V17)
- Capacity to recognise and analyse problems, and to plan strategies for their solution. (V04)
- Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists. (V08)
- Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
- Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)

Academics and students agreed in rating the aforementioned competences, although there are two competences that differ in importance (V08**,** fluency in English) is considered important by students and not by academics. At the same time, the academics consider it to be more important to develop curiosity (V18), and therefore, the most important competences are:

- Capacity to apply knowledge and understanding in chemistry. (V01)
- Knowledge and application of Good Laboratory Practices. (V17)
- Capacity to recognise and analyse problems, and to plan strategies for their solution. (V04)

— Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
— Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)

Competences with below average scores

Academics

— Knowledge of the frontiers of research and development in chemistry. (V07)
— Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
— In-depth knowledge and understanding of a specific area of chemistry. (V06)
— Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
— Knowledge of the main synthetic routes in chemistry. (V13)
— Comprehension of the epistemology of science. (V21)

Students

— Knowledge of the main synthetic routes in chemistry. (V13)
— Ability to participate effectively in inter- and transdisciplinary teams working on projects related to chemistry. (V11)
— Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
— In-depth knowledge and understanding of a specific area of science. (V06)
— Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
— Comprehension of the epistemology of science. (V21)

The academics and students agree that the least important competences are:

— Knowledge of the main synthetic routes in chemistry. (V13)
— Knowledge of other scientific disciplines necessary for the comprehension of chemistry. (V14)
— In-depth knowledge and understanding of a specific area of science. (V06)
— Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)
— Comprehension of the epistemology of science. (V21)

Table 5

Importance of the specific competences in the area of chemistry

	Competence	A	G	S	E
V01	Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems.	3.842	3.805	3.839	3.742
V02	Good understanding of the fundamental theories, principles and concepts of chemistry.	3.782	3.726	3.686	**3.570**
V03	Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory.	3.772	3.778	3.680	3.738
V04	Capacity to recognise and analyse problems, and to plan strategies for their solution.	3.761	3.788	3.709	3.841
V17	Knowledge and application of Good Laboratory Practices and Quality Assurance.	3.670	**3.689**	3.769	**3.610**
V18	Capacity to work with curiosity, initiative and enterprise.	3.670	3.723	**3.647**	3.661
V08	Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists.	**3.647**	3.742	3.703	3.707
V05	Skill at using, applying and developing analytical techniques.	**3.546**	**3.562**	**3.625**	3.612

A: academics; G: graduates; S: students; E: employers

Table 6

Correlation matrix for importance

	Graduates	Students	Employers	Academics
Graduates	1			
Students	0.92708303	1		
Employers	0.95179119	0.87724561	1	
Academics	0.967272	0.91245763	0.89645726	1

Achievement of competences: Graduates and Employers

There was a high degree of correlation between the opinions of the graduates and the employers on the achievement of competences (0.947, see Table 8), as can be seen by comparing the scores given to the competences by each group (Table 7).

Level of achievement of competences with above average scores

- Mastery of Chemical terminology, nomenclature, conventions and units (V12)
- Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
- Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems. (V01)
- Knowledge and application of Good Laboratory Practices. (V17) (graduates)
- Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)
- Skill at using, applying and developing analytical techniques. (V05)
- In-depth Knowledge and understanding of a specific area of chemistry. (V06) (employers).

The language of chemistry, the understanding and application of the knowledge essential to chemistry, the development of analytical techniques and the interpretation of information for solving quantitative and qualitative problems, are the competences that the graduates and employers agree in considering to have the highest level of achievement, and universities should therefore address themselves to developing in-class and out-of-class methodologies and procedures for extending their achievement.

Achievement of competences with below average scores

Graduates and employers agreed on the achievement levels of the competences that were least important:

- Ability to participate effectively in inter- and transdisciplinary teams working on projects related to chemistry. (V11)
- Capacity to plan, design and execute research projects. (V09)
- Sufficient Knowledge of English to be able to read, write and present papers, and to communicate with other scientists. (V08)
- Skill at applying knowledge of chemistry for the purposes of sustainable development. (V20)
- Comprehension of the epistemology of science. (V21)
- Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)

Significantly, there are two competences that have a great impact on the employment field that graduates and employers both consider to be underachieved.: teamwork and communication in English.

Achievement of competences: Academics and Students

Achievement of competences with below average scores

Among academics and students, there is a high degree of correlation as to the achievement of the following competences, with a correlation rate of 0.935 (see Table 8):

- — Mastery of Chemical terminology, nomenclature, conventions and units. (V12)
- — Good understanding of the fundamental theories, principles and concepts of chemistry. (V02)
- — Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems. (V01)
- — Knowledge and application of Good Laboratory Practices. (V17) (students)
- — Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory. (V03)
- — Skill at using, applying and developing analytical techniques. (V05)
- — In-depth knowledge and understanding of a specific area of chemistry. (V06) (academics)

Two competences about which there is no agreement between students and academics, but which each considers important —as well as being essential tools for obtaining the best results from the degree, since they involve the development of student specialisations— are V17, *knowledge and application of Good Laboratory Practices and Quality Assurance*, and V06, *knowledge of a specific area* (seen as important by academics).

Achievement of competences with below average scores

Academics and students agreed in rating the following competences as being those with the lowest level of achievement:

- — Capacity to plan, design and execute research projects. (V09)
- — Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists. (V08)
- — Skill at applying knowledge of chemistry for the purposes of sustainable development. (V20)
- — Comprehension of the epistemology of science. (V21)
- — Good knowledge of, and ability to apply and provide advice on legislation having to do with the field of chemistry. (V19)

The below average score obtained by V08 suggests that both students and academics feel that activities should be carried out to encourage the learning of English.

Table 7

Level of achievement of subject specific competences in the area of chemistry

	Competence	A	G	S	E
V02	Good understanding of the fundamental theories, principles and concepts of chemistry.	3.190	3.349	3.133	3.305
V12	Mastery of Chemical terminology, nomenclature, conventions and units.	3.155	3.394	3.182	3.267
V01	Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems.	3.013	3.219	3.061	3.097
V05	Skill at using, applying and developing analytical techniques.	2.992	3.000	2.963	3.122
V03	Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory.	2.962	3.057	3.047	3.049
V06	In-depth knowledge and understanding of a specific area of chemistry.	2.798	**2.871**	**2.759**	2.906
V13	Knowledge of the main synthetic routes in chemistry.	**2.755**	2.872	**2.812**	**2.894**
V17	Knowledge and application of Good Laboratory Practices and Quality Assurance.	**2.778**	**2.780**	3.019	**2.732**

Table 8

Correlations matrix for level of achievement

	Graduates	Students	Employers	Academics
Graduates	1			
Students	0.96419158	1		
Employers	0.94713036	0.89837061	1	
Academic Personnel	0.96268756	0.93520841	0.96065973	1

Reflections and examples on teaching, learning and assessment of subject specific competences

The group from the chemistry area has debated the problem of developing subject specific competences. It is important to mention that strategies need to be changed if a transformation of the system of teaching/learning is to be brought about to ensure achievement of the competences. This does not mean that all the activities performed in traditional teaching, such as lectures, presentations, laboratory practice, workshops, seminars, projects, should be done away with. A change of attitude is required among teachers, and a basic prerequisite is disciplinary and pedagogic training for them. Without doubt these changes will require considerable time and work and on occasions will mean that a support team will be needed. Universities need a policy of teaching-learning-assessment and human resources and infrastructure that fosters this change in attitude. The methodology will depend on the characteristics of the universities.

Some notes on mechanisms for calculating the student workload

The learning process is not restricted to the formal contact hours. Students learn through a process of reflection, led by the students themselves and it is not a process which can be achieved from the outside in. Spaces of time therefore need to be created, within the curricular design, for searching, reflecting, familiarisation and consolidation of the knowledge. Such knowledge, when effectively integrated, grasped and applied, will enable development of the competences required for the complete training of the future professional.

Distribution of the total student workload

The workload is the time spent on academic work, including all the different types of study, that is required to develop the different competences that enable the curriculum to be fulfilled. As well as class time, the workload should be weighted to include independent study times, practical field work and laboratory work, workshops, outreach work and research, among others.

The workload encourages greater flexibility in taking studies outside periods of regular classes (during the trimester, semester or academic year), such as for example, an intensive summer course. This system emphasises student-centred teaching, in that it takes into account each student's different individual learning times.

Higher education systems that represent their study scoring units in terms of workload, therefore use specific directives that allow room for continuous teaching, distance learning, recovery of extracurricular experience, in that they encourage a reduction in the time spent on formal academic activities.

The workload may be associated to the *academic credits*, by means of a function that takes in the type of course (theoretical, laboratory, exercises, etc.), thus catering to the specific circumstances of each university and each country.

Example of teaching and assessment of a specific competence in chemistry

Specific competence analysed:

V02. Good understanding of the fundamental theories, principles and concepts of Chemistry

Achievement of this competence is related to the following subject specific competences in the area:

V01. Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems.

V04. Capacity to recognise and analyse problems, and to plan strategies for their the solution.

V03. Capacity to interpret and evaluate data drawn from observation and measurement, relating such data to theory.

V06. In-depth knowledge and understanding of a specific area of chemistry.

V05. Skill at using, applying and developing analytical techniques.

V10. Skill at using modern computer and communication techniques applied to chemistry.

The order in which these competences are listed does not imply any prioritisation.

The competence analysed (V02) is achieved transversally and systematically through completion of the study programme, by means of:

- ***Student motivation*** to prepare different examples that should, in principle, lead to the concept to be studied, whose historical development provides the guideline for intuitive and formal presentation.
- ***Active student-teacher participation*** throughout the education process, through the preparation of summaries of previous guided readings, which back the specific and group discussion and allow consensus to be reached on the study subject, thus achieving systemisation of the concepts. The teacher helps students grasp the concepts studied, discusses their scope and extension, fosters the creation of the student's own examples, orients the student towards the identification and location of the concept in the different areas and in the different levels in which it is applied, supplies materials and promotes the achievement of individual and group activities, which will give the student an understanding, use, mastery and application of the concepts.
- ***Activities***: tasks, exams, oral or written presentations, laboratory practice, which will allow compliance with the following indicators assessing the achievement of these competences to be observed for each specific concept:

Comprehension of the concept is extensive and relates to the course programme.
Recognition and identification of the concept allows the student to apply it correctly.
Efficiency and precision in the use, transmission and application of the concept, and its relation with other items will enable it to be logically resolved an extrapolated to the area of sciences.

Conclusions

Of the list of 21 subject specific competences created in the area of chemistry, only 20 were considered to be important in the education of a professional chemist by the 1512 people surveyed from 10 countries. The four groups surveyed broadly agreed on the importance of Competences V01 *Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems* and V04 *Capacity to recognise and analyse problems, and to plan strategies for their solution*.

There was also broad agreement on the achievement of Competences V12 *Mastery of Chemical terminology, nomenclature, conventions and units*; V02 *Good understanding of the fundamental theories, principles and concepts of chemistry*, and V01 *Capacity to understand and apply knowledge of chemistry in solving qualitative and quantitative problems*.

The ten most important competences for the graduates, academics and employers, included Competence V18 *Capacity to work with curiosity, initiative and enterprise*, but it was not rated as being one of the most highly achieved. This competence is related to initiative and it appears that graduates and academics do not have a broad culture in this respect.

Work needs to be done on the teaching of a second language, V08 *Sufficient knowledge of English to be able to read, write and present papers, and to communicate with other scientists*, given its importance in a globalised economy.

The language of chemistry, *the understanding and application of the knowledge essential to chemistry, the development of analytical techniques* and *the interpretation of information for solving quantitative and qualitative problems*, are the competences that the graduates and employers agree in considering to have the highest level of achievement, and universities should therefore address themselves to developing in-class and out-of-class methodologies and procedures for extending their achievement.

Outlook for the future and outstanding issues

It is essential to follow up on the work achieved in the Tuning Latin American project, in terms of the definition of the subject specific competences in chemistry common to all participating countries, which has marked the first step towards achieving consensus that will in the future make it possible to ensure the quality and mobility of students, academics and professionals at a regional level.

For all of the above reasons, it is necessary to develop a second stage, taking in the implementation of the system of competences in the countries in the region. In this context, the chemistry group proposes a project along the following lines:

1. Design of common competence-based curricula for the region of Latin America. This will involve defining:

    a) Subject specific competences for degrees and subjects.
    b) Student-centred teaching methodology.
    c) Systems of assessment and indicators.
    d) Systems for measuring student workload.

2. Training programmes involving support and exchange among universities on a national and international scale (Latin America and the European Union).
3. Structuring and development of networks in chemistry, that allow agreements to be drawn up between various countries for greater mobility of academics and students.

In order to implement this proposed second stage, it will be essential to have economic and academic support from the European Union.

5

Some remarks on the units used for measuring student workload in Latin America

Introduction

From the outset, the Tuning – Latin America project set itself the task of providing a theoretical and methodological framework of reference for designing, developing and implementing study programmes. At the first general meetings of the programme, we spent time and energy on identifying generic and specific competences for the twelve subject areas attending. The high level of consensus reached and the precision in the definitions of the competences are proof of the immense work of the academics involved in the project.

In the second phase, the process turned to identifying examples of good practice that would be suitable for applying these competences (generic and subject specific) to the activities of teaching, learning and assessment.

These first two lines of the project —Line 1, the generic and specific competences and Line 2, approaches to teaching, learning and assessment— are now under development and have made important progress. The third line proposed relates to academic credits and has received backing from some of those responsible for higher education in Latin America, who consider it to be a subject that needs to be addressed. It is important to remember that this line had been omitted in the initial line-up for the project in Latin America because it was felt to be a sensitive issue in the region and we had no desire under any circumstances to force a discussion about such a delicate issue.

The initial proposal was presented without the line on academic credits. After the project had been approved we made a series of preparatory visits, presenting the proposal and explaining the working methodology to those authorities in the region responsible for university policy. In most of the Latin American countries visited we encountered an interest in including this line in the project. It was taken up as a proposal, and although there was agreement that it was a significantly sensitive subject, it was felt to be important to include it among the points to be debated and developed in the project.

Taking into account the suggestions, the issue of the academic credit was incorporated into the lines of work and it began to be developed as a subject for discussion in the meetings of the National Tuning Centres. It was decided that we should first come to some agreement within this group before taking it to the subject areas.

This document was prepared within the framework of the Tuning Latin America Project and is based on the deliberations made at the general meetings of the National Tuning Centres. It does not intend to outline a single system of units for measuring the student workload in Latin America, but it does move towards the definition of general criteria which, while respecting national and institutional academic autonomy, will act as effective elements to aid a better understanding of higher studies and the degrees they confer and foster academic mobility in the region.

It is important to note that the debate on the academic credit is a highly nuanced one and it helps to look closer at the importance of taking into account the student's time commitment, the workload required for achieving given competences, and the ways of achieving a weighted and realistic distribution of learning activities in the curriculum, which would help to prevent unnecessary prolongation of the degrees or repetitions. There was general consensus about the need to take the student's whole workload into account when planning programmes since the learning process is not restricted to the time spent on activities in direct contact with academic staff.

Learning is not an «outside-in» process, but instead is constructed internally from a process of reflection by the student, and one which the student him/herself leads. It is therefore necessary to create spaces of time within curricular design for research, reflection, familiarisation and consolidation of knowledge, all of which, when integrated, mobilised and applied, will develop the competences required in the holistic education of the future professional.

There are a number of ways of formally measuring the time a student devotes to academic study. One way is to measure make an estimate of the total time a course or programme demands in terms of the student's commitment to work, ie the student´s workload[40]. Another is by giving elements of the programme a rating or weighting related to the perceived demand it makes on student time. The third is academic credits.

[40] See Glossary of terms.

Academic credits is one of the essential aspects of the approach proposed in Tuning Europe[41], and is grounded on the correlation between a series of elements:

- The degree profile, which sets out the competences to be developed.
- The level and existing admission requirements.
- The learning outcomes specified for each subject/module/section/course.
- The educational activities that best ensure that the learning outcomes will be achieved.
- The types of assessment considered to be most appropriate for the learning outcomes.
- The time (measured in hours), based on the student's work, which on average will be needed to perform the educational activities that are necessary for achieving the learning outcomes.

This document focuses on the role of the student's workload, and seeks to stress its relationship with the competences and learning outcomes and with the other factors mentioned above.

The Tuning project, focussed on generic and specific competences and learning outcomes has shown that the approaches of learning, teaching and assessment affect the work students need to do to achieve the desired learning outcomes[42] ; hence it also affects how they measure themselves. Student's work, teaching methods and competences and learning outcomes are all clearly interrelated. Nevertheless, other factors also have an influence, such as the diversity of traditions, design of the study plan and context, consistency of the study programmes, organisation of teaching, and the capacity and attitude of the student. In other words, the time students require to achieve the same competences and learning outcomes may vary depending on the context.

Some considerations on the units used for measuring the student's work

Latin America is currently undergoing a process of reflection on its higher education systems. Many countries are now preparing to amend their systems,

---

[41] See Final Reports 1 and 2 of the Tuning Europe Project:

- GONZÁLEZ, Julia and WAGENAAR, Robert, eds. *Tuning Educational Structures in Europe. Final Report - Pilot Project Phase 1,* Bilbao, 2003.
- GONZÁLEZ, Julia and WAGENAAR, Robert, eds. *Tuning Educational Structures in Europe. Final Report - Pilot Project Phase 2, Universities' Contribution to the Bologna process,* Bilbao, 2006.

[42] The agreed definition of learning outcomes in the Tuning project is as follows: *Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning. Learning outcomes must be accompanied by appropriate assessment criteria which can be used to judge that the expected learning outcomes have been achieved.*

and clearly there is a need to offer reference points on ways of calculating the time students require to complete the work of a programme. This latter concept is related to the introduction of a shared approach to units for measuring the student's work, as one of the tools that can promote comparability and compatibility among higher education systems, fostering academic mobility among the Latin American countries. The need for clearly and precisely agreed reference points can also be explained by the demand for greater transparency and impartiality with students.

Some countries are adopting, or have already adopted, local, national or regional credit systems to help modernise their education systems. One of the main reasons for using credits is that they make systems of higher education more flexible. It would be sufficient to think of agreeing on a space in which the different systems used for measuring student's work run together, a space which serves to increase the transparency and comparability of different national systems of higher education.

Taking as our point of departure the idea that we would be making a reflection and that it was not our intention to make any country feel pressurised into accepting commitments as to the results of the discussion, the National Tuning Centres exchanged information on different aspects related to academic credits. A very simple questionnaire was drawn up with five questions focusing on the features and problems of the academic credit. This information was provided by most of the countries and the information was collated. The full version can be seen in Appendix III[43]. Perhaps one of the most significant findings of this survey is that academic credits are not widely used among Latin American universities, and in some cases where they are used, the unit of measurement is based on the teacher's contact hours with the student and not on the student's workload. In addition to this information, it was particularly interesting to note the long list of advantages each of the countries gave when asked as to the possibility of including a credit system. As a preliminary conclusion we can therefore say that a majority appear to be in favour of the idea. Although there are disadvantages the list is shorter and the nature of the problems appears to relate more to aspects of implementation than to the implications of the concept itself.

One element that was highlighted is the duration of the academic year in the different countries. The length of the academic year —in other words the number of work hours in an academic year— is one of the factors used to calculate the student's work hours and to define a credit. In Latin America, the duration of the academic year differs from one country to another and in some countries, even from one university to another. Although time itself is a clearly insufficient measure, an informal survey was conducted to get a clearer idea of the real situation, based on which we have drawn up some preliminary conclusions. Firstly, it is necessary to distinguish between the specific number

[43] See Appendix III - INFORMATION ON ACADEMIC CREDIT SYSTEMS IN LATIN AMERICA. Collated by Guillermo Morones (ANUIES - Mexico).

of class weeks, the number of weeks of independent study and field work, the time taken in preparing for exams and the number of weeks of exams. Adding all these factors together, we get the specific length of the academic period, information that can be used to draw a comparison by discipline, institution and/or country.

This calculation takes into account the vacation periods, when students are expected to continue working, preparing assessments, projects and dissertations. In the latter case, the figure for nearly all countries is between 32 and 40 weeks per year.[44]. If we presume that a week has 40 to 45 hours available, the real number of «official hours» during which a student was expected to work over an academic year came to between 1280 and 1800. Even in systems where the official number of hours stipulated is lower, it is clear that in practice the actual number of hours coincides with this general standard, due to the additional work carried out during vacations. The average, in most countries, could be said to lie around 1540 hours per year.

However, as well as the length of the academic year, there are other important features that need to be looked at when reflecting on the student's work. A large number of inter-related factors are involved in achieving the desired learning outcomes, These are not restricted to the number of student work hours, and to the student's intelligence and speed, but also include the teaching and learning methods. It can make a great difference, if the teaching is organised into large groups or is more individualised; if most of the subjects/units in the course the student is taking are contact classes, seminars, practical courses or practical exercises. Moreover, the number of students in a class and the existence or not of a system of tutorials might influence the learning outcomes.

Other important factors include the way the design and the consistency of the study programme are assessed (is it based on an approach of gradual progress, or is it over- or underdemanding, at certain stages?); the quality of the organisation and the availability of advanced educational materials, such as computers, available to the students. National and regional traditions also need to be taken into account. For example in some countries most students live at home and require time to commute from home; in other countries, they live on their own and have to look after themselves and work; while in others they live on the university campus. All of these factors influence to some extent the learning outcomes measured in time (in terms of units of measurement) and in performance (in terms of level of achievement). In an ideal situation, all of the goals and objectives established would be achieved in the conceptual learning time. The conceptual learning time is the specific time any student requires to achieve the competences and learning outcomes of a programme or a part of one. This specific time will vary from one student to another, since in many cases the ideal situation does not occur.

---

[44] At the Fourth General Project Meeting of Tuning – Latin America (Brussels, Belgium 14 - 16 June 2006), in the area of the National Tuning Centres, a survey was taken of the average number of weeks in the academic year in each country.

The aforementioned factors make it very clear that it is neither possible nor would it be desirable to define a one-size-fits-all formula for achieving the desired competences and learning outcomes. Depending on the circumstances and the internal and external conditions, we have to pursue the right balance for each programme/course/degree in terms of the factors mentioned, including the student's workload. This combination may vary from one university to another and from one country to another. It is clear, then, that *different roads can lead to comparable learning outcomes*, while at the same time preserving the existing diversity across Latin America.

Nonetheless, in spite of these differences, it is important to stress that this rich diversity need not prevent us from considering a shared approach to units for measuring student workload throughout Latin America. The best thing would be to build a common and flexible approach which, while respecting existing diversity and taking into account local and national autonomy, is capable of providing greater accountability and links between the different education systems at a regional level.

Having set out the rich variety of perspectives that exist in the region and made it clear that this does not constitute an obstacle to pursuing common frameworks of reference we may find it useful to look at some conceptual aspects related to academic credits from the perspective of Tuning.

Simply put, a credit system is a system that facilitates evaluation and comparison of learning outcomes in the context of different degrees, programmes and learning environments. It provides a standardised method for comparing learning in different academic programmes, sectors, regions and countries. The need for lifelong learning combined with the increasing rate of educational change brought about by globalisation makes it essential to build bridges between the different higher education systems. The use of a shared language offers the necessary tool for facilitating this process.

In the Tuning Europe project, the work in the Academic credits line was facilitated by the existence of the ECTS[45], a system widely used for transferring

[45] The European Credit Transfer and Accumulation System, abbreviated as ECTS, is a student-centred system based on the student workload required to achieve the objectives of a programme, objectives specified in terms of the learning outcomes and competences to be required. ECTS is based on a number of principles

—60 credits measure the workload of a full-time student during one academic year. The student workload of a full-time study programme in Europe amounts in most cases to around 1500-1800 hours per year and in those cases one credit stands for around 25 to 30 working hours.
—Credits in ECTS can only be obtained after successful completion of the work required and appropriate assessment of the learning outcomes achieved. Learning outcomes are sets of competences, expressing what the student will know, understand or be able to do after completion of a process of learning, long or short.
—Student workload In ECTS consists of the time required to complete all planned learning activities such as attending lectures, seminars, independent and private study, placements, preparation of projects, examinations, and so forth.

credits in Europe and which has been strengthened by the input of the European academics participating in the project. From this perspective, the system of academic credits seeks to provide greater transparency and connection between the different education systems. Although it is difficult to define precisely the nature of the system, it could be said to include the following characteristics:

— It is applicable to all sectors of higher education and is capable of being articulated with other levels of education.
— It covers all forms and systems of learning.
— It addresses all systems of education and recognises the many different outlets (first degree/master's degree/doctorate).
— It enables transfer between other educational schemes in other regions.
— It encourages mobility of students and recognition of their degrees between institutions from the same country and with institutions from other countries.
— It facilitates student-centred learning.
— It respects national and institutional academic autonomy since it can be entirely compatible with existing education systems.

Credits only describe the student's work in terms of the time taken to successfully complete a course or a part of the course. This represents an approach to teaching and education that places the student at the centre of the education process.

Academic credits only measure the student's work, they do not measure its quality, content or level. These features are described in other ways. The work performed by the student in any formal learning activity can be expressed in credits and reflected in the student's academic record. However, when obtaining a recognised degree, credits will **only** be applicable when they constitute an approved part of a study programme.

Since credits expresses the student's work measured in term of time they allow institutions of higher education better to plan their degree programmes, in order to achieve the planned results within the established time. Credits also provide a suitable system for monitoring results and improving the effectiveness of teaching/learning. They also allow greater mobility of students and teachers, by providing a common resource, transparency as to the contents and weight of the course material and information on the methods of assessment.

— Credits are allocated to all educational components of a study programme (such as modules, courses, placements, dissertation work, etc) and reflect the quantity of work each component requires to achieve its specific objectives or learning outcomes in relation to the total quantity of work necessary to complete a full year of study successfully.

For further information, see the European Commission website: http://ec.europa.eu./education/programmes/socrates/ects/index_es.html

Principles and characteristics of the units used to measure student's work

Establishing an approach based on the different units for measuring student's work in Latin America requires a series of shared agreements and viewpoints. The more information and detail that are provided on the nature, context, level and definition of the units of measurement, the more useful they will be as a medium of exchange for recognising qualifications.

To be viable the construction of a shared approach as to the units of measurement of the student workload in Latin America requires reaching a series of defined principles and characteristics, which include:

— Promoting accessibility, flexibility, mobility, collaboration, transparency, recognition and integration (connection) in and among the higher education systems.
— Defending the diversity of contents and provision of education programmes and by extension, academic autonomy at an institutional, local, national and regional level.

Similarly, this approach should assume that the units of measurement of the student's work:

— Are a way of expressing the equivalence of the learning that takes place.
— Are awarded once the learning has been successfully completed.
— Beyond being designed by one institution, they can be recognised by another, but the final decision will always lie with the host institution or relevant national authority, to whom an application will be submitted for total or partial recognition of the study programmes.
— When they are related to competences and learning outcomes, they become easier to compare.
— If they are quantifiable in terms of learning outcomes, they become more precise and more clearly express their «value».

The units of measurement do not mean anything in themselves since they always describe the work completed by the student as part of a study programme. They are units that reflect a quantity of work successfully completed at a given level, to achieve a recognised qualification and cannot therefore be automatically transferred from one context to another. The basic idea is that the recognition should not be made on the basis of a course-by-course comparison, but more flexibly, through recognition of the study periods of a level and some comparable learning outcomes. It is important to note that the main axis of the descriptive perspective is the **student and his/her work**.

A) ***Student-centred approach***

In this type of debate the difference between emphasising teaching and emphasising learning becomes clear. Higher education systems can focus more on the role of the teacher or on that of the student. The student-centred approach gives more importance to the design of an overall study programme and centres particularly on the usefulness of programmes that target the graduate's future position in society. In this perspective, a precise estimation of the student workload required to achieve the competences and a reasonable definition of the learning outcomes are both essential.

Traditionally most systems have focused on the central role of the teacher. However, the tendency now is to look at the obstacles the average student may encounter to complete his or her studies. The student's work is considered to be a crucial factor and educators recognise that there is a conflict between what a student **should learn** and what he/she **is capable of learning** in a given period of time.

B) ***Based on the student's work***

We can see, then, the importance of designing education systems that take into account the student's workload. In practice, different approaches are used for calculating them. Although they may vary from area to area, they also display common features.

In estimating the student's workload, it is a good idea to consider:

- The total number of contact hours for the unit/subject of the course/programme (number of hours per week x number of weeks);
- The amount of preparation and follow-up the class/seminar requires of the student;
- The amount of independent work required to successfully complete that part of the programme.

This last point is the most difficult to estimate and depends to a great extent on the discipline in question and the complexity of the subject. Independent work may include:

- Gathering and selecting relevant material.
- Reading and studying the material.
- Preparing a written or oral examination
- Preparation of an essay or presentation.
- Independent laboratory work.
- Preparing seminars.

It is clear that calculating the student's work is not an easy process. One of the primary contributions of this approach is that it leads teachers to reflect on the design of the study programme and the teaching, learning and assessment methods.

To verify whether students will be able to perform tasks within the established periods it may prove very useful to use questionnaires[46]. Students were

[46] Through the Ministry of Education's MECESUP programme (http://www.mecesup.cl/) Chile conducted a survey on student workload during the second semester of 2005, using a series of instruments developed by the Universidad de Chile.

asked their opinion as to their workload, motivation and the estimated time for the course and to provide reliable information on the real time they have actually spent.

Final considerations

This short look at the subject of measuring student workload in Latin America leads us to a series of preliminary conclusions. In principle, it is interesting to note the stress given to this issue in Latin America. Whereas in Europe the emergence of the academic credit was related more to the idea of transfer and as a basic tool to allow student mobility within the framework of the ERASMUS programme, in Latin America it is for some countries one of the central axes to be considered in rolling out a competence-based curriculum.

As mentioned at the beginning of this chapter when the lines of work of this project were first discussed it was the most senior authorities in higher education in some countries in the region who remarked on the omission of the academic credit. For Latin America engaged as it is in a profound process of change and with improvement in the quality of higher education seen as a priority the inclusion of this debate seemed natural, necessary and logically linked to the advances and reflections that had been agreed on competence-based and student-centred learning.

From the outset, the Latin American countries working on the project showed a clear intention to consider alternatives that would allow the systems and structures of higher education in the different contexts to be connected. The deliberations that have taken place to date have shown how it is possible to advance an approach based on a philosophy of mutual respect and trust, and on a series of general suppositions related to information and the student's work. It is crucial in this regard to respect the separate pace of each country as they join the process and, of course, to respect the alternatives that may arise in this area.

Information gathered during the project suggests that there seems to be in most countries a favourable climate for considering the possibility of creating a framework of understanding on the units of measurement of student workload for Latin America. An approach is needed that enables comparison between the periods of study in different universities in different countries, helping students who, within the same country, change degree or university, and to advance the bilateral or multilateral agreements on mechanisms and guidelines for the recognition of university qualifications at academic level and for professional work. The advantages identified for possible incorporation into the educational structures of Latin America appear to outnumber the difficulties. Appendix III lists the advances made in each of the participating countries in this area.

This preliminary outline has tried to show the relationship between the education systems, learning outcomes and student's work in the context of the Tuning Latin America Project. The proposal outlined here is not limited to the concept of the academic credit. The purpose is to present a precise and useful tool for strengthening communication among the institutions of higher education, faculties, departments, teachers and students that will facilitate mutual knowledge, understanding and trust.

This is the beginning of an intense and fruitful process of debate and reflection. The first steps now appear to have been taken. There is an awareness of the real situations —different, but not unrelated to the aims of the processes now underway. There is a willingness to design together a shared philosophy that will foster the comparability and compatibility of higher education systems. The challenge that still remains is to consolidate existing bridges and build new paths to understanding at regional and international level.

6

Conclusions and proposals for the future

After more than two years of hard work, engaging in discussion and exchanging information and experience an enriching rapprochement has been built up between all the participants in the project. The impact already visible in some countries and institutions in the region extends far beyond the conclusions set out here:

1. Twelve subject area networks have been created which working together have managed to reach consensus and lay the foundations for innovative proposals. The National Tuning Centres have enabled the project to have a greater impact and to connect with bodies operating at national level.
2. There is general agreement on the importance of using the concept of competence for preparing or improving a curriculum.
3. Participants discussed the importance of defining professional profiles in terms of generic and specific competences. Thanks to a high degree of consensus 27 generic competences and a series of specific competences were defined for each of the twelve areas involved in the project. These were validated by an extensive survey conducted among 42,000 individuals from four target groups—academics, graduates, students and employers.
4. The results obtained in the twelve Subject Areas and the material produced will serve as a framework of reference for encouraging processes of competence-based education.
5. By exchanging information, communicating experiences and sharing of teaching, learning and assessment practices, participants were able to understand the particular features of the curricula in the different areas covered by the project.

6. Some countries have created internal networks which have drawn on the discussions and outputs of this project, allowing significant contributions to be made by stakeholders in the area who did not formally participate in the project.
7. Communication among the universities and other agents involved in higher education has been encouraged, to identify their concerns and appraisals of university education.
8. Mechanisms were devised and used to identify and analyse common and divergent aspects of university degrees in Latin America.
9. The information provided by each of the countries has allowed higher education in Latin America to be clearly described.
10. There was general agreement that it is essential for students to play a central and dynamic role in the teaching-learning process and on the need to estimate the average time taken to achieve the competences included in the professional profiles.
11. The agreements reached allowed participants to identify aspects that need to be improved, strengthened and changed in the teaching and learning processes. The challenge now is to actually implement the necessary changes.
12. The Tuning Latin America project is exploratory, propositional and non-binding. Some countries and institutions have taken on the proposals and undertaken processes of implementation that go beyond the objectives of the project itself.
13. The project produced synergies with existing higher education networks in the area of Latin America.
14. There is a willingness among all participants, to examine more closely the aspects dealt with in the project and an awareness as to the need for progress in other issues related to higher education in Latin America.
15. The Tuning project will provide the Latin American community with publications that will serve as methodological reference works, which can contribute to the development of innovative forms of teaching-learning, with a view to continuously improving the curricula of higher education institutions.
16. The website and intranet enabled dissemination of documents, exchange of information and virtual discussions among participants.

Recommendations

a) A search for channels of funding for projects that will allow the results obtained to be continued, at least in the following essential directions:

   — The joint construction of methodological strategies for developing and assessing the formation of competences in implementation of

the curriculum, which will contribute to a continuous improvement in quality;
- Training and empowerment of teachers in higher education to allow this process to happen;
- Increased comparability of degrees between countries to facilitate mobility among students and teachers; and,
- An approach to different curriculum systems (contact, semi-contact, distance).

b) The subject areas as a whole propose to take further steps in the following areas:

- Analysis, design and implementation of competence-based curricula.
- Development of an observatory of best educational practices involving competences.
- Analysis of the student workload.
- An analysis of the total academic workload of the programmes
- Consideration of teacher training schemes in competence-based methodologies

c) Allow new countries and subject areas to join
d) The network of National Tuning Centres must be maintained and consolidated to encourage countries to continue the process of deliberation begun in the project. The networks associated with institutions and subject areas must equally be maintained and consolidated, and the creation of new networks must be encouraged.
e) The National Tuning Centres should participate in disseminating and sharing the outcome of the project in the university community in their respective countries.
f) The skills and experiences of different Latin American countries should be harnessed to strengthen processes of regional cooperation that will support initiatives for curriculum reform.
g) A systematic record (Observatory) need to be established of best practices for implementation of competences and disseminate it in each country, through the Tuning Latin America portal.

In conclusion, we would like to restate **our strong conviction of the viability, relevance and appropriateness of continuing the Tuning Project for Latin America.**

7

Participants and structure of the organisation

Map of the Institutions

List of Participants

Coordination Team

General coordinators

- Julia González - *Universidad de Deusto (Spain)*
- Robert Wagenaar - *Rijksuniversiteit Groningen (Netherlands)*

Technical Staff

- Pablo Beneitone - *Universidad de Deusto (Spain)*; pbeneito@relint.deusto.es
- Margarethe Macke - *Universidad de Deusto (Spain)*; mmacke@relint.deusto.es
- Maida Marty Maletá - *Universidad de Deusto (Spain)*; mmarty@relint.deusto.es

Management Committee

Signatory Universities

- Wolfgang Sander - *Technische Universität Braunschweig (Germany)*
- María Rosa Depetris - *Universidad Nacional de La Plata (Argentina)*
- Vicente Rodríguez - *Universidade Estadual de Campinas - UNICAMP (Brazil)*
- Roxana Antonina Pey Tumanoff - *Universidad de Chile (Chile)*
- Jaime Parra Rodríguez - *Pontificia Universidad Javeriana (Colombia)*
- Leda Badilla Chavarría - *Universidad de Costa Rica (Costa Rica)*
- Martine Bellec - *Université Paris Dauphine (France)*
- Jorge Humberto Rodríguez Mahuad - *Universidad Rafael Landívar (Guatemala)*
- Ann Katherine Isaacs - *Università degli Studi di Pisa (Italy)*
- Joaquim Ramos de Carvalho - *Universidade de Coimbra (Portugal)*
- Arlene Gilpin - *University of Bristol (United Kingdom)*
- Guillermo Yaber Oltra - *Universidad Católica Andrés Bello (Venezuela)*

Coordinators of Work Groups

- Sergey Udolkin Dakova - Business Administration - *Universidad del Pacífico (Peru)*
- Samuel Ricardo Vélez González - Architecture - *Universidad Pontificia Bolivariana (Colombia)*
- Loussia Penha Musse Felix - Law - *Universidade de Brasilia (Brazil)*
- Ana Maria Del Pilar Montaño López - Education - *Universidad Núr (Bolivia)*

— Luz Angélica Muñoz González - Nursing - *Universidad Andrés Bello (Chile)*
— Armando Fernández Guillermet - Physics - *Instituto Balseiro (Argentina)*
— Iván Soto Espinoza - Geology - *Universidad Católica del Norte (Chile)*
— Darío Campos Rodríguez - History - *Universidad Nacional de Colombia (Colombia)*
— Rodolfo Morales Velázquez - Civil Engineering - *Universidad Autónoma de Baja California (Mexico)*
— María José Arroyo Paniagua - Mathematics - *Universidad Autónoma Metropolitana (Mexico)*
— Christel Hanne - Medicine - *Universidad de Chile (Chile)*
— Jesús Pastor Medrano - Chemistry - *Universidad Autónoma del Estado de México (Mexico)*
— César Esquetini Cáceres - *Representative of the National Tuning Centres*

Other participating institutions

— Bastian Baumann - *ESIB (Germany)*
— Aníbal Bartolome Martínez Muñoz - *CSUCA (Guatemala)*
— Luis Guillermo Morones Diaz - *ANUIES (Mexico)*

National Tuning Centres

— Alberto Dibbern / Emilce Moler / Anahí Astur / Gabriela Siufi - *Ministerio de Educación (Argentina)*
— Lauren Müller de Pacheco - *Universidad Privada Santa Cruz de la Sierra* / Gustavo Rodríguez Ostria - *Ministerio de Educación (Bolivia)*
— Irilene Fernandes de Paula - *Ministerio de Educación* / Leticia Sampaio Suñe - *Universidade Federal da Bahia (Brazil)*
— Ricardo Reich / Julio Castro - *MECESUP, Ministerio de Educación (Chile)*
— Xiomara Zarur Miranda - *ASCUN (Colombia)*
— José Andrés Masís Bermúdez - *CONARE (Costa Rica)*
— Roberto de Armas Urquiza - *Ministerio de Educación (Cuba)*
— Juan Cristóbal Morales Ordoñez / Jorge Fernando Martinez Mora / César Esquetini Cáceres - *CONESUP (Ecuador)*
— Ana Ligia Guadalupe Rodríguez Trujillo - *Ministerio de Educación (El Salvador)*
— Sydney Alexander Samuels Milson - *Consejo de Enseñanza Privada Superior (Guatemala)*
— Benjamín Henriquez Rivas - *Universidad Autónoma de Honduras (Honduras)*
— Eugenio Cetina Vadillo - *Secretaría de Educación Pública (Mexico)*
— Elmer Cisneros Moreira - *UNAN-Managua (Nicaragua)*
— Salvador Arsenio Rodríguez Guerini - *Consejo de Rectores de Panamá (Panama)*

- Domingo Pedrozo García / Osvaldo Luis Barresi Villalba - *Ministerio de Educación y Cultura (Paraguay)*
- Víctor Latorre Aguilar - *Asamblea Nacional de Rectores (Peru)*
- Pablo Julio Pebe Pereyra / Mercedes Collazo - *Universidad de La República (Uruguay)*
- Marina Polo De Rebillou / José Miguel Cortazar - *Universidad Central de Venezuela (Venezuela)*

Subject Areas

Architecture

- Samuel Ricardo Vélez González (Group coordinator) - *Universidad Pontificia Bolivariana (Colombia)*
- Ines Juana Presman - *Universidad Nacional del Nordeste (Argentina)*
- Patricia Brieger Rocabado - *Universidad Privada del Valle (Bolivia)*
- Pablo César Benetti - *Universidade Federal do Rio de Janeiro (Brazil)*
- Flavio Valassina Simonetta - *Universidad de Bio-Bio (Chile)*
- Daniel Morgan Ball - *Universidad de Costa Rica (Costa Rica)*
- Lourdes Ortega Morales - *Instituto Superior Politécnico (Cuba)*
- Alcibiades Vega Malo - *Universidad de Cuenca (Ecuador)*
- Roberto Carlo Amaya Lemus - *Universidad Dr. José Matías Delgado (El Salvador)*
- Constantin Spiridonidis - *Aristotle University of Thessaloniki (Greece)*
- Carlos Enrique Valladares Cerezo - *Universidad de San Carlos de Guatemala (Guatemala)*
- Jorge Carlos Parga Ramírez - *Universidad Autónoma de Aguascalientes (Mexico)*
- María Eugenia Molina/Eric Botello / Maria Carmen Terrientes de Benavides - *Universidad de Panamá (Panama)*
- Juvenal Baracco Barrios - *Universidad Ricardo Palma (Peru)*
- Jesús L. D´Alessandro - *Universidad Iberoamericana (Dominican Republic)*
- María Cristina Bausero Pochintesta - *Universidad de la República (Uruguay)*
- Dulce Marín Andujar / Freddy Silva - *Universidad Nacional Experimental del Táchira. UNET (Venezuela)*

Business Administration

- Sergey Udolkin Dakova (Group coordinator) - *Universidad del Pacífico (Peru)*
- Guillermo Mario Vinitzky - *Universidad de Belgrano (Argentina)*
- Raul Strauss - *Universidad Privada Santa Cruz de La Sierra (Bolivia)*
- Paulo da Costa Lopes - *Universidade Estadual de Londrina - UEL (Brazil)*

— Jairo Simião Dornelas - *Universidade Federal de Pernambuco - UFPE (Brazil)*
— Nelda Ruth Muñoz Galaz - *Universidad de Talca (Chile)*
— Maria Andrea De Villa Correa / Juan Felipe Mejía Mejía - *EAFIT (Colombia)*
— Jaime Arturo Castrillón Cifuentes / Paola Elena Lora Osorio - *Universidad del Norte (Colombia)*
— Edmundo Batallas Chavez - *Universidad Tecnológica Equinoccial (Ecuador)*
— Mauricio Gaborit - *Universidad Centroamericana «José Simeón Cañas» (El Salvador)*
— Reina Consuelo Navas Galvez - *Universidad Nacional Autónoma de Honduras (Honduras)*
— Hilda Catalina Cruz Solís / Dora Estela Rodríguez Flores / Bárbara Valle - *Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico)*
— María del Pilar Arango Rodríguez - *Universidad de Guanajuato (Mexico)*
— Miguel Angel Murillo Cruz - *Universidad Politécnica de Nicaragua (Nicaragua)*
— Etilvia Arjona Chang / Alvaro Hernandez Medina - *Universidad Santa María La Antigua (Panama)*
— Lourdes Concepción R. - *Universidad APEC (Dominican Republic)*
— Beatriz Güinovart Firpo - *Universidad de La República (Uruguay)*
— Guillermo Yaber Oltra - *Universidad Católica «Andrés Bello» (Venezuela)*

Chemistry

— Jesús Pastor Medrano (Group coordinator) - *Universidad Autónoma del Estado de México (Mexico)*
— Juana Chessa - *Universidad Nacional de Río Cuarto (Argentina)*
— Adelaide Faljoni-Alario - *Universidade de Sâo Pablo (Brazil)*
— Gloria Cárdenas Jirón - *Universidad de Santiago de Chile (Chile)*
— Gloria Machado Rodríguez - *Universidad de Antíoquia (Colombia)*
— Martha Eugenia Niño Gómez /Jairo René Martínez Morales - *Universidad Industrial de Santander (Colombia)*
— Gilberto Piedra Marín - *Universidad Nacional (Costa Rica)*
— Ximena Chiriboga Pazmiño - *Universidad Central del Ecuador (Ecuador)*
— Gustavo Pedraza Aboytes - *Universidad Autónoma de Querétaro (Mexico)*
— Nadia Gamboa Fuentes - *Pontificia Universidad Católica del Perú (Peru)*
— María Noel Rodríguez Ayán - *Universidad de la República (Uruguay)*
— Pedro Rafael Sojo Cardozo - *Universidad Central de Venezuela (Venezuela)*

Civil Engineering

— Rodolfo Morales Velázquez (Group coordinator) - *Universidad Autónoma de Baja California (Mexico)*
— Jorge Adue / Maria Teresa Garibay - *Universidad Nacional de Rosario (Argentina)*

— Jorge Omar Del Gener - *Universidad Tecnológica Nacional (Argentina)*
— César Villagomez Villarroel/ Hermógenes Rosas Rodríguez - *Universidad Privada Boliviana (Bolivia)*
— Antonio Edesio Jungles - *Universidade Federal de Santa Catarina (Brazil)*
— Turibio José da Silva - *Universidade Federal de Uberlândia (Brazil)*
— Raúl Benavente García - *Universidad de Concepción (Chile)*
— Jorge Alberto Guzmán Jaimes - *Universidad Industrial de Santander (Colombia)*
— Giannina Ortiz Quesada - *Instituto Tecnológico de Costa Rica (Costa Rica)*
— Julio Alberto Hernández Caneiro - *Instituto Superior Polítecnico «José Antonio Echevarría» (Cuba)*
— Carlos Chon Díaz - *Universidad Católica Santiago de Guayaquil (Ecuador)*
— Ana Aracely Quiteño / Walter Nelson Parada Arteaga - *Universidad Católica de Occidente (El Salvador)*
— Alba Maritza Guerrero Spínola - *Universidad de San Carlos de Guatemala (Guatemala)*
— Carlos Alberto Murcia Carbajal - *Universidad Nacional Autónoma de Honduras (Honduras)*
— Miguel Ángel Vergara Sánchez - *Instituto Politécnico Nacional (Mexico)*
— Oscar Isaac Gutiérrez Somarriba - *Universidad Nacional de Ingenería (Nicaragua)*
— Martín Edmundo Candanedo Guevara - *Universidad Tecnológica de Panamá (Panama)*
— Juan Alberto Gonzalez Meyer / Daniel Agustin Britez Abbate - *Universidad Católica Nuestra Señora de la Asunción (Paraguay)*
— Germán Gallardo Zevallos - *Universidad de Piura (Peru)*
— Indhira Inmaculada De Jesús Salcedo - *Instituto Tecnológico de Santo Domingo (Dominican Republic)*
— Iacint Manoliu - *Technical University of Civil Engineering Bucharest (Rumania)*
— Luis Enrique Ramos Rojo - *Universidad Centroccidental «Lisandro Alvarado» (Venezuela)*

Education

— Ana Maria del Pilar Montaño López (Group coordinator) - *Universidad Núr (Bolivia)*
— María Luisa Porcar / Norma Pacheco - *Universidad Nacional de Cuyo (Argentina)*
— María Rosa Depetris - *Universidad Nacional de La Plata (Argentina)*
— Vicente Rodríguez - *Universidade Estadual de Campinas - UNICAMP (Brazil)*
— Marlucy Paraíso - *Universidade Federal de Minas Gerais - UFMG (Brazil)*
— Horacio Walker Larraín / María Adriana Audibert Arias - *Universidad Católica de Valparaíso (Chile)*

— Jaime Parra Rodríguez - *Pontificia Universidad Javeriana (Colombia)*
— Leda Badilla Chavarría - *Universidad de Costa Rica (Costa Rica)*
— Fernando Abad - *Universidad de Guayaquil (Ecuador)*
— Ana María Glower De Alvarado - *Universidad de El Salvador (El Salvador)*
— Bartolomé Chinchilla Chinchilla / Ivy Lou Green Arrechavala - *Universidad Pedagógica Nacional (Honduras)*
— Francisco Miranda López - *Universidad Autónoma del Estado de Hidalgo (Mexico)*
— Alejandro Genet - *Universidad Nacional Autónoma de Nicaragua - Managua (Nicaragua)*
— Celsa Quiñónez de Bernal / Magdalena Gamarra / Rita Wattiez - *Universidad Nacional de Asunción (Paraguay)*
— Domingo Enoé Huerta Huamán - *Universidad Peruana Unión (Peru)*
— Arlene Gilpin - *University of Bristol (UK)*
— Irene le Maitre Castillo / Thais Marrero - *Universidad Nacional Experimental Simón Rodríguez (Venezuela)*

Geology

— Iván Soto Espinoza (Group coordinator) - *Universidad Católica del Norte (Chile)*
— Ricardo Oscar Etcheverry - *Universidad Nacional de La Plata (Argentina)*
— Carlos Humberto Treo / Norma Teresa Rossa - *Universidad Nacional de San Juan (Argentina)*
— Luís de Almeida Prado Bacellar - *Universidade Federal de Ouro Preto (Brazil)*
— Candido Augusto Veloso Moura - *Universidade Federal do Pará (Brazil)*
— Jimmy Fernández Lamus - *Universidad Nacional de Colombia (Colombia)*
— Carlos Alberto Leyva Rodríguez - *Instituto Superior Minero Metalúrgico (Cuba)*
— Edison Navarrete Cuesta - *Escuela Superior Politécnica del Litoral (Ecuador)*
— Pere Santanach Prat - *Universidad de Barcelona (Spain)*
— Gonzalo Cruz Calderón - *Universidad Nacional Autónoma de Honduras (Honduras)*
— Edgar Roque Gutiérrez Salinas - *Universidad Nacional de San Agustín de Arequipa (Peru)*
— Jorge Abud Sebastiani - *Universidad de Oriente (Venezuela)*

History

— Darío Campos Rodríguez (Group coordinator) - *Universidad Nacional de Colombia (Colombia)*
— Lila María Caimari / Eduardo Zimmermann - *Universidad de San Andrés (Argentina)*

- Eduardo José Míguez - *Universidad Nacional del Centro de la Pcia. de Buenos Aires (Argentina)*
- Ilmar Rohloff de Mattos - *Pontifícia Universidade Católica do Rio de Janeiro - PUC/RJ (Brazil)*
- Nicolás Cruz - *Universidad Católica de Chile (Chile)*
- Guillermo Bravo Acevedo - *Universidad Metropolitana de Ciencias de la Educación (Chile)*
- José Antonio Fernández Molina - *Universidad Nacional (Costa Rica)*
- Sergio Guerra Vilaboy - *Universidad de La Habana (Cuba)*
- Carlos Landázuri Camacho - *Pontificia Universidad Católica del Ecuador (Ecuador)*
- Jorge Antonio Catalá Sanz - *Universitat de Valéncia (Spain)*
- Ricardo Danilo Dardón Flores - *Universidad de San Carlos de Guatemala (Guatemala)*
- Ann Katherine Isaacs - *Università degli Studi di Pisa (Italy)*
- Marco Velázquez Albo - *Benemérita Universidad Autónoma de Puebla (Mexico)*
- Francisco Fernández Repetto - *Universidad Autónoma de Yucatán (Mexico)*
- Gastón Antonio Zapata Velasco / Carlota Casalinos - *Universidad Nacional Mayor de San Marcos (UNMSM) (Peru)*
- Joaquim Ramos de Carvalho - *Universidade de Coimbra (Portugal)*
- María Elena González Deluca - *Universidad Central de Venezuela (Venezuela)*

Law

- Loussia Penha Musse Felix (Group coordinator) - *Universidade de Brasilia (Brazil)*
- Ricardo R. Balestra - *Universidad del Museo Social Argentino (Argentina)*
- Graciela Barranco Goyena - *Universidad Nacional del Litoral (Argentina)*
- Juan Carlos Pedraza Cuellar / Carlos Francisco Pérez Rivero - *Universidad Autónoma «Juan Misael Saracho» (Bolivia)*
- Ademar Pereira - *Universidade Presbiteriana Mackenzie- Sao Pablo (Brazil)*
- Rodrigo Coloma Correa - *Universidad Católica de Temuco (Chile)*
- José Luis Benavides - *Universidad Externado de Colombia (Colombia)*
- Juan Cristóbal Morales Ordoñez - *Universidad del Azuay (Ecuador)*
- Julio Alfredo Rivas Hernandez - *Universidad Salvadoreña «Alberto Masferrer» (El Salvador)*
- Maria Pilar Canedo - *Universidad de Deusto (Spain)*
- José Salvador Ventura Del Toro - *Universidad de Colima (Mexico)*
- Nauhcatzin T. Bravo Aguilar - *Universidad de Guadalajara (Mexico)*
- Eva Romano Urbina - *Universidad Centroamericana (Nicaragua)*
- Julio Américo Campos - *Universidad Autónoma de Asunción (Paraguay)*
- Josefina Ovelar - *Universidad Católica Nuestra Señora de La Asunción (Paraguay)*

— Ernesto Álvarez Miranda - *Universidad de San Martín de Porres (Peru)*
— Martín Risso Ferrand - *Universidad Católica del Uruguay (Uruguay)*
— Mayerling Lisbeth Cantor Arias - *Universidad Católica del Táchira (Venezuela)*

Mathematics

— María José Arroyo Paniagua (Group coordinator) - *Universidad Autónoma Metropolitana (Mexico)*
— Wolfgang Sander - *Technische Universität Braunschweig (Germany)*
— Pablo Miguel Jacovkis - *Universidad de Buenos Aires (Argentina)*
— Marta Urciuolo - *Universidad Nacional de Córdoba (Argentina)*
— Luis Roberto Zegarra Dorado / Carlos Esteban González Castellón - *Universidad Mayor de San Simón (Bolivia)*
— Laurete Zanol Sauer - *Universidade de Caxias do Sul - UCS (Brazil)*
— Marco Antonio Nogueira Fernades - *Universidade Federal da Bahia (Brazil)*
— Roxana Antonina Pey Tumanoff / Sara Gabriela Chauriye Batarce - *Universidad de Chile (Chile)*
— Roberto Cruz Rodes - *Universidad de Antíoquia (Colombia)*
— Baldomero Valiño Alonso - *Universidad de La Habana (Cuba)*
— Nelson Subía Cepeda - *Unversidad de las Américas (Ecuador)*
— Adolfo Quirós Gracián - *Universidad Autónoma de Madrid (Spain)*
— José Manuel Bayod Bayod - *Universidad de Cantabria (Spain)*
— Martine Bellec - *Université Paris Dauphine (France)*
— Jorge Humberto Rodríguez Mahuad - *Universidad Rafael Landívar (Guatemala)*
— Carlos Moisés Hernández Suárez - *Universidad de Colima (Mexico)*
— Josué Ortiz Gutiérrez - *Universidad de Panamá (Panama)*
— Pedro Canales García - *Universidad Nacional de Ingeniería (Peru)*
— Orestes Montilla Montilla - *Universidad de Carabobo (Venezuela)*

Medicine

— Christel Hanne (Group coordinator) - *Universidad de Chile (Chile)*
— Mario Donato Turin / Julio Ravioli - *Instituto Universitario CEMIC (Argentina)*
— Horacio Deza - *Universidad Nacional de Tucumán (Argentina)*
— Jorge Luis Flores Franco - *Universidad Católica Boliviana (Bolivia)*
— Regina Celes de Rosa Stella - *Universidade Federal de Sâo Paulo (Brazil)*
— Patricio Altamirano Valencia - *Universidad Austral de Chile (Chile)*
— Mary Bermúdez Gómez - *Pontificia Universidad Javeriana (Colombia)*
— Ana Isabel Gómez Córdoba - *Universidad Colegio Mayor de Nuestra Señora del Rosario (Colombia)*
— Carlos Alberto Isaza Mejía - *Universidad Tecnológica de Pereira (Colombia)*
— Victor Hugo Jimenez Maldonado - *Universidad Nacional de Loja (Ecuador)*

- — Julio César Ruiz - *Universidad Dr. José Matías Delgado (El Salvador)*
- — José Carreras Barnés - *Universidad de Barcelona (Spain)*
- — Ana Margarita Rodas Rodas - *Universidad de San Carlos de Guatemala (Guatemala)*
- — Iris Milagro Tejeda - *Universidad Nacional Autónoma de Honduras (Honduras)*
- — Carlos Staff Sánchez - *Universidad Latina de Panamá (Panama)*
- — Manuel Eduardo Gutiérrez Sierra - *Universidad Peruana Cayetano Heredia (Peru)*
- — Jorge S. Asjana David / Maritza Taveras - *Universidad Autónoma de Santo Domingo (Dominican Republic)*
- — Teresita Ceretti Berchio - *Universidad de la República (Uruguay)*
- — Carmen Zoraida Molina Vega - *Universidad de Los Andes (Venezuela)*

Nursing

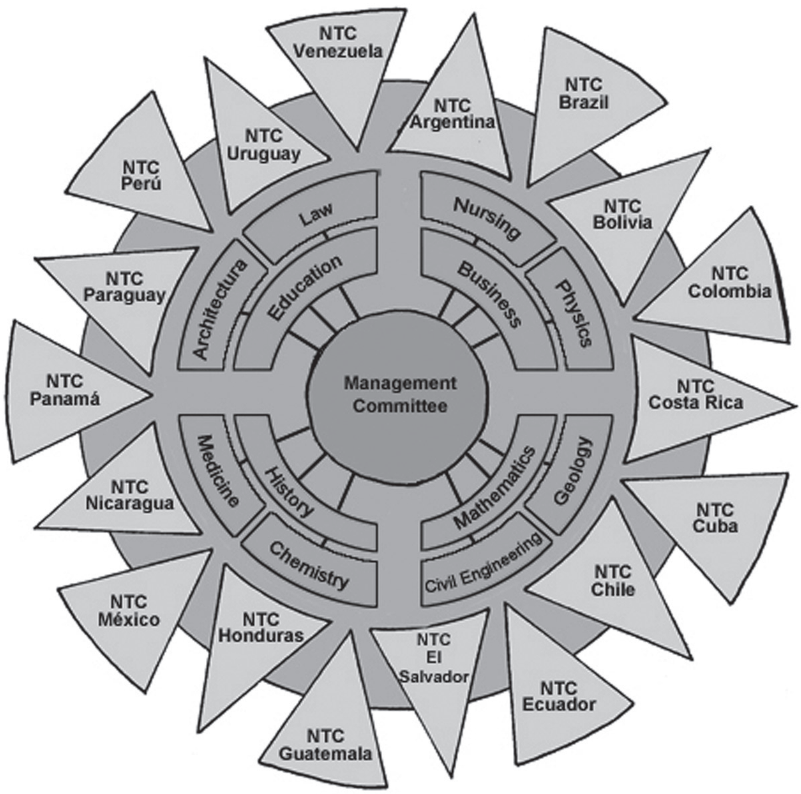
- — Luz Angélica Muñoz González (Group coordinator) - *Universidad Andrés Bello (Chile)*
- — Ramón Arístides Álvarez / Silvia Cárcamo - *Universidad Nacional de Lanús (Argentina)*
- — Silvia Teresa Federici - *Universidad Nacional de Mar del Plata (Argentina)*
- — Elsa Olmos Quiroz - *Universidad Evangélica Boliviana (Bolivia)*
- — Ellen Marcia Peres - *Universidade do Estado do Rio de Janeiro (Brazil)*
- — María Clara Quintero Laverde - *Universidad de la Sabana (Colombia)*
- — Ligia Murillo Castro - *Universidad de Costa Rica (Costa Rica)*
- — Jesús Yubagni Rezabala Villao - *Universidad Laica Eloy Alfaro de Manabí (Ecuador)*
- — Silvia Espinoza Ortega - *Universidad Autónoma de Nuevo León (Mexico)*
- — María Magdalena Zárate Banda - *Universidad de Guanajuato (Mexico)*
- — Serafina Espinoza Blanco - *Universidad de las Regiones Autónomas de la Costa Caribe Nicaragüense (Nicaragua)*
- — Elsa Beatríz Ramos de Velasquez - Melita Wall Enns - *Universidad Evangélica del Paraguay (Paraguay)*
- — Ruth Esther Seminario Rivas - *Universidad Nacional «Federico Villarreal» (Peru)*
- — Ilsia Amarista - *Universidad Nacional Experimental de los Llanos Centrales «Rómulo Gallegos» (Venezuela)*

Physics

- — Armando Fernández Guillermet (Group coordinator) - *Instituto Balseiro (Argentina)*
- — Wilfredo Tavera Llanos - *Universidad Mayor de San Andrés (Bolivia)*
- — Eloneid Felipe Nobre - *Universidade Federal do Ceará (Brazil)*
- — Naira Maria Balzaretti - *Universidade Federal do Rio Grande do Sul (Brazil)*

— Alfonso Llancaqueo Henríquez - *Universidad de la Frontera (Chile)*
— Carlos Julio Uribe Gartner - *Universidad del Valle (Colombia)*
— Osvaldo de Melo Pereira - *Universidad de La Habana (Cuba)*
— Arquímides Haro Velasteguí - *Escuela Politécnica del Chimborazo (Ecuador)*
— Eduardo Martín Álvarez Massis - *Universidad del Valle de Guatemala (Guatemala)*
— Gustavo Adolfo Pérez Munguía - *Universidad Nacional Autónoma de Honduras (Honduras)*
— Lupo Donà Dalle Rose - *Università di Padova (Italy)*
— Carlos Antonio Calcáneo Roldán - *Universidad de Sonora (Mexico)*
— Orlando Luis Pereyra Ravínez - *Universidad Nacional de Ingeniería (Peru)*
— Enrique J. M. Iglesias Castro/Rafael Escalona Zerpa - *Universidad Simón Bolívar (Venezuela)*

Structure of the organisation



8

Glossary of terms

Academic credit (*crédito académico*)
A quantified means of expressing the volume of learning based on the achievement of learning outcomes and their associated workloads, measured in time. It can also be defined as a unit of measurement of the academic work a student requires to achieve higher level professional competences. It may be based on various parameters, such as workload, class time, independent study, practical field work, work in the laboratory or workshop and others.

Academic cycle[47] **(*ciclo académico*)**
Traditionally, higher education is divided into two cycles or levels: undergraduate and graduate studies. The European Higher Education Area uses the three-cycle structure of higher education comprising undergraduate studies, graduate studies (master's degrees and specialisations) and doctoral studies. Some countries in Latin American use a three-cycle system: *pregrado*, *grado* and *posgrado*. The name of the degrees or certificates conferred on completing each of the cycles varies, depending on the system of higher education. Sometimes the same name is used to certificates corresponding to different cycles.

Academic mobility (*movilidad académica*)
This is one of the key instruments in the process of internationalisation of higher education institutions. It is important to note that mobility may be one-way, involving exclusive movement of academics from one institution to another, with none of the reciprocity that is a feature of academic exchange. There are two

[47] Definition taken from the glossary of the Latin American Network for the Accreditation of Quality in Higher Education (Red Iberoamericana para la Acreditación de la Calidad de la Educación Superior, RIACES). See website: http://www.riaces.net/glosarioc.html

areas of university mobility: academics and students. In the former case, teachers and researchers go on short stays or for longer periods (sabbatical year) and among other tasks, take postgraduate studies, laboratory practice and joint research. Student mobility allows university students to do practical experience, short courses and academic residences away from their own home institution. Time spent in a foreign country is an important instrument for the complete formation of the future graduate, an opportunity to learn another language, to coexist with people from other cultures and learn to understand and respect them. There are four types of foreign students. The first are exchange students involved in international agreements; they study for a short period of one or two semesters, and their studies are recognised in their home university. The second type consists of students attending study centres for foreigners or centres for language-learning and cultural dissemination. The third type is made up independent self-financing students or grant-beneficiaries who study a complete degree. The fourth type are students who want to make a short stay in some other university or institution, in order to collaborate in teaching, develop research or gain work experience.

Accreditation (*acreditación*)
Process carried out to ensure the quality of an institution or educational programme. It is performed by an external agency. Accreditation, also known as quality assurance, certification and validation, recognises the quality of the accredited programmes or the institution. One variation is international accreditation, which is performed by agencies from other countries. It involves making an assessment based on previously established standards and criteria of quality by an accreditation agency or body. The procedure includes self-assessment by the applicant institution, and assessment by a team of external experts and a plan of improvement based on their findings. Accreditation agencies and bodies are themselves accredited on a regular basis. In all cases, the resulting certification is temporary and is issued for given number of years. It is based on a set of relatively basic and uniform principles, although there is a great diversity of models[48].

Competences (*competencias*)
A combination of knowledge, abilities and skills, specific and transverse, that a degree holder must have to fully satisfy the demands of social contexts. The aim of educational programmes is to foster these competences. Competences are aptitudes that a person develops gradually throughout the education process and they are assessed at different stages. They may be divided into competences, those that are common to any degree course (generic competences) and those that are related to a specific area of knowledge (subject specific competences).

---

[48] See Note 47.

Course unit (*módulo*)
A self-contained, formally structured learning experience. It should have a coherent and explicit set of learning outcomes, expressed in terms of competences to be obtained and appropriate assessment criteria.

Curriculum[49] **(*curriculo*)**
Also known as the curricular structure. It is to the concept of the study plan, i.e. the set of subjects and academic requirements into which a degree is organised. By extension, it can be applied to the path taken by a student to obtain a degree.

Diploma supplement (*suplemento al diploma*)
An annex, generally in two languages, to a degree or diploma designed to provide a description to make them more comprehensible. The Bologna process proposes diploma supplements to standardise the understanding of official qualifications and favour their recognition. It is also known as the European diploma supplement.

ECTS (European Credit Transfer System) (*Sistema Europeo de Transferencia y Acumulación de Créditos*)
A student-centred system, based on the student workload required to satisfy the objectives of a study programme. The objectives are specified in terms of the learning outcomes and competences that must be acquired. It is based on the general assumption that the global workload of an academic year of study is equal to 60 credits. Undergraduate degrees have 180 or 240 credits, while postgraduate courses have 60, 90 or 120 credits. The student workload of a full time study programme in Europe amounts in most cases to around 1500 - 1800 hours per year and in those cases one credit stands for between 25 and 30 hours of work. The system is designed to increase the transparency of educational systems and facilitate the mobility of students across Europe through credit transfer and accumulation. Credit transfer is guaranteed by explicit agreements between the home institution, the host institution and the mobile student.

Graduate profile (*perfil del graduado*)
An organised and synthetic set of features distinguishing a person who has trained in accordance with a degree study plan.

Harmonisation (*armonización*)
Process that seeks to establish a correspondence or compatibility between different qualifications and degrees conferred by higher education institutions in different countries. Involves adopting processes for reviewing the institutions' plans and study programmes and adopting standards for credit transfer of, to facilitate the validation of studies in other institutions of higher education.

[49] See Note 47.

Learning outcomes (*resultados del aprendizaje*)
Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning. Learning outcomes must be accompanied by appropriate assessment criteria which can be used to judge that the expected learning outcomes have been achieved. Learning outcomes, together with assessment criteria, specify the requirements for the award of credit, while marking is based on attainment above or below the requirements for the award of the credit. Credit accumulation and transfer is facilitated if clear learning outcomes are available to indicate with precision the achievements for which the credit will be awarded.

National Tuning Centre (NTC) (*Centro Nacional Tuning* (*CNT*))
The National Tuning Centre is a creation of the ALFA Tuning Latin America Project. Its main purposes is to work alongside the activities of the universities participating in the project and disseminate the results achieved in it among the higher education institutions and related bodies in their country. Each country participating in the project has an NTC, which liaises between the project and its country.

Nostrification[50] (*homologación*)
Process by means of which a qualification or studies taken are considered to be equivalent to those that exist in the nostrifying system or institution.

Recognition (*reconocimiento*)
UNESCO uses the term «validation» for the act of granting official validity to the studies carried out and the diploma, qualifications and degrees obtained in any of the member states. Nonetheless, the term «recognition», is also used in the case of a foreign diploma, degree or other qualification, referring to its acceptance by the relevant public authorities of a state and the conferral on holders of such qualification of the entitlements enjoyed by those who possess the corresponding national qualification. These entitlements refer to the pursuit of studies and the practice of a profession. In the area of academic mobility, recognition of studies is established in inter-institutional agreements.

Revalidation (*revalidación de estudios*)
This is the administrative act through which studies performed within the education system of one country can acquire official validity in the system educational of another. The term is similar to «Recognition».

Skills[51] (*habilidades*)
Instrumental, social, systemic and cognitive aptitudes, which may be generic or specific, such as reading, writing, public speaking, computing and mathematics.

---

[50] See Note 47.
[51] See Note 47.

Skills are related to the professional or graduation profiles of the study programmes.

Tuning
To «tune» means to turn a radio to the desired frequency; it can also refer to the idea of tuning the various instruments in an orchestra, so that the performers can play the music without unwanted dissonance. In the case of the Tuning Project, it means creating agreed reference points for the organisation of higher education structures in Europe, recognising that the diversity of traditions is a positive factor in the creation of a dynamic common higher education area.

Workload (*carga horaria)*)
The workload is the time spent on academic work, including all the different types of study that is required to develop the different competences that enable the curriculum to be completed. The workload may be calculated in terms of the time spent on classes, independent study, practical field work and laboratory work, workshops, university outreach and research, or on the basis of the learning outcomes. Use of the workload encourages greater flexibility to allocate study time to atypical class periods in the trimester, semester or academic year, such as, for example, a one-week intensive summer course. This system emphasises student-centred teaching, in that it takes into account each student's different individual learning times. Higher education systems that represent their study scoring units in terms of workload therefore use specific directives that allow room for continuous teaching, distance learning, and give more value to extracurricular experience, in that they encourage a reduction in the time spent on formal academic activities.

9

Bibliography

ARAUJO, Javier. (2006). *Articulación universidad-escuela media: política para la definición de competencias para el acceso a la educación superior*. Buenos Aires, Ministerio de Educación, Ciencia y Tecnología (Documento CPRES).

BRYK, A.S. y RAUDENBUSCH, S.W. (1992) *Hierarchical Linear Models: Applications and Data Analysis Methods*. Sage Publications.

CONDEMARÍN, M. y MEDINA, A. (2000). *Evaluación auténtica de los aprendizajes: un medio para mejorar las competencias en el lenguaje y comunicación*. Santiago, Chile, Editorial Andrés Bello.

CONFERENCIA MUNDIAL SOBRE EDUCACIÓN SUPERIOR (1998, París). *Declaración Mundial Sobre la Educación Superior en el Siglo XXI.* París, UNESCO

CULLEN, Carlos. (1996). «El debate epistemológico de fin de siglo y su incidencia en la determinación de las competencias científico tecnológicas en los diferentes niveles de la educación formal». En: *Novedades Educativas* N,° 62. Buenos Aires.

CUMBRE ALCUE (2005, México D.F.) *Declaración de Guadalajara*. México D.F.

DRAPER, D. (1995). «Inference and hierarchical modelling in the social sciences». *Journal of Education and Behavioral Statistics* 20, 115-147.

GARDNER, Howard. (1995). *Inteligencias múltiples: la teoría en la práctica*. Barcelona, Es., Paidós.

GOLDSTEIN, H. (1992). «Statistical information and the measurement of education outcomes (editorial)». *Journal of the Royal Statistical Society*, A.155, 313-15.

GOLDSTEIN, H. (1995). *Multilevel Statistical Models*. London, Edward Arnold: New York, Halstead Press.

GOLDSTEIN, H. y SPIEGELHALTER, D. (1996). «League tables and their limitations: Statistical issues in comparisons of institutional performance». *Journal of the Royal Statistical Society*, Series A 159, 385-443.

GOLDSTEIN, H., RASBASH, J., YANG, M., WOODHOUSE, G., PAN H., y THOMAS, S. (1993). «A multilevel analysis of school examination results». *Oxford Review of Education*, 19: 425-33.

GONZÁLEZ, Julia y WAGENAAR, Robert (2004). *Tuning Educational Structures in Europe: informe final fase 1*. Bilbao, Es. Universidad de Deusto.

González, Julia y Wagenaar, Robert (2006). *Estructura Educativa Tuning II en Europa: La contribución de las universidades al proceso de Bolonia*. Bilbao, Es. Universidad de Deusto.

Mockus, Antanas (2000). *Las Fronteras de la Escuela.* Bogotá, Cooperativa Editorial Magisterio.

Reunión General Proyecto Tuning América Latina (1.ª, 2005, Buenos Aires) documento 1. Buenos Aires, Tuning América Latina.

Reunión General Proyecto Tuning América Latina (2.ª, 2005, Belo Horizonte) documento 2. Belo Horizonte, Brasil, Tuning América Latina.

Reunión General Proyecto Tuning América Latina (3.ª, 2006, San José) documento 3. San José, Tuning América Latina.

Reunión General Proyecto Tuning América Latina (4.ª, 2006, Bruselas) documento 4. Bruselas, Tuning América Latina.

Reunión General Proyecto Tuning América Latina (5.ª, 2007, México, D.F.) documento 5. México D.F., Tuning América Latina.

Seminario Internacional Currículo Universitario Basado en Competencias (2005, Barranquilla) informe final. Barranquilla, Colombia.

Zalba, Estela María y Gutiérrez, Norma Beatriz (2006). *Una Aproximación a la educación basada en competencias en la formación universitaria*. Mendoza, Argentina, Universidad Nacional de Cuyo.

Websites

—Alfa Programme. European Commission
http://ec.europa.eu/europeaid/projects/alfa/index_es.htm

—Association of Amazonian Universities (UNAMAZ)
http://www.ufpa.br/unamaz/

—Association of Universities of Latin America and the Caribbean for Integration (AUALCPI)
http://www.aualcpi.org/

—Association of Universities of the Montevideo Group (AUGM)
http://www.grupomontevideo.edu.uy/

—Council of Rectors for the Integration of the Sub-Region of Mid-West South America (CRISCOS)
http://www.criscos.org/index_flash.htm

—Economic Commission for Latin America and the Caribbean (CEPAL/ECLAC). Demographic Bulletin 2005. www.eclac.cl/id.asp?id=9321

—European Credit Transfer and Accumulation System (ECTS) Users' Guide
http://europa.eu.int/comm/education/socrates ects.html

—European Union, Latin America and the Caribbean (UEALC/ALCUE)

—General Agreement on Trade in Services (GATS)
http://www.wto.org/english/tratop_e/serv_e/serv_sectors_e.htm

—Inter-American University Organisation (OUI)
http://www.oui-iohe.qc.ca/INDX/es-index.htm

—Latin American University Postgraduate Association (AUIP)
http://www.auip.org/

—Network of Macro-Universities of Latin America and the Caribbean
http://www.redmacro.unam.mx/

—Official Website of the Bologna process
http://www.dfes.gov.uk/bologna/
—Organisation of Ibero-American States for Education, Science and Culture. (OEI)
http://www.oei.es/
—Tuning Europe project
http://tuning.unideusto.org/tuningeu/
—Tuning Latin America project
http://tuning.unideusto.org/tuningal/
—Twenty-Sixth Latin American Education Conference, Montevideo, Uruguay, 12 and 13 July, 2006.
http://www.oei.es/xvicumbre.htm
—Twenty-Sixth Meeting of Ministers of Education from the Countries of MERCOSUR, Bolivia ad Chile (RME), 10 June 2004. 2004, Buenos Aires, Argentinean Republic.
http://www.sic.inep.gov.br/
—UNESCO - IESALC: Report on Higher Education on Latin America and The Caribbean 2000-2005.
http://www.iesalc.unesco.org.ve/iesalchome.asp
—Union of Latin American Universities (UDUAL)
http://www.udual.org/
—United Nations Educational, Scientific and Cultural Organisation. (UNESCO)
www.unesco.org
—UNIVERSIA www.universia.es
—Common Area for Higher Education
http://www.aneca.es/present/rrii_internacional_alcue.html
http://www.alcue.net/uealc/portal/user/UserSignOn.do

Appendix I

Tuning methodology[52]

TUNING MOTTO: **Tuning of educational structures and programmes on the basis of diversity and autonomy**

In the framework of the Tuning project a methodology has been designed to understand curricula and to make them comparable. Five lines of approach have been distinguished to organize the discussions in the subject areas:

1) generic (general academic) competences,
2) subject-specific competences,
3) the role of ECTS as an accumulation system
4) approaches to learning, teaching, and assessment and
5) the role of quality enhancement in the educational process (emphasizing systems based on internal institutional quality culture).

In the first phase of the Tuning project the emphasis was on the first three lines. The fourth and fifth lines received less attention due to time constraints, but they had a central place in the second phase of the project (2003-2004).

Each line has been developed according to a pre-defined process. The starting point was updated information about the state of the art at European level. This information was then reflected upon and discussed by teams of experts in the now nine subject related areas. It is the work of these teams, validated by the respective European networks,

[52] In González, Julia and Wagenaar, eds. *Tuning Educational Structures in Europe. Final Report- Pilot Project - Phase 2, Universities' contribution to the Bologna Process,* Bilbao, 2006; pp. 28-38

that has provided understanding, context and conclusions which can be considered valid at European level. All together, the five lines of approach allow universities to «*tune*» their curricula without losing their autonomy and at the same time stimulate their capacity to innovate.

Tuning model

Furthermore Tuning developed a model for designing, implementing and delivering curricula offered within one institution, or, jointly, by two or more institutions. The following main steps in the process for designing a study programme either a local programme or an (international) integrated programme / joint degree were identified:

1. Meeting the basic conditions:

   For all study programmes:

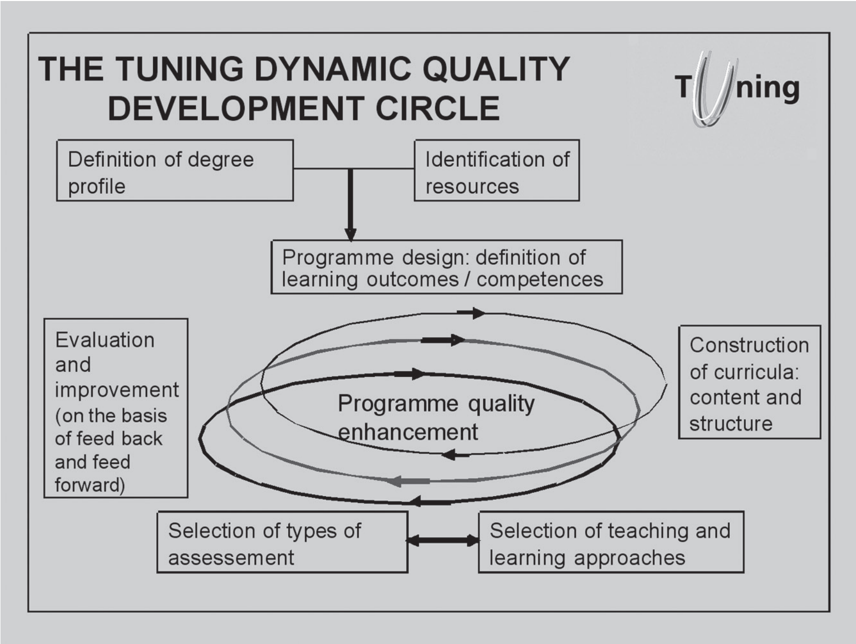
   — Has the social need for the programme on a regional/national/European level been identified? Has this been done on the basis of a consultation of stakeholders: employers, professionals and professional bodies?
   — Is the programme of sufficient interest from the academic point of view? Have common reference points been identified?
   — Are the necessary resources for the programme available inside or, if required, outside the (partner) institution(s) concerned?

   For international degree programmes offered by more than one institution:

   — Is there commitment of the institutions concerned? On what basis: an (official) agreement or a strategic alliance?
   — Is there sufficient guarantee that the programme will be recognised legally in the different countries?
   — Is there agreement with regard to the length of the programme to be designed in terms of ECTS-credits based on student workload?

2. Definition of a degree profile.
3. Description of the objectives of the programme as well as the learning outcomes (in terms of knowledge, understanding, skills and abilities) that have to be met.
4. Identification of the generic and subject-related competences which should be obtained in the programme.
5. Translation into the curriculum: content (topics to be covered) and structure (modules and credits)
6. Translation into educational units and activities to achieve the defined learning outcomes.
7. Deciding the approaches to teaching and learning (types of methods, techniques and formats), as well as the methods of assessment (when required, the development of teaching material)
8. Development of an evaluation system intended to enhance its quality constantly.

This process is reflected in the following flow chart:



This model is based on the assumption that programmes can and should be enhanced on the basis not only of feedback but also of «feed forward» by taking into account developments in society as well as the academic field concerned. This is illustrated by the progressive loops in the model.

ECTS

One of the main innovations of Tuning has been to link learning outcomes,, competences and ECTS workload based credits. As part of Tuning I it was necessary to develop a new concept for ECTS. This concept implies the change of the European Credit Transfer System into a European Credit Transfer and Accumulation System, in which credits no longer have a relative value but have an absolute one and are linked to learning outcomes. In the new ECTS system the award of credits depends on full achievement of the desired learning outcomes for a unit or module. The philosophy as well as its features are reflected in the paper *Educational Structures, Learning Outcomes, Workload and the Calculation of ECTS Credits,* which formed the basis for the new ECTS Users' Guide published by the European Commission in the Summer of 2004[53]

[53] ECTS Users' Guide: http://europa.eu.int/comm/education/socrates ects.html.

Learning outcomes and competences

The introduction of a two or three cycle system makes it necessary to revise all existing study programmes which are not based on the concept of cycles. In practice these programmes have to be redesigned because in a cycle system each cycle should be seen as an entity in itself. The first two cycles should not only give access to the following cycle but also to the labour market. This shows the relevance of using the concept of competences as a basis for learning outcomes.

Tuning makes the distinction between learning outcomes and competences to distinguish the different roles of the most relevant players: academic staff and students/learners. Desired learning outcomes of a process of learning are formulated by the academic staff, preferably involving student representatives in the process, on the basis of input of internal and external stakeholders. Competences are obtained or developed during the process of learning by the student/learner. In other words:

- Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of learning. They can refer to a single course unit or module or else to a period of studies, for example, a first or a second cycle programme. Learning outcomes specify the requirements for award of credit.
- Competences represent a dynamic combination of knowledge, understanding, skills and abilities. Fostering competences is the object of educational programmes. Competences will be formed in various course units and assessed at different stages.

Competences can be distinguished in subject specific and generic ones. Although Tuning acknowledges to the full the importance of building-up and developing subject specific knowledge and skills as the basis for university degree programmes, it has highlighted the fact that time and attention should also be devoted to the development of generic competences or transferable skills. This last component is becoming more and more relevant for preparing students well for their future role in society in terms of employability and citizenship.

Tuning distinguishes three types of generic competences:

- Instrumental competences: cognitive abilities, methodological abilities, technological abilities and linguistic abilities;
- Interpersonal competences: individual abilities like social skills (social interaction and co-operation);
- Systemic competences: abilities and skills concerning whole systems (combination of understanding, sensibility and knowledge; prior acquisition of instrumental and interpersonal competences required).

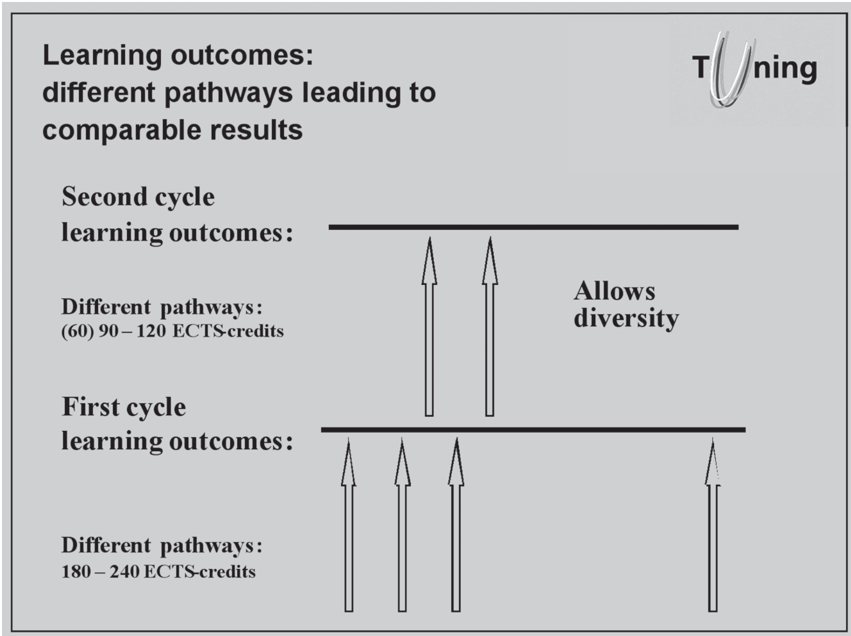
As part of Tuning I, a large scale consultation was organized among graduates, employers and academics to identify the most important generic competences for each of the academic fields involved. Although the set of most relevant generic competences differed slightly between the different subject areas, for most competences there was a striking similarity between the fields. In all fields typical academic competences were identified as being the most important ones, like the capacity for analysis and synthesis, the capacity to learn and problem solving. In particular the graduates and employers, who proved to be remarkably in agreement, showed that other generic competences as well were seen as being very important for employability, like the capacity for applying knowledge in practice, the capacity to adopt to new situations, concern for quality, information management skills, ability to work autonomously, team work, capacity for organizing and planning, oral and written communication in your native language as well as interpersonal skills. It was also concluded by graduates and employers that some of the competences mentioned above were of more use and developed to a higher level than others. They drew attention to the fact that more attention should be given to a specific number of generic competences to prepare students better for their future workplace. The outcome of this extended consultation process can be found in the publication which resulted from the Tuning I project as well as on the Tuning website.

Subject specific competences have been identified already for nine subject areas e.g. Business Administration, Chemistry, Education Sciences, European Studies, History, Geology (Earth Sciences), Mathematics, Nursing and Physics. These sets of competences are reflected in documents prepared by each of the nine subject area groups of the project.[54] As already stated in the introduction to this book the approaches of the nine groups differed, because of differences in the structure of the disciplines; nonetheless, all groups followed a similar procedure to obtain their results. Through discussion, creation of reciprocal knowledge and mapping the ways the subject area is learned and taught in the various countries, insight was gained and consensus built on what constitutes the vital core of each subject area. The documents which resulted should be understood to be working documents, subject to further elaboration and change.

In Tuning competences are described as reference points for curriculum design and evaluation, not as straightjackets. They allow flexibility and autonomy in the construction of curricula. At the same time, they provide a common language for describing what curricula are aiming at.

The use of learning outcomes allows for much more flexibility than is the case in more traditionally designed study programmes, because they show that different pathways can lead to comparable outcomes; outcomes which can be much more easily recognized as part of another programme or as the basis for entrance to a next cycle programme. Their use fully respects the autonomy of other institutions as well as other educational cultures. Therefore this approach allows for diversity, not only in a global, European, national or institutional framework, but also in the context of a single programme. This concept is summarized in the following scheme:

[54] These papers can be found on the Tuning Website as well as in the first Tuning book.

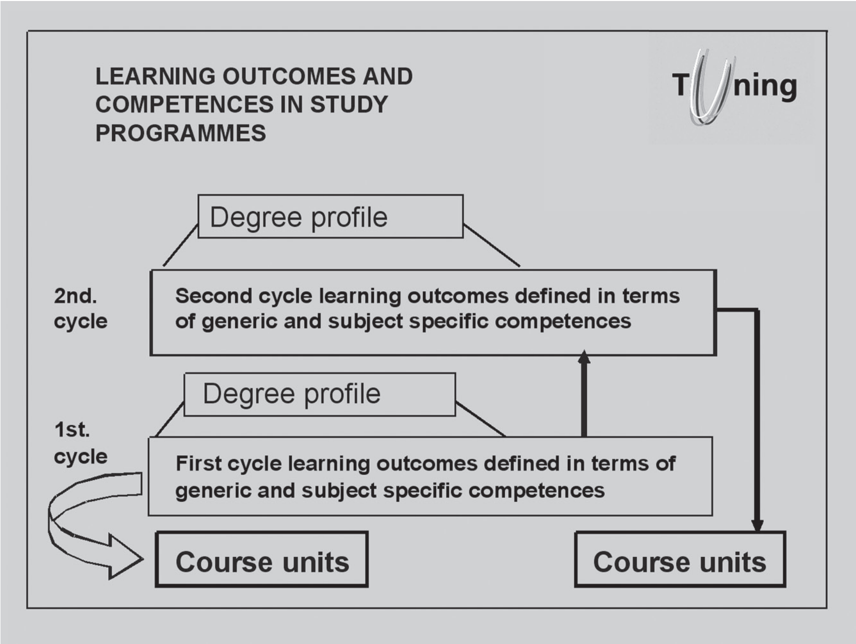


Student centred

The use of learning outcomes and competences is necessary in order to make study programmes and their course units or modules student centred / output oriented. This approach requires that the key knowledge and skills that a student needs to achieve during the learning process determine the content of the study programme. Learning outcomes and competences focus on the requirements both of the discipline and of society in terms of preparing for citizenship and employability. Still today, many study programmes are staff centred, which means in practice that they are input oriented. They often reflect a combination of the fields of interest and expertise of the members of staff. In effect this leads to programmes of rather loose units which might not be sufficiently balanced and most effective. Although Tuning recognizes fully the importance of making maximum use of the available expertise of the staff, this aspect should not dominate a programme.

In an output based study programme the main emphasis lies on the degree or qualification profile. This profile is determined by the academic staff and endorsed by the responsible authorities. The profile should be based on an identified and recognized need by society —in practice internal stakeholders, that is the academic society, as well as external stakeholders like employers (organizations), graduates and professional organisations—. All have their place in deciding which competences, generic and subject-specific, need to be emphasised and to what extent. Although every programme profile is unique and based on the judgements and decisions of the academic staff, this staff has to take into account specific features which are seen as being crucial for the subject area concerned. In other words: what makes a business programme a business programme. In the framework of Tuning groups of academics have defined these sets of features for their own discipline. These are reflected in so-called Templates, or Summaries of Outcomes containing synthetic indications within a common format, which are based on more extensive papers.

In a cycle system each cycle should have its own set of learning outcomes formulated in terms of competences. This can be visualized using the following scheme:



As stated before, learning outcomes are formulated both at programme level and on the level of individual course units or modules. The learning outcomes of the individual units add to the overall learning outcomes of the programme. The situation for the competences to be acquired is more or less comparable. Competences are developed in a progressive way. This means that they are formed in a number of course units or modules at different stages of the programme. During the design phase of the programme it has to be decided in which units a particular competence has to be formed. Depending on the size of a unit or module Tuning is convinced that it is advisable not to include more than six to eight competences in the learning outcomes for that unit. Although there might be competences which can be trained implicitly in a programme, only competences which can actually be assessed should be mentioned explicitly. The following scheme shows a possible approach for dividing competences over course units or modules.

LEARNING OUTCOMES AND COMPETENCES IN STUDY PROGRAMMES

Example

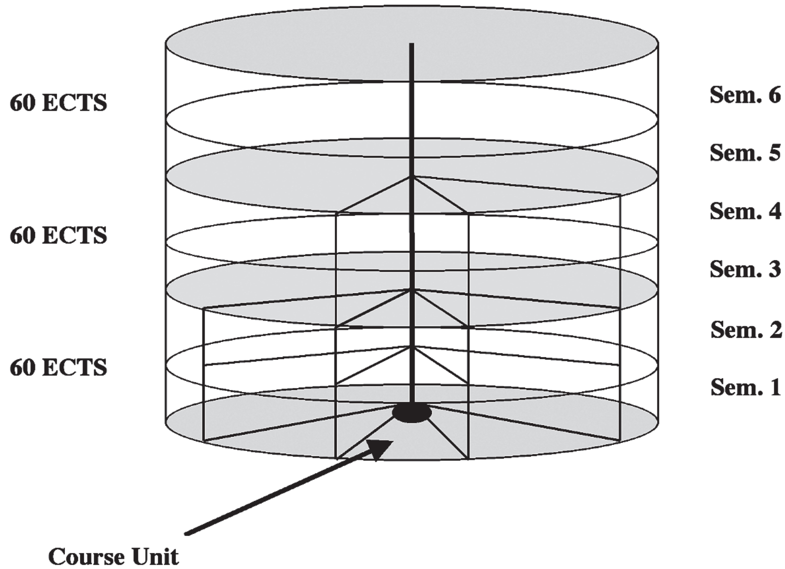
Course unit/ learning outcome	Competence A	B	C	D	E	F	G	H	I	F
Unit 1		X			X					
Unit 2	X			X			X			
Unit 3		X				X			X	
Unit 4	X		X							X

X = THIS COMPETENCE IS DEVELOPED AND ASSESSED AND IS MENTIONED IN THE LEARNING OUTCOME OF THIS UNIT

As has been shown above, for Tuning, a study programme is not a summing-up of a number of loosely related course units; it must be handled as an entity in itself. This requires a more holistic approach. In a student centred- / output-oriented study programme, all units in one way or another are related to each other. This not only applies to the units or modules which are part of the major or the core part of the programme, but also to minor courses and electives. In a well designed programme, minors and electives should strengthen the profile of the programme.

In the vision of Tuning a study programme can be seen as a large cake, with different levels, in which all slices are linked to one other, either in a horizontal or in a vertical way. In more formal educational terms: the learning outcomes of the individual units or modules add to the overall learning outcomes and to the development of the level of competences, taking into full consideration the learning outcomes to be achieved in other units. This concept can be visualized in a more schematic form as the following model shows:

FIRST CYCLE PROGRAMME



The model presumes progression regarding the achievement of learning outcomes expressed in terms of competences. Each course unit has a role in the overall curriculum. It distinguishes three periods of 60 credits which again are subdivided into two. This is the more traditional way a programme is taken: semester by semester. However, it also shows that other options are possible. For example a student can study one part of a programme in greater depth, by taking two units (or slices) in a vertical way if the prerequisites (entrance conditions) of this unit allow this. One can imagine that a student studying a language will focus first on language acquisition and will then concentrate on either literature or linguistics, although the official order of the programme might be different. It also shows that separate units, followed successfully in another context, can be fitted into the study programme on the basis of prior recognition. In a life long learning context and in more flexible programmes this might be very relevant.

One of the main objectives of the Bologna process is to make study programmes and periods of learning more comparable and compatible. This objective is strongly promoted by making use of the concept of levels, learning outcomes, competences and ECTS credits. A further way to promote this aim is to base study programmes on units of equal size. Modularization of educational programmes will promote transparency, and will facilitate mobility and recognition. It may also help to make programmes more feasible to study, because it offers an instrument to balance the student workload over the different phases of the programme.

Levels

The use of cycles automatically includes the introduction of the concept of levels. A distinction can be made between levels for a cycle and levels within a cycle. For each of these level indicators can be used. They are called *level descriptors*. As part of the Bologna Process, a group of experts, the so-called Joint Quality Initiative, has developed sets of general descriptors for each cycle, which are called the Dublin descriptors. These cycle descriptors have now been endorsed by the European Ministers of Education as part of the report *A Framework for Qualifications of The European Higher Education Area*. The approaches of Tuning and the JQF are fully compatible and complementary.

Because cycle descriptors in practice are level descriptors which identify the level of a cycle, Tuning has suggested naming these descriptors *cycle level descriptors*, to distinguish them from intermediate or sublevel descriptors. Tuning has produced cycle level descriptors at programme level for the first and second cycle for each of the subject areas included in the project. It has also debated the possibility of developing sublevel descriptors but has not yet come to a final conclusion. One can imagine, for example, that the following sublevels can be distinguished in university first cycle programmes: basic or fundamental, intermediate and advanced. For a second cycle programme a distinction might be made between the sublevels: advanced and specialized.

Appendix II

Key characteristics of Latin American education systems

Model of the questionnaire

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country ______
— Number of HEIs by type (universities, technology institutes or others):
____
— Number of HEIs by legal system: Public: ________ Private: ________

2. **Enrolment at higher level**

— Total higher level enrolment in the country : ____________________
— Total enrolment by legal system:
Public: _______________ Private: _________________
— Enrolment by degree types

Types of degree	Duration of the degree	Enrolment
• Technician	___________	___________
• Higher technician	___________	___________
• *Licenciatura*	___________	___________
• Speciality	___________	___________
• Master's Degree	___________	___________
• Doctorate	___________	___________
• Other	___________	___________

— Percentage in higher level education (Total enrolment/ 20-24 age group or equivalent. Indicate the age group referred to):
____

3. **Teaching staff:**

— Number of teaching staff in higher education: ____________________
— Academic level of teaching staff (percentages):
Licenciatura _____ Specialisation _____ Master's degree _____ Doctorate _____

— Type of contract (percentages):
Full-time ______ Part time ______ By hours _______

4. **Academic periods**

— Number of academic periods per year ______
— Dates of beginning and end of the periods ______________________________

5. **Scale of grades**

— Indicate the scale(s) of grade(s) applied in higher education of your country and the minimum pass grades on each scale:

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes ____ No ____
— Total amount or approximate range of the admission or tuition fees (in dollars):
____

7. **Admission and graduation criteria**

— Explain briefly the process for admitting students to the HEIs (selection exam, interviews, etc.).
— Explain briefly the student graduation process (is a thesis, exam, etc. required?).

8. **Academic credits**

— Is a system of academic credits used?: Yes ____ No ____ Partially ____
— If so, what does the academic credit consist of? And how is it applied between HEIs?

9. **Legal framework**

Describe briefly the legal framework of higher education.

10. **Responsibility of higher education**

Explain briefly what bodies are responsible for higher education.

11. **Assessment/accreditation bodies**

State whether there are higher education assessment and/or accreditation bodies in your country, who they are answerable top and whether assessment and/or accreditation is compulsory for HEIs.

ARGENTINA

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 102
— Number of HEIs by type (universities, technology institutes or others):

- Universities: 79 (38 public and 41 private)
- University Institutes: 20 (6 public and 14 private)
- Foreign University: 1
- International University:1
- Provincial University: 1

(2005 data)

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 1,527,310
— Total enrolment by legal system:
Public: 1,293,489 Private: 233,821

— Enrolment by degree type

Types of degree	Duration of the degree
Technician:	1500 hours
Higher technician	1500 hours
First degree	4-5 years (minimum duration of 4 years and minimum workload in the contact system of 2600 hours - compulsory minimum)
Speciality	1.5 years (with a minimum of 360 hours - compulsory minimum)
Master's degree	Minimum workload of 540 hours, must include at least 160 hours of tutorials and research tasks (compulsory minimum)
Doctorate	Preparation of a thesis leads to the conferral of the academic degree of Doctor. The thesis is carried out on an individual basis and performed under the supervision of a thesis director. Culminates with assessment by a jury, most of whose members are external to the programme and at least one of these is external to the institution (minimum requirements).

Percentage in higher level education (2005 data):

Range used by the OECD	2001	2005
Population 20-24	3,199,339	3,225,378
Net University Rate	17%	18.6%
Gross University Rate	35%	47.7%
Gross Rate of Higher Education	51%	63.5%

Range used in Argentina	2001	2005
Population 18-24	4,465,671	4,552,019
Net University Rate	16%	18.3%
Gross University Rate	25%	33.8%
Gross Rate of Higher Education	36%	45%

(1) Information from the population census 2001
(2) Information on Population Estimations INDEC 2005

Gross Rate of higher education attendance in Argentina, 2003: 60%

3. **Teaching staff:**

Number of teaching staff in higher education:

— Teachers in public universities: 143,804

- Full time: 15,450 (11%)
- Semi-full time: 26,360 (18%)
- *Dedicación simple* (10h): 77,529 (54%)
- Others: 13,075 (9%)
- Pre-university: 1,390 (8%)

4. **Academic periods**

— Number of academic periods per year: In general these are set by the board of each academic unit.
— Dates of beginning and end of the periods: set by the board of governors of each university.

5. **Scale of grades**

There is no single nationwide scale. The general criteria are set by the academic units.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes ____ No____
— Total amount or approximate range of the admission or tuition fees (in dollars):

Undergraduate courses in public universities are free. However, in the case of post-graduates a fee has to be paid which depends on the institution and the type of course on offer.

7. **Admission and graduation criteria**

Admission

The minimum requirements to be admitted as a student to higher level institutions is established in Article 7 of the Higher Education Act Num. 24,521 (HEA). In principle the applicant must have passed the secondary level or the polymodal teaching cycle. In exceptional cases, people over 25 who do not meet this condition, may be eligible provided they can demonstrate the through assessment procedures established by

the provinces, municipality of the city of Buenos Aires or universities, as applicable, establish, that they have preparation and/or work experience that is in accordance with the studies they propose to take, and sufficient skills and knowledge to take them satisfactorily. They must also meet the requirements of the admission system established by each institution.
The universities, pursuant to Article 29, Clause J of the HEA, are responsible for establishing the system of admission, continuance and advance of students, and the system of equivalences. They may make it a prerequisite of admission to have passed additional matriculation exams or courses that may be organised by the universities or by the academic units. This varies depending on the university and even within the same university, depending on the academic unit.

Graduation

The only basic condition established by the state is that the study plans must respect the minimum workload. There are degrees which receive special treatment, which correspond to the state regulated professions, whose exercise might affect public interest, directly jeopardising the health, security, rights, goods or education of the public (Article 43 of the HEA). In these cases, in addition to the minimum workload, they are required to respect special requirements such as: the study plans must take into account the basic curricular contents and the criteria on intensity of the practical training established by the Ministry of Education, Science and Technology; and the respective degrees must be accredited on a regular basis by the National Commission of University Assessment and Accreditation or by duly authorised private organisations set up for this purpose.
In compliance with the basic requirements established by the state, for each degree the conditions for graduation may vary at each university's discretion. In some cases students are required to submit a thesis, in others they are not.

8. **Academic credits**

— Is a system of academic credits used: Yes ____ No ____ Partially _____
— If so, what does the academic credit consist of? And how is it applied between HEIs?

There is no system of academic credits on a national scale. Although to date there are no significant applications of such a system, it should be mentioned that the inclusion and development of a credit system is amongst the aims of both national policies and the policies of many public and private universities.

Some experiences may be mentioned:

— Creation of several university consortia which have developed a number of projects with a view to creating mechanisms of articulation.
— The experience of the Federal Board of Deans of Engineering [*Consejo Federal de Decanos de Ingeniería* or CONFEDI]: «Strategic Project of Curricular Reform of Engineering Degrees».

9. **Legal framework**

The Higher Education Act (HEA) N.° 24.521, passed into law in 1995, sets the general guidelines regulating system of higher education in Argentina. It covers university and non university institutions of higher education, on a national, provincial or municipal scale, public and private.

10. **Responsibility for higher education**

Within the structure of the Ministry of Education, Science and Technology, the Secretariat of University Policies (SUP) is a central body, specific to the area of higher education. The objectives of the Secretariat, as laid out in Decree 357/02, are as follows:

- To advise on the preparation and assessment of plans, programmes and projects for the development of the system of university education and to promote development and improvement of the quality of teaching, research and outreach;
- To design and implement policies and strategies to improve the effectiveness and efficiency of the system of higher education and to allocate and employ economic and financial resources in national universities;
- To advise on the interpretation and application of the standards related to the system of higher education, the official recognition and national validity of studies and qualifications, the monitoring and auditing of the private university institutions and the validation of qualifications issued by universities from other countries;
- To design policies and strategies and to administer an information system that enables information on the system of university education to be elucidated and processed for use by the institutions that make up the system and the sectoral authorities responsible;
- To assist the Minister of Education, Science and Technology in coordinating the programmes of assistance and external financing for the higher education system;
- To promote and maintain institutional relations between the different components of the higher education system and with sectors linked directly or indirectly to it;
- To develop policies and strategies for the regional articulation of the institutions that form part of the higher education system and of said system with the community.;
- To develop policies likely to encourage activities of research, technological development and association of the universities with the public and private sectors;
- To prepare and propose policies related to the admission into higher education institutions of foreign applicants, and for the recognition of studies and qualifications from other countries and in particular with the higher education institutions of MERCOSUR;
- To participate in an analysis of the drafts of international treaties pertaining to higher education;
- To design and propose strategies and methodologies for verifying compliance with legal requirements on higher education;
- To oversee the activities of the National Commission of University Assessment and Accreditation (CONEAU);
- To participate in the preparation of the contents of competence-based technical and professional education, insofar as it pertains to higher education, which contents shall be agreed by the Federal Council for Culture and Education;
- To promote the quality of technological education in the higher education tiers of the education system, to ensure ongoing provisions of education to meet social and production demands, through the federal coordination and articulation with support, compensation and incentive programmes.

The HEA also stipulates the organs of coordination and consultation of the university system: the Universities Council; the National Interuniversity Council (CIN), the Council of Rectors of Private Universities (CRUP) and the Regional Higher Education Planning Councils (CPRES).
The National Interuniversity Council (CIN): comprised of rectors or presidents of national university institutions recognised by the state, which are fully organised.
The Council of Rectors of Private Universities (CRUP): comprised of the rectors or presidents of private university institutions.
The Regional Higher Education Planning Councils (CPRES): include all agents in higher education in Argentina: national and private universities, national government and provincial governments. Its main role is to act as a body for meeting and articulation of the higher education system at a regional level.
The Universities Council: is presided over by the Minister of Education, or by a person designated by same with a minimum category of a [state] secretary. It is comprised of the executive committee of the National Interuniversity Council, the steering committee of the Council of Rectors of Private Universities, by a representative of each Regional Higher Education Planning Council —who must be the rector of a university institution— and by a representative of the Federal Council of Education.

11. **Assessment/accreditation bodies**

National Commission of University Assessment and Accreditation (CONEAU):
The National Commission of University Assessment and Accreditation (CONEAU) was established under the HEA in 1995. Article 46 of the act establishes it as a decentralised body operating under the jurisdiction of the Ministry of Education.
The main functions of the CONEAU are:

- To coordinate and implement the external assessments of the university institutions (national, provincial and private), with the participation of academic peers of recognised competence;
- To accredited the undergraduate courses corresponding to state-regulated professions;
- To accredit the graduate study degrees;
- To issue recommendations (regarding consistency and viability) on the institutional projects of new state universities to enable the Ministry of Education to authorise their foundation (following their creation under a law passed by the national congress or their provincial recognition);
- To prepare reports as to whether or not to grant provisional authorisation and definitive recognition for private institutions and to prepare reports on the annual assessments during the provisional operating period thereof;
- To rule on the proposals for the constitution of private organisations of university assessment and accreditation prior to their recognition by the Ministry of Education.

As established in Article 44 of the HEA, the university institutions must ensure the functioning of the internal bodies of institutional assessment, whose purpose shall be to analyse achievements and difficulties in fulfilling their functions, and to suggest measures for improving them. Self-assessments are complemented by external assessments, which must be performed every six years, within the framework of the objectives set out in each institution. As stipulated in the act, this encompasses: the functions of teaching, research and outreach, and in the case of the national institu-

tions also the management of the institutions. Within this framework, the CONEAU is in charge of the external assessment in conjunction with academic peers of recognised competence.
There are also degrees which receive special treatment, and which correspond to the state regulated professions, whose exercise might affect public interest, directly jeopardising the health, security, rights, goods or education of the public. In such cases in addition to workload requirements, they are also required to fulfil the special requirements set out in Article 43 of the HEA. In these cases, the respective courses must be accredited on a regular basis by the National Commission of University Assessment and Accreditation.

BOLIVIA

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 49
— Number of HEIs by legal system: Public: 11 Private: 38

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 281,095
— Total enrolment by legal system:
Public: 240,824 Private: 40,271

— Enrolment by degree type

Types of degree	Duration of the degree
• Technician	—
• Higher technician	2400 - 2600 hours
• *Licenciatura*	4200 - 6000 hours
• Speciality	4000 hours
• Master's degree	2400 - 2800 hours
• Doctorate	3000 - 3400 hours
• Other	—

3. **Teaching staff:**

— Number of teaching staff in higher education: 11,203 undergraduate
— Academic level of teaching staff (percentages):
First degree: 11,203 Specialisation: — Master's degree: — Doctorate: —

4. **Academic periods**

— Number of academic periods per year: II
— Dates of beginning and end of the periods: the first in January and the second in June

5. **Scale of grades**

First degree: 51 - 100

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars):
Public university $10
Private University $100

7. **Admission and graduation criteria**

Admission:
Public System - Pre-university - Admission Exam
Private University - Pre-university

Graduation:
Thesis - Supervised work - Final Exam - Work Experience - Final Assignment

8. **Academic credits**

— Is a system of academic credits used: Yes X No ___ Partially ___
— If so, what does the academic credit consist of? And how is it applied between HEIs?
  for every hour of theory, 1 credit
  for every hour of practical study 2 credits

9. **Legal framework**

Political Constitution of the State, Act 1565, General Regulation of Private Universities, Organic Statute CEUB, Bolivian University Congresses and related provisions.

10. **Responsibility for higher education**

Ministry for Education and Cultures; Deputy Minister for Higher Education; Executive committee of the *Universidad Boliviana*, rectorates of public universities.

11. **Assessment/accreditation bodies**

Through an ad-hoc committee and by means of the CONEA, MERCOSUR and IESALC UNESCO

BRAZIL

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 2,185
— Number of HEIs by type (universities, technology institutes or others):
Universities: 176
University Centres: 114
Faculties: 1,691
Centres of Technological Education: 184

— Number of HEIs by legal system: Public: 231 Private: 1,934

* *The information is taken from the Census of Higher Education - 2005*

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 4,453,156
— Total enrolment by legal system:
Public: 1,192,189 Private: 3,260,967

— Enrolment by degree type:

Types of degree	Duration of the degree	Enrolment
• Technician	—	—
• Higher tech. (CST)	2 a 3 years	153,307
• First degree	3 a 7 years	4,299,849
• Speciality	360h (minimum)	343,569*****(2004)
• Master's degree	3 years (minimum)	80,787
• Doctorate	4 years (minimum)	52,376
• Other	—	—

— Percentage in higher level education (Total enrolment/ 20-24 age group or equivalent. Indicate the age group referred to): 11% of the population between 18 and 24 (gross rate of 18.2%)

3. **Teaching staff:**

— Number of teaching staff in higher education: 305,960
— Academic level of teaching staff (percentages): First degree: 39,115; Specialisation: 89,908; Master's degree: 110,992; Doctorate: 65,897.
— Type of contract (percentages):
Full time: 110,480; Part time: 67,654; By hours: 127,826

4. **Academic periods**

— Number of academic periods per year: 2
— Dates of beginning and end of the periods: February to June; August to December

5. **Scale of grades**

— State the grade scale(s) applied in higher education in your country and the minimum **pass** grades on each scale:

There is no single system for allocating grades and required pass averages among regularly enrolled students. Each institution adopts its own system defined in its respective regulation and statutes.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in **public** HEIs? **No**
— Total amount or approximate range of the admission or tuition fees (in dollars): **Not applicable**

7. **Admission and graduation criteria**

— Explain briefly the process for admitting students to the HEIs (selection exam, interviews, etc.)

By law, all institutions must admit students by means of a selection process. The type of selection process is determined by the institution.
Practically all public institutions conduct this process through matriculation exams. The candidates are examined on their knowledge of all areas of secondary education. Each candidate must previously choose a degree in the institution and although the exams covers the entire scope of secondary education, greater weight will be given to areas relating to the chosen degree. Admission into the institution depends on their grade and the number of vacancies available in the institution for the chosen degree. Some institutions are also experimenting with other admission mechanisms.
At present, most of the public institutions reserve a given number of vacancies for specific groups. Those quotas can be for Afro-Brazilians, deprived students or graduates from public secondary schools, depending on the criteria of each institution. Candidates for the quotas must also take admissions exams and be admitted in accordance with their grade and the number of vacancies reserved for these groups.

— Explain briefly the process of graduation (whether it requires a thesis, exam, etc.)

The educational process in the final years is developed on the basis of a «pedagogical project» drafted by the accredited institution, following the National Curricular Guidelines established laid down the National Council of Education for each course (degree). The requirements depend on the specific circumstances of each area and for some courses, final assignments are required and for others they are not.

8. **Academic credits**

— Is a system of academic credits used?: **There is no single system.**
— If so, what does the academic credit consist of? And how is it applied between HEIs?

The system of credits is not standardised. Each institution applies its own system, in accordance with criteria formally established by the higher collegiate organs of the institution. The studies carried out in an institution can be used by another, following an analysis of the equivalence of the subjects taken, independently of the system adopted (credits or other). The educational-pedagogic autonomy of higher education institutions is thus respected on all occasions.

9. **Legal framework**

Describe briefly the legal framework of higher education

Act No. 9,394/1996, also known as the Education Directives and Bases Act, is the basis for all educational legislation in the country.

Act N.° 11,096/2005, institutes the University For All Programme (PROUNI,) regulates the actions of aid institutions in higher education;

Act N.° 10,861/2004, institutes the National Higher Education Assessment System.

Outside the area of these 3 basic laws, the higher education in Brazil is regulated by Decrees, ministerial Orders and Resolutions from the National Education Council. Decree No. 5,773/2006, recently promulgated, regulates «the functions of regulation, supervision and assessment of higher education institutions and higher graduation and sequential courses in the federal teaching system, encompassing institutions run by the federal Union and by private initiative).

10. **Responsibility for higher education**

Explain briefly which bodies are responsible for higher education

The Ministry of Education, through the Secretariat of Higher Education, the Secretariat of Technological Education and the National Education Council, has responsibility over the entire area of graduation and postgraduation *lato sensu* in the country, in matters relating to:

- regulation;
- accreditation and re-accreditation of institutions;
- authorisation, recognition and renovation of recognition of courses (accreditation of degrees);
- preparation and implementation of incentive policies to higher education;
- administration of the Federal Institutions of Higher Education (IFES)

The **Coordination of Higher Level Personnel Studies (CAPES)**, as an organ independent, associated to the Ministry of Education, has responsibility on postgraduation *stricto sensu* (Master's degree, doctorate and PhD).
It should be noted that the state/provincial and municipal institutions and their higher education courses, while under the obligation to comply with national laws and standards, come under the responsibility of the state/provincial governments and councils of education, and are accredited and supervised by these bodies.

11. **Assessment/accreditation bodies**

State whether there are higher education assessment and/or accreditation bodies in your country, who they are answerable to and whether assessment and/or accreditation is compulsory for HEIs
The functions of assessment and regulation (accreditation) are performed by different bodies.

Accreditation and re-accreditation of higher education institutions

Brazilian public and private institutions of higher education (classification of administrative organisation) are subject to different procedures for creation and accreditation. It is the institutions themselves that are accredited for a specified length of time. As a result, re-accreditation of the institution is also required, depending on the specific circumstances. These processes are carried out by the Secretariat of Higher Education of the Ministry of Education (SESu/MEC) and by the Secretariat of Professional and Technological Education (SETEC/MEC) on the basis of the results of the assessment conducted by the National Institute of Educational Studies and Research - INEP. The application is submitted to the Sesu (or the SETEC, in the case of higher courses in technology), to which the necessary documentation must be sent.

Authorisation, recognition and renovation of recognition for courses (degrees)

Degrees are created by means of a legal deed which differs depending on the academic organisation of the institution. This may be referred to as a «Creation Deed» or an «Authorisation Deed». This deed is provisional and requires recognition of the course (which includes a validation period). Once this time has elapsed, the institution must apply for Renovation of Recognition. It is the responsibility of the Secretariat of Higher Education and of the Secretariat of Technological Education, based on the results of the assessment conducted by the National Institute of Educational Studies and Research - INEP, which must comply with the standards defined for each area of education.

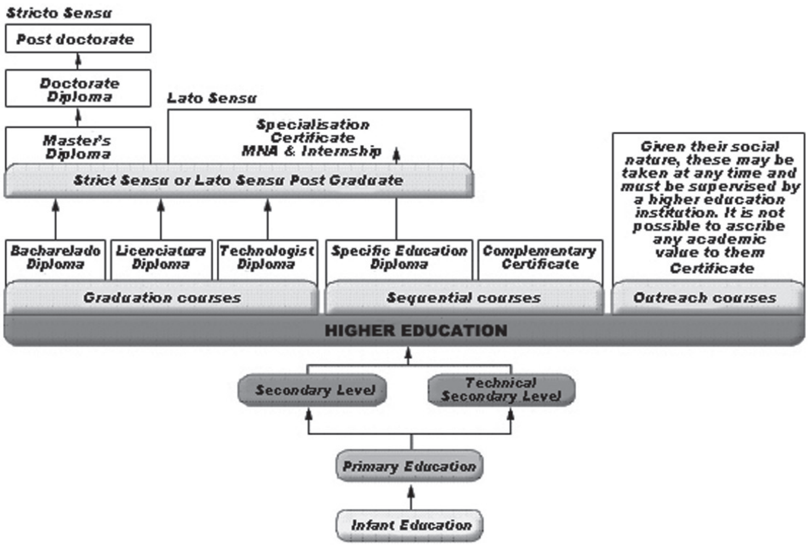
National Higher Education Assessment System

The SINAES (National Higher Education Assessment System), created by Act No. 10,861, on 14 April 2004, redefines the national assessment process. It offers the basic referentials for the procedures of regulation, an obligation for the running of all higher education institutions in Brazil (accreditation, re-accreditation, authorisation, recognition and renovation of recognition), and consists of four instruments of assessment:

- The **institutional self-assessment**, conducted continuously and with results to be submitted on a regular basis by the Institutions;
- The **external institutional assessment**, conducted *in loco* by commissions of assessors designated by the MEC/INEP;
- The **assessment of the graduation courses (ACG)**, conducted *in loco* by committees of assessors designated by the MEC/INEP;
- **National Student Performance Assessment Examination (ENADE)**, consisting of a nationwide test, by sampling, of students entering or completing the course, in four large areas: human sciences, exact sciences, technological and biological science and health science.

The National Higher Education Assessment Commission - CONAES is the collegiate organ of coordination and supervision of the National Higher Education Assessment System SINAES, which is articulated by the National Institute of Educational Studies and Research - INEP.

APPENDIX - Diagram of Brazilian Higher Education with the corresponding definitions



Basic higher education offers **graduation**, **sequential** and **outreach** courses. Among the differences between them is the qualification that determines pursuit of further studies (graduate studies) and the professional education system. Post -graduate studies comprise courses *Lato* and *Stricto Sensu*. The Secretariat of Higher Education - SESu coordinates only two *Lato Sensu* courses in the specialisations of medical internship and MBA. The *Stricto Sensu* courses fall under the responsibility of the CAPES. The organisation of higher education may be summarised as follows:

Graduation

— *Bachillerato* (diploma)
— *Licenciatura* (diploma)
— Technology (diploma)

Sequential

— Specific education (diploma)
— Complementary (certification)

Outreach courses (social certificate)

Postgraduation

— *Lato Sensu* (certified)
— *Stricto Sensu* (diploma)

Graduation

Bachillerato

In Brazil, the bachillerato is a type of diploma that allows its holders (the bachilleres) to work in certain areas of human knowledge. In some areas, however, the entitlement to professional work is not automatic, since it is regulated by orders or professional councils (such as the Order of Lawyers of Brazil or the Federal Council of Medicine). They are obtained in regular higher courses of four or five years duration.

First degree

In Brazil, the *Licenciatura* is a type of diploma that entitled its holder to exercise the *magisterio* in Infant Education and in the initial years of primary education (in this case, the education is received in the course on Pedagogy); in the final series of primary education and in secondary education (in this case, the education is received in the *Licenciatura*s for the specific areas of knowledge). The *Licenciatura* is different to the *Bachillerato*, but it is possible to obtain the diploma of *Bachiller* and Graduate by fulfilling the specific curriculum for each of these systems. In this case, as well as the disciplines in the area of education of the *bachillerato*, for the *Licenciatura* pedagogical subject are also required along with 300 hours of teaching practice.

Technology

Entitles the holder to be a technologist, basically specialist labour in different areas of knowledge. Offered by both universities or faculties, the duration of the course ranges from 2 to 3 years. E.g.: Technologist: in civil construction, Technologist in Cytotechnology, Technologist in Information Systems, etc.

Postgraduation

Lato Sensu

The courses have a minimum duration of 360 hours, not counting individual or group study time and without teacher assistance. It is destined to the preparation of monographic works or final assignments. Targeted at training in the component parts of a professional or scientific branch, the course offers graduates a certificate. The *Lato Sensu* postgraduate courses generally have a similar format to that of traditional courses, with classes, seminars and lectures, alongside research work on subjects related to the course. The selection criteria for being admitted to the *Lato Sensu* postgraduate course are determined independently in each institution, but generally consist of an assessment and an interview, in which the only formal demand to be met by the interested party is that they must have a higher level diploma. *It is the responsibility of the Secretariat of Higher Education to regulate the courses known as* Specialisations *Medical Internship.*

Stricto Sensu

Stricto Sensu courses are intended for further scientific and academic education, such as **master's degrees and doctorates** for higher level students. *The Coordination of Higher Level Personnel Studies* (CAPES) *separately assesses each course.* Assessment is made every three years, and the averages go from 1 to 7. To be recognised, the course must be awarded an average score of over 3. The master's degree course has a duration of two years, during which the student develops the dissertation and takes any subjects relevant to his/her research. The four years of the doctorate involve passing the subjects and preparing a thesis with the supervisor.

CHILE

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 221
— Number of HEIs by type:
Universities: 63 (of which 25 are institutions with input from state funding)
Professional Institutes: 47
Technical education centres: 111

— Number of HEIs by legal system:
Public: 25
Private: 196

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 583,959 (2004)
— Total enrolment by legal system:
Public: 246,611
Private: 337,348

— Enrolment by degree type:

Degree types	Duration of the degree	Enrolment	
• Technician	up to 2 years	62,354 (10.7%)	
• Higher technician	3 to 4 years	104,844 (17.9%)	
• First degree	4 to 5 years	—	
• Prof. degree (*)	5 to 7 years	401,062 (68.7%)	(includes first degree education)
• Master's degree	2 years	12,986 (2.2%)	
• Doctorate	4 years	2,713 (0.5%)	

(*) In the Chilean university system, the traditional degrees cover a professional cycle following on from the Licenciatura which varies between 1 to 2 years and leads to the obtention of the professional degree. The cycle consists of different requirements for the student, from specific courses to activities such as work experience, dissertation to opt for a degree, research project, and others. This is the case of degrees such as Law, Civil Engineering, Architecture, Medicine, and others.

— Percentage of in higher level education:
Total enrolment/age group 18-24 or corresponding = 33.32% (2005 data)

3. **Teaching staff:**

— Number of teaching staff in higher education: 66,055

— Academic level of teaching staff (percentages):
First Degree /Specialisation /Graduate Studies (Master's degree and/or Doctorate): 19,364 (29.3%)

— Type of contract (percentages):
Full time: 13,629 (20.6%)
Part time: 7,194 (10.9%)
By hours: 45,232 (68.5%)

4. **Academic periods**

— Number of academic periods per year: 2
— Dates of beginning and end of the periods: March-July / August-December

5. **Scale of grades**

Scale 1- 7 Minimum pass: 4
Scale 0- 100 Minimum pass: 51

6. **Enrolment or tuition fees**

— ¿Are enrolment or tuition fees charged in public HEIs? Yes **X** No ____
— Total amount or approximate range of the admission or tuition fees (in dollars):
$3000 to $7500 per year, undergraduate studies
$3500 to $15000 per year, graduate studies
$600 to $2500 per year Higher technician

7. **Admission and graduation criteria**

Admission

As their admissions test, the 25 universities in the public system, use a university selection test (UST) which measures basic knowledge in the areas of history, language, mathematics and sciences. Based on the results of the test, and the weighted average of marks obtained by the student in secondary school, each degree defines a minimum shut-off scores for enrolment.
In addition, some degrees, such as architecture and psychology, in some universities, require special matriculation exams.
Private institutions have no compulsory selection criteria, although they also tend to use the system of selection via UST, but in different conditions: for example, some only require that the student sits the test without stipulating a minimum score for admission.

Graduation

Traditional university degrees of over 5 years duration generally establish degree requirements that cover at least one of the following activities whose theoretical duration ranges from one semester to one year: professional practice (outside the institution), graduation project, graduation thesis, dissertation.
The first degree courses (4 to 5 years) do not involve special activities, apart from completing the courses established in the curriculum.
The degrees given by the professional institutes and technical education centres generally require work experience outside the institution (in the company), and a graduation assignment.

8. **Academic credits**

— Is a system of academic credits used: Yes ____ No ____ Partially X
— If so, what does the academic credit consist of? And how is it applied between HEIs?

In most universities in the public system several credit systems co-exist based mainly on contact teaching hours by academics (theoretical classes.). For example, 1 credit = 1 hour of theoretical classes.
According to measurements of the effective student workload taken during 2005, in most degrees, the student workload exceeds the normal weekly working hours of the average worker (44 hours).
Since 2004 a project, MECESUP, has been being developed in Chile to design a credit transfer system (CTS) to be introduced in the 25 universities corresponding to the Council of Rectors, which receive state funding.
To date, the project has already come up with a developed model which has been approved by the majority of the 25 institutions. The model consists of three main elements:
The concept of the credit is based on the effective student workload, which covers the activities required to achieve the learning outcomes established in the academic programmes.
The student workload for any degree must lie within a range of 1440 to 1900 hours per year
The model's regulator stipulates a base of 60 credits

Over the coming year, the model will be tried out in 15 national networks in different disciplines to facilitate student mobility; a group of institutional monitors will also be trained whose mission will be to examine the mechanisms of implementation inside each institution.
It is hoped finally to begin full implementation of the system.

9. **Legal framework**

Higher Education in Chile[55] is made up of a diversified system, comprising three types of institution on offer to those graduating from secondary education: Universities, Professionals Institutes and Technical Education Centres, recognised by the state in Article 29 of the Basic Constitutional Teaching Act (BCTA), 1990.
act 18962 (the BCTA), sets out, inter alia, the rules for official recognition of establishments of higher education and states that these institutions are authorised to confer higher level technical qualifications, professional degrees and academic degrees (first degrees, master's degrees and doctorates), as applicable.
Universities constitute the highest tier in education, where the functions of teaching, research and outreach converge. It is at this level that first degree and graduate studies (master's degrees, doctorates) programmes are given and academic degrees are conferred, as well exclusively conferring the professional qualification of the 17 university degrees set out in the BCTA, which require prior acquisition of a first degree (*licenciatura*).
The ***professionals institutes*** award professional degrees other than those stipulated by law as being exclusive to the universities and may also award higher level technical qualifications in the areas in which they confer the professional degrees.

[55] http://www.mineduc.cl

Technical education centres are intended to train level higher technicians, with the skills and knowledge required to respond principally to the requirements of the (public and private) goods and services sector.

10. **Responsibility for higher education**

The public system of higher education, run by the state, has gradually established mechanisms for regulating both the quality of the services on offer (with the recent passing of the Accreditation System Act) and the resources received from the state.

Increasingly, institutions have improved accountability and generation of impact and results indicators (rates of retention, graduation and academic productivity, among others) allowing more transparent systems of access to resources to be created.

Increasingly young people from medium- and low-income families are entering higher education, and this figure will increase even more over the coming years. The country must make greater financial efforts to meet its commitment to guarantee all talented young people the right to enter higher education.

The National Student Financing System currently under construction, comprises three sub-systems that are required to act in coordination and whose aim is to ensure through credit and grants, the necessary economic support for totally or partially financing the fees of young people who need it and for the poorest, to provide additional help to cover essential expenses. The system includes:

- The National Grants Fund for the most underprivileged students.
- The University Credit Solidarity Fund for students from the Universities of the Council of Rectors (CRUCH).
- State-Guaranteed Loans for students at autonomous and accredited universities, professional institutes and technical training centres (Act 20,027, since 2005)

For many years, fee grants for poorer students and loans for students in CRUCH universities have formed the basis of student aid in Chile. The recent implementation of State-Guaranteed Loans now allows aid to reach students in institutions in all levels of higher education, with an improvement in the total amount and enrolment.

Private institutional must only submit to a regulatory system establishing certain initial conditions for joining the system. This process, called the Licensing of Institutions, leads to a condition of Autonomy which allows them to operate without constraints in accordance with market laws, within the framework of the BCTA.

11. **Assessment/accreditation bodies**

Higher education in Chile is offered by a broad and diverse range of institutions: traditional and new, public and private, universities, professional institutes and technical education centres. Third-level institutions have different vocations: teaching, research, specialisation in certain disciplines in the fields of teaching and research, with a regional vocation, undergraduate and postgraduate, etc.

It is intended to maintain and strengthen this diversity by safeguard the quality of the studies and the accountability of the various options, while at the same time creating a system with different levels that offers young people and adults different education opportunities throughout their lives.

If a higher education system is to exist, it is essential that the programmes and institutions offer a guarantee of quality so that the studies taken in the different institutions have equivalences on a national and international scale. In Chile, it has been decided to implement quality assurance in higher education through self-regulation and the accreditation of programmes and institutions. The latter has been implemented in experimental form by the National Accreditation Commission (CNAP[56]) and the National Postgraduate Accreditation Commission (CONAP[57]).

The purpose of the bill on quality assurance in higher education institutions, recently passed by the national congress is to ensure the sustainable quality of higher education. The bill sets out the standards through which the state of Chile will publicly guarantee the education of technicians and professionals in the country. The law covers five functions:

— Accreditation of degrees and undergraduate programmes. Compulsory for degrees in Education and Medicine since the law was passed.
— Accreditation of postgraduate programmes.
— Accreditation of institutions.
— Licensing of new institutions.
— Information System.

There is broad consensus on the need to improve the available information on the higher education on offer. This act makes it a requirement to provide suitable, true and relevant information.

A process is now underway to build greater capacity in the Ministry of Education and the institutions to compile, processes, and validate and publish the information. This process can be implemented once the regulatory framework of the act is passed into law, and will include the design and introduction of a Higher Education Observatory.

It is essential for prospective students and their families to be able to take informed decisions. This decision is aided by knowing the employability and potential remuneration of different academic alternatives. The Employment Observatory[58] has revealed important information on the employability and income of graduates and technicians, but the information that is still very aggregate and does not cover all degrees and institutions. This is the challenge that needs to be tackled so that young people can choose freely among the opportunities open to them when they leave secondary education.

56 http://www.cnap.cl;
57 http://www.conicyt.cl/becas/acreditacion-conap.html;
58 http://www.futurolaboral.cl/wps/portal

COLOMBIA

1. **Higher education institutions (HEIs)** *(Information taken from the National Higher Education Information System (SNIES) in October 2006):*

— Total number of HEIs in the country: 277 principal ones and 53 sectional ones[59].
— Number of HEIs by type (universities, technology institutes or others):
Universities: 75 principal ones and 43 sectional ones
University institutions: 90 principal ones and 4 sectional ones
Technological institutions and schools: 54 principal ones and 1 sectional one
Technical vocational institutions: 49 principal ones
Special regime institutions: 9 principal ones and 5 sectional ones

— Number of HEIs by legal system:
Public: 73 principal ones and 25 sectional ones
Private: 196 principal ones and 27 sectional ones
Special Regime: 8 principal ones and 1 sectional one

2. **Enrolment at higher level** (2006)

— Total higher level enrolment in the country: 1,301,728 students
— Total enrolment by legal system:
Public 637,847 (49%) Private 663,881 (51%)

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Prof. Technician (*)	2 to 3 years	157,509 (12.1%)
• Higher technician	This qualification does not exist in Colombia	
• Technological	3 years	177,035 (13.6%)
• Univ. and first degree (**)	4 to 5 years	911,210 (70%)
• First degree	Included in university level enrolment	
• Speciality	1 to ½ years	41,655 (3.2%)
• Master's degree	2 years	13,017 (1.0%)
• Doctorate	3 to 5 years	1,302 (0.1%)

(*) In Colombia, the technical level is known as Professional Technician [Técnico Profesional]
(**) The title of «Licenciado» is conferred exclusively on graduates of university level programmes in the area of education.

— Percentage of in higher level education
The gross percentage in higher education in Colombia is 26.1. The reference age group is 18 - 24.

3. **Teaching staff** (2005)

— Number of teaching staff in higher education: 80,610 teachers positions in 2005

[59] Sectional institutions are facilities organised by the institutions in cities other than their main home, on authorization from the National Ministry of Education.

— Academic level of teaching staff (percentages):
Professional Technician: 1%
Technologist: 1%
University Level Professional: 33%
First degree: 4%
Specialist: 37%
Master's degree: 21%
Doctorate: 3%

— Type of contract (percentages):
Full time: 25% Part time: 11% Professorship: 64%

4. **Academic periods**

— Number of academic periods per year:
Generally 2 academic periods. Some degrees are organised in years and some (very few) are structured into modules with each module lasting less than an academic semester, which is between 16 and 20 weeks class time, not including the period of the final exams***.***

— Dates of beginning and end of the periods:
First period: End of January to mid June. Second period: Beginning of August to beginning of December.

5. **Scale of grades**

The most commonly used grading scale goes from 1.0 to 5.0, although if a test is disqualified or for other reasons, grades of less than 1.0 may be awarded.
The minimum pass grade is 3.0.

6. **Enrolment or tuition fees**

— ¿Are enrolment or tuition fees charged in public HEIs? YesX No ___
— Total amount or approximate range of the admission or tuition fees (in dollars):

The six monthly tuition fee in state universities ranges from $177 to $900, calculated on the basis of the students' capacity to pay. Each university has set out a procedure for settling the amount of the fee for each student; most pay an amount close to the minimum value.

7. **Admission and graduation criteria**

Admission

The state exam is a compulsory requirement (known as the ICFES exam because of the institution responsible for the test). Some institutions use it only as a selection criterion; other perform institutional tests and allocate a proportion of the final grade to the state exam. Most commonly, this exam is combined with other criteria, such as: the institution's own admission exam; interviews; exam to identify specific skills depending on the degree, etc.

Graduation

After completing the courses in their study plan, students are generally required to fulfil other requirements before graduating. Among the most common of these are: a) final year examinations; b) business practice (in Business Administration and some Engineering degrees); c) internship (in Medicine); d) final assignment which can range from a monographic piece to research work.
Some institutions choose one of these requirements; others combine several of them. It is also common to require an accredited level in a foreign language.

8. **Academic credits**

— Is a system of academic credits used: Yes X No____ Partially _____
— If so, what does the academic credit consist of?

One academic credit in Colombia is equivalent to 48 hours of academic work by the student, which includes time with direct accompaniment by the teacher and other time spent by the student on independent activities study, practice, or others which may be necessary to achieve the goals of learning. This time does not include the time spent on submitting the final assessment tests. The student's total average number of hours of academic work per week corresponding to one credit, can be calculated by dividing the total of 48 hours work by the number of weeks each institution specifies for the corresponding lecture period.

How is it applied between HEIs?
There is a requirement to express any curricular work students must carry out in academic credits. This requirements forms part of the minimum quality conditions for the working of the academic programmes. However, many programmes only report the credit rating to the Ministry of Education but do not actually use them.

9. **Legal framework**[60]

— **Constitution of Colombia:** Defines the country as a Social State of Law and education as a public service. It establishes university autonomy and assigns the President of the Republic, as the head of the executive, the responsibility for the overall inspection and supervision of the provision of the educational service.
— **Act 30, 1992** «organising the public service of higher education» is the framework law regulating higher education in Colombia.
— **Act 115 of 1994** «issuing the General Education Act» incorporates technological institutions within higher education.
— **Law 749 of 2002** «organising the public higher education service in the technical professional and technological education systems, and setting out other provisions» which regulates these levels and establishes education by cycles, referred to in the Act as «propedeutic cycles».

[60] The following list includes only the regulations governing general aspects of the system related to the institutions, undergraduate and postgraduate programmes and those organised by the quality assurance system. Specific standards are not included.

— **Law 812 of 2003** «approving the National Development Plan 2003 - 2006 towards a community state» which incorporates «*Profundización*» (advancement) master's degrees which are distinct from the research master's degrees which were the only ones initially covered by Act 30/92.
— **Decree 1781 of 2003** «regulating quality examinations of the quality of higher education (ECAES) among students in undergraduate academic programmes». This test is compulsory for all graduates from a first degree programme.
— **Decree 2566 of 2003** «establishing the minimum conditions of quality and other requirements for the offering and development of academic programmes in higher education and setting out other provisions».
— **Decree 1767 of 2006** «regulating the National System of Information on Higher Education (SNIES) and setting out other provisions».
— **Decree 1001 of April 2006** «organising the offer of postgraduate programmes and setting out other provisions».

10. **Responsibility for higher education**

Responsibility for the promotion and regulation of higher education in Colombia lies with the state. The President of the Republic is responsible for the inspection and oversight of the educational service, which is organised and developed by the National Ministry of Education and other institutions and bodies created for this purpose.
In order to fulfil the responsibilities of direction, guidance, coordination and promotion of higher education, The National Ministry of Education, through the 2003 reform, created a Junior Ministry for Higher Education which is the specialist office attending to all maters related to this educational level. It also has the following support bodies:

— the National Higher Education Council (CESU), an organisation of the National Government which plays a consultatory role in matters of educational policy;
— the National Accreditation Council (CNA) which has the function of applying the policies and mechanisms for performing the processes of accreditation of the programmes and institutions of higher education directed towards ensuring their quality;
— the National Intersector Quality Assurance Committee (CONACES), whose mission is to assess compliance with the requirements for the establishment and running of institutions and programmes. This task is performed through the 5 offices by area of knowledge, the institutional office and the special postgraduate office.
— the Colombian Institute for the Promotion of Higher Education (ICFES), responsible for the assessment of the Colombian education system, which currently focuses on assessing students in primary, secondary and higher education;
— the «Mariano Ospina Pérez» Colombian Institute of Educational Credit and Technical Studies Abroad (ICETEX) which recently became a special financial institution and which administers the grants offered by other countries and international bodies and allocates the resources provided by the state for the provision of educational credit for access to higher education at undergraduate and postgraduate level;
— the Higher Education Development Fund (FODESEP), a mixed organisation which supports funding to higher education institutions;

Two bodies operating under other ministries are also closely related to the higher education system:

- the «Francisco José de Caldas» Colombian Institute for the Development of Science and Technology, (COLCIENCIAS), which forms part of the National Planning Department (DNP) is in charge of promoting research, scientific and technological development and innovation and incorporating it into the country's economic and social development plans, contributing to the high level education of human resources and encouraging the social relevance of science and technology;
- the National Learning Service (SENA), answerable to the Ministry of Social Protection, which performs the state's function of investing in the social and technical development of Colombian workers; offering and providing comprehensive professional education, for the incorporation and development of people in areas that contribute to the social, economic and technological development of the country.

11. **Assessment/accreditation bodies**

Colombian Quality Assurance System: has various components for assessing institutions, programmes and students. It is also backed by elements that contribute to ensuring the accountability of the higher education system, such as: a) The National Higher Education Information System —SNIES— which, as its title indicates, provides information on the state of the institutions, programmes and resources available in each one and b) the Employment Market Observatory —OML— which monitors graduates' progress.

1. ***Assessment of Programmes and Institutions:***

In Colombia this is carried out on two levels:

1.1. *Qualifying Registry*: This is a mandatory record which verifies compliance with the minimum standards established by the National Ministry of Education and is under the National Intersector Quality Assurance Committee —CONACES—, organised into the following offices:

- General Office
- 6 offices for different areas of knowledge: a) Humanities and Social Sciences, within which a further sub-office of Arts has been created; b) Education Science; c) Biological, Agricultural, Veterinary and Related Sciences; d) Engineering, Architecture, Mathematics and Physical Sciences; e) Health Sciences; f) Economic and Administrative Sciences
- Institutions Office
- Special Office of Master's and Doctorate Degrees, made up of the coordinators from the six area-specific offices and the Institutions Office.

1.2. *High Quality Accreditation*: This is voluntary and temporary and assesses high levels of quality. It is run by the National Accreditation Council —CNA—, a body set up under law, which is made up of members of the academic community, who have set out the «Accreditation Guidelines». The following phases are followed: to) Self-assessment, b) External Assessment performed by academic peers, c) Final assessment performed by the CNA and d) Accreditation by Resolution of the Ministry of Education, when the levels of excellence are met.

2. ***Student Assessment:***

On completion of secondary education, students must sit the state exam set by the Colombian Institute for the Promotion of Higher Education —ICFES—. This is a mandatory requirement for admission to higher education; during their studies, students are assessed by the institution through various course assessment tests and when they complete their studies, they must sit the Higher Education Quality Examination —ECAES— which is compulsory and is also run by the ICFES. To date, this test has had no value for pursuing graduate studies nor for entering the labour market; nonetheless, some institutions require the results for hiring graduates of higher education.

COSTA RICA

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country[61]: 78

University institutions:	4 public	50 private
Parauniversity institutions:	7 public	17 private

— Number of HEIs by type (universities, technology institutes or others)
Universities: 53
Technology institutes: 1
Centre, institute, school or other: 24

— Number of HEIs by legal system
Public: 11 Private: 67

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 175,284[62]
— Total Enrolment by legal system (percentage)
Public: 42.7 Private[63]: 57.3

— Degree types and duration

Degree types[64]	Duration of the degree[65]
• Diploma[66]	2 to 3 years
• Diploma[67]	4 - 6 cycles
• *Bachillerato*	8 cycles
• *Licenciatura*	10 cycles
• Speciality	2 cycles[68]
• Master's degree	4 cycles[69]
• Doctorate	4 cycles[70]

— Percentage in higher level education (Total enrolment/ 18-22 age group): 43.7[71]

---

[61] Number includes HEIs of university character and parauniversity institutions (which generally only offer short degrees of a technical nature). The private parauniversity institutions in this figure include only those that are authorised by the Higher Council of Education. Another four institutions of university character classified as international also operate in the country.

[62] IESALC estimate*: Report on Higher Education in Latin America and the Caribbean 2000 - 2005*, p. 252.

[63] Estimate Information taken from IESALC (2006).

[64] The nomenclature of university degrees and the durations of the courses is stipulated in the Agreement on Higher Education Nomenclature (1977 and amendments). For the complete text see the agreement under «Convenio de Nomenclatura de la Educación Superior» in www.conare.ac.cr In the case of parauniversity institutions, the definition is based on the Parauniversity Institutions Act.

[65] Cycle: Fifteen-week lecture period.

[66] Of parauniversity type. Only degree offered at parauniversity level.

[67] Of university type.

[68] Minimum; also requires a minimum of 1620 hours supervised work experience.

[69] Minimum over and above university ¡*bachillerato*¡.

[70] Minimum over and above master's degree.

[71] Information from IESALC, *op. cit*.

3. **Teaching staff:** (Complete information for this point is not available. Figures given are for the Universidad de Costa Rica in the first lecture cycle of 2005)

Number of teaching staff in higher education:

— Minimum degree of teaching staff (percentages):
Licenciatura: 41.4%
Specialisation: Master's degree: 35.8% Doctorate: 22.08 Others: 0.4%

— Type of contract (percentages):
Full time: 39.7%
Three-quarters time: 3.2%
Part time: 20.8%
One quarter: 25.5%
Others: 10.7%

4. **Academic periods**

— Number of academic periods per year:[72] Two or three.
— Dates of beginning and end of the periods:

No common dates for all types of institution involved. Classes generally being in January in the private institutions, and at the beginning of the year (February, March) in the public ones. Where available, summer courses in public institutions run from December to January.

5. **Scale of grades**

In general, the grade scale goes from 0 to 10, where 10 is the maximum grade. The minimum pass grade is 7, although in some institutions, the minimum pass rate is 8 for graduate studies.

6. **Enrolment or tuition fees**

Varies by institution and level (undergraduate, graduate studies). In the case of the private institutions, the fee also varies from degree to degree. Public HEIs charge Enrolment or tuition fees; nonetheless, nearly all them offer extensive grant programmes that include partial or total exoneration from payment of fees.[73]

7. **Admission and graduation criteria**

Admission

Three of the four public universities combine the grades obtained in secondary school with a test or admission exam to determine the student's admission grade. In

---

[72] In the private university sectors there are 3 cycles a year. In the public sector, there are usually two summer courses are also offered.

[73] Information on costs and grant opportunities for the case of the public HEIs is available in the annual publication *Oportunidades de estudio en la educación superior universitaria estatal de Costa Rica.* See CONARE website.

some of these universities, having a sufficiently high grade to income to be admitted to the institution does not guarantee access to the required degree. Normally, in such cases, the student indicates two or three degree preferences and the grade obtained in the admission note is compared with the cut-off grade for the degrees that he or she has stated. Students will be admitted to a degree in cases in which the first of the grades is greater than or equal to the second. Should the student be eligible for more than one degree, he or she has the option of choosing the one that most interests him/her. Some degrees also require exams or interviews. Processes of admission to each of the state university institutions are described in detail in the annual publication *Oportunidades de estudio en la educación superior universitaria estatal de Costa Rica.*
In general, private universities do not require an admission exam, and nor do parauniversity institutions. The minimum admission requirements for the different levels of university studies (first, second and third levels) are set out in the aforementioned Nomenclature of Degrees and Qualifications and are common to all the institutions in the sector.

Graduation

The graduation requirements common to all university education in the country, public and private, are set out, by degree academic, in the Agreement on Nomenclature of Degrees and Qualifications. The criteria established are general and the institutions can impose other additional or higher ones.

Graduation requirements of the different academic degrees in university education in Costa Rica

Degree	Graduation requirements
Profesorado	Approval of the subjects and academic activities set out in the study plan.
Diploma	Approval of the subjects and academic activities set out in the study plan.
Bachillerato	—Approval of the subjects and academic activities set out in the study plan. —Presentation of a graduation, thesis or assignment is not required unless specified in the study plan.
First degree	—Approval of the subjects and academic activities set out in the study plan. —Approval of the final graduation assignment determined by the institution for each degree.
Professional Speciality	—Approval of the activities set out in the corresponding study plan. —Presentation of a practical exam or practical graduation test.

Degree	Graduation requirements
Professional master's degree	—Approval of the subjects and academic activities set out in the study plan. —A practice applied research project must be conducted. This is done through case studies, diagnoses and proposals, artistic or documentary production, laboratories, professional work experiences, etc. This research must presented in one or more reports and in a final presentation. —A working knowledge of a second language is required.
Academic master's degree	—Approval of the subjects and academic activities set out in the study plan. —A research project or graduation thesis must be given and defended before a tribunal. —A working knowledge of a second language is required.
Doctorate	—Approval of the subjects and academic activities set out in the study plan. —Publication of two articles in journals of recognised prestige. —Presentation of a thesis, the result of an original work of research after successfully sitting a candidature exam. —A working knowledge of a second language is required.

8. **Academic credits**

The scoring unit of the academic credit has been used in Costa Rica since the 1970s. In 1976 the public, university institutions agreed to establish a common definition which remains in force to this day, and which is basically the same as that used by all the private universities in the country. Based on this definition,

Credit is a unit for assessing the student's work which is equivalent to three hours per week of work, over 15 weeks, applied to an activity that has been supervised, assessed and approved by the teacher.

Based on this definition, for the study plan of a degree, a maximum academic score of 18 credits per 15-week cycles is adapted.

9. **Legal framework**

The public university institutions enjoy independence in the performance of their functions and full legal capacity to acquire rights and contract obligations, and to provide their own organisation and government. (Article 84 of the Constitution of Costa Rica).

Private higher education is based on the articles of the Constitution which states: *Freedom of education is guaranteed. Nonetheless, all private teaching centres shall be under the inspection of the state.* (Article 79) *Private initiative in educational matters serves encouragement from the state, in the manner established in law.* (Article 80). Private education is regulated under Act Num. 6693, of 27 November 1981, and in the present regulation of this law (Decree Num. 29631, of 11 July 2001).

At the same time, Article 87 of the Constitution establishes: *The right to free teaching is a basic principle of university teaching.*
Act. 6541 regulates all references to the creation and functioning of parauniversitary, public and private higher education institutions.

10. **Responsibility for higher education**

In accordance with the degrees of independence set out in the previous sections, in the case of the public universities, each of the institutions defines its own framework of government, whose maximum authority is normally a university board, whose members are elected by an assembly from the university community itself. Student representatives make up twenty-five per cent of these bodies.
The academic, political and administrative organisation of the institutions is defined by means of a statute approved by each university. The National Council of Rectors (CONARE) acts as a coordinating —not higher— body amongst the four public universities and exercises other functions assigned to it in the University State Higher Education Coordination Agreement.
For private universities, the Article 1 of the act establishes the National Council of Private University Education (CONESUP), a state body, which is responsible, inter alia, for *Authorising the creation and workings of private universities, when they are shown to meet the requirements established by this law* (Article 3, Clause a.). It is also the responsibility of the CONESUP to approve these institutions' degrees as well as the statutes of these centres and any amendments thereto.
In the case of parauniversity higher education, the Higher Council of Education, a state body, is in charge of creating, supervising and cancelling degrees, in the case of both the public and the private institutions, and the study plans, programmes and graduate profiles.
Despite its name, the Higher Council of Education has now powers over higher university education in the country.

11. **Assessment/accreditation bodies**

The National Higher Education Accreditation System (SINAES) is the official body responsible for accrediting the degrees and programmes of the university education in the country. Accreditation by the SINAES is voluntary and is open to both public and private universities.
An accreditation body set up by the private universities, known as SUPRICORI has also begun operating.
At regional level in Central America, there is the Central American Accreditation Council, a second tier accreditation body, while within the area of the public universities that form part of the CSUCA, there are other bodies for accrediting regional postgraduates and giving support to self-assessment processes. Similarly, a large number of engineering degrees in public universities have approved the accreditation process of the Canadian Board of Accreditation.

CUBA[74]

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 65
— Number of HEIs by type (universities, technology institutes or others): 12 Universities, 29 Higher Institutes, 10 Independent Faculties, 4 University Centres, 10 Schools and Academies
— Number of HEIs by legal system: Public: 65 Private:

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 852,224 *(data for academic year 2006/07)*
— Total enrolment by legal system: Public: 852,224 Private: —
— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician	—	—
• Higher technician (Engineer)	5 years	37,935
• First Degree	5 years	620,199
• Speciality	2 years	14,296
• Master's degree	2 years	98,795
• Doctorate	4 years	4,129
• Diploma	1 year	76,870

— Percentage of in higher level education: 61.8% of age group 18 to 24.

3. **Teaching staff:**

— Number of teaching staff in higher education: 139043
— Type of contract (percentages):
Full time: 32.1% Part time: - By hours: 67.9%

4. **Academic periods**

— Number of academic periods per year: 2
— Dates of beginning and end of the periods: September-January and February-July

5. **Scale of grades**

5- Excellent
4- Good
3- Pass
2- Fail

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes ___ No X

[74] Data for academic year 2005/06.

7. **Admission and graduation criteria**

Admission

In contact teaching, 50% is based on the accumulated grades from 10th, 11th and 12th year of the Higher Middle School (secondary) and the other 50% corresponds to an entrance exam. This scoring system allows all available places in each degree to be covered in a single step. The student may select up to 5 degrees in order of priority. In the other types of teaching, which account for 80% of undergraduate admissions, the only requirement is to have completed 12th year.

Graduation

Depending on the type of degree, in order to complete his/her studies and receive the corresponding diploma, the student must present and defend a thesis or sit a state exam.

8. **Academic credits**

— Is a system of academic credits used: Yes ___ No ___ Partially: X
— If so, what does the academic credit consist of? And how is it applied between HEIs?

They are only being used in postgraduate and an academic credit is considered to be equivalent to a total of 48 hours of student work; these hours include lectures, and the time the student has to spend on independent activities: practical work, work experience, scientific publications, preparation for exams, writing texts, research and other requirements in order to achieve the proposed objectives.

9. **Legal framework**

The Ministry of Higher Education was set up in 1976. It is the governing body of higher education in Cuba and is responsible for directing all state functions assigned to higher education.

10. **Responsibility for higher education**

The Ministry of Higher Education is the governing body. Other bodies also participate in the supervision of related degrees: the Ministry of Education, the Ministry of Public Health, the Ministry of Culture, the National Institute of Sport, Physical Education and Recreation, the Ministry of Science, Technology and the Environment, the National Office of Industrial Design and the Ministry of Computing and Communications.

11. **Assessment/accreditation bodies**

— State whether there are higher education assessment and/or accreditation bodies in your country, who they are answerable top and whether assessment and/or accreditation is compulsory for HEIs

There is a National Accreditation Board which is in charge of the assessment and accreditation of first degree and postgraduate programmes and for institutional assessments. This board, presided over by the Minister of Higher Education, consists of an Executive Secretariat, a Technical Degree Assessment Committee and a Technical Committee for Assessment of Master's Degrees and Doctorates. The process is compulsory and the results obtained are valid for a given period of time. It is also compulsory to pass the process again on expiry of this period.

Tuning A Latina INGL.indd 362 19/7/07 10:46:32

ECUADOR

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 431
— Number of HEIs by type (universities, technology institutes or others):
72 Universities and 359 Institutes of Higher Education
— Number of HEIs by legal system:
Universities:
Public: 29 Private: 34 Cofinanced: 9

Institutes:
Public: 146 Private: 195 Cofinanced: 18

2. **Enrolment at higher level**

— Total higher level enrolment in the country:
Universities: 314,496
(Data from last census, 2004. There has been no major change since then)

— Total enrolment by legal system:
Public: 224,218 Private: 11,054 Cofinanced: 79,224
Institutes: 32,501

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician	2 years	17,566
• Higher technician	3 years	14,935
• First Degree	5 years	314,496
• Speciality	1 year	
• Master's degree	2 years	8,605 (Speciality + Master's degree)
• Doctorate	4 years	None
• Other	—	—

3. **Teaching staff:**

UNIVERSITIES:

— Number of teaching staff in higher education: 17,351
— Academic level of teaching staff (percentages):
First degree: 14,033 Specialisation: 862 Master's degree: 2,199 Doctorate: 132

4. **Academic periods**

— Number of academic periods per year: 2
— Dates of beginning and end of the periods: (March - August) (September - February)

5. **Scale of grades**

There is a proposal, not as yet approved, for Regulation of the Higher, Academic Regime. At present, each university has its own academic regulation and the grades are allocated using their best criteria.

The most common grade is scored out of 10 or out of 5. The pass mark in these cases is 6 and 3.5 respectively.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes: X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars):

Fees depend on the income of the family. One student may pay $40 whereas another other pays $500 per semester.

7. **Admission and graduation criteria**

Admission

At present, in the majority of institutions, admission to university is by means of an entrance exam, or an assessment of school grades.

Graduation

Students graduate from institutes by presenting a degree assignment, project or essay; in a university or polytechnic school, a graduation thesis is required at first degree or of master's degree level.

8. **Academic credits**

— Is a system of academic credits used: Yes ___ No ___ Partially X
— If so, what does the academic credit consist of? And how is it applied between HEIs?

An academic credit corresponds to a given number of contact hours; when the type of degree is semi-contact or by distance learning, the credit is related to the hours of self-learning and tutorials.

9. **Legal framework**

The legal framework comprises the Constitution of the Republic, the Higher Education Act, the Higher Education Regulations, the rulings of the CONESUP, Regulations of Institutes, and Acts and Regulations of the CONUEP.

10. **Responsibility for higher education**

Responsibility for higher education lies with the National Higher Education Council, National Accreditation Council, universities, polytechnic schools and institutes.

11. **Assessment/accreditation bodies**

The assessment and/or accrediting body for higher education is the National Accreditation Council (CONEA), an autonomous institution, and accreditation is compulsory for higher education institutions.

EL SALVADOR

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 40
— Number of HEIs by type (universities, technology institutes or others):
26 universities, 5 specialist institutes and 9 technology institutes.

— Number of HEIs by legal system: Public: 7 Private: 33

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 2005) 122,431
— Total enrolment by legal system:
Public 41,658 Private: 80,773

— Enrolment by degree types

Degree types	Duration of the degree	Enrolment
• Technician	2 years	10,247
• Higher technician		
• First Degree	5 years	106,478
• Speciality (*)	3 years (for doct. and dent.)	0
• Master's degree	2 years	1,337
• Doctorate	3 years	16
• Other		
Teacher	3 years	3,342
Technologist	4 years	852
Teach. train. course	1 year	159

— Percentage in higher level education (Total enrolment/ 20-24 age group or equivalent. Indicate the age group referred to):
Enrolment age group 20-24 years: 55,695
National population in that age group: 643,743 (%) Population in higher education: 8.65%
Student Enrolment, 2005: 122.431 (%) Higher level coverage: 45.49%

(*) This academic degree has recently been created and is for doctors and dentists as established by the Higher Education Act approved in October 2004.

3. **Teaching staff:**

— Number of teaching staff in higher education: 2,966
— Academic level of teaching staff (percentages):
First degree: 71% Specialisation n.i. (**) Master's degree: 15% Doctorate: 4%
Technologist: 3% Profesorado: 2% Technician 5%

— Type of contract (percentages):
Full time: 33.88% Part time: 16.60% By hours: 49.52%

(**) NO INFORMATION AVAILABLE.

4. **Academic periods**

— Number of academic periods per year 2
Dates of beginning and end of the periods Cycle 1: January to June
Cycle 2: End of July to December

5. **Scale of grades**

The grade scale used in higher education in El Salvador goes from 0.0 to 10.0, with 6.0 being the minimum pass rate for «pregrado» and «grado» courses and 7.0 for graduate studies.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars):

The total maximum amount paid by students in the Universidad de El Salvador (UES) is approximately $600 a year.

7. **Admission and graduation criteria**

Admission

The UES and the Universidad Centroamericana José Siméon Cañas set a selection exam for students in mid-November. The other private universities do not set admission exams.

Graduation

In most undergraduate courses a thesis is required, except for Law students who are required to sit private written and oral exams.
Technical degrees no not require a thesis. The teachers gain teaching experience before graduating. Both the «pregrado» and «grado» courses require community service time. Graduate studies only require a thesis.

8. **Academic credits**

— Is a system of academic credits used: Yes X No Partially
— If so, what does the academic credit consist of? And how is it applied between HEIs?

In El Salvador the system of scoring units for quantifying the academic credits accumulated by the student is compulsory. The system us based on the workload during the study of a degree. The scoring unit is equivalent to a minimum of twenty hours of academic work by the student, attended by a teacher, in a cycle of at least sixteen weeks, based on an academic hour of fifty minutes.

9. **Legal framework**

The legal framework for higher education is based on a special law, the Higher Education Act, which was first passed on 27 December 1995 and amendments to that act which were passed on 14 October 2004.

There is a Special Incorporations Regulation, passed on 26 February 1998 and the Regulation of the Accreditation Board approved on 8 March 2000.

10. **Responsibility for higher education**

Responsibility for higher education in El Salvador lies firstly with the National Directorate of Higher Education, which answers to the Ministry of Education, which is the governing body of higher education. The second area of responsibility is the Higher Education Council which is the body which proposes and advises the Ministry and thirdly the Accreditation Board which is the accredited quality body of the HEIs.

11. **Assessment/accreditation bodies**

Assessment and accreditation are administered by different organisms.
Assessment is performed by the National Directorate of Higher Education every three years and is a compulsory process for all higher education institutions.
Accreditation is a voluntary process and is performed by the Accreditation Board which answers to the Ministry. Accreditation is a public recognition conferred by the state on an institution of higher education when it meets certain parameters of quality.

GUATEMALA

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 11
— Number of HEIs by type (universities, technology institutes or others): 11 Universities
— Number of HEIs by legal system: Public: 1 Private: 10

2. **Enrolment at higher level**

— Total higher level enrolment in the country: Over 253,000
— Total enrolment by legal system:
Public: 124,000 (49%) Private: 129,000 (51%)

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician	Less than 1 year	Not available
• Higher technician	Not applicable	
• First degree	5 to 6 years	Around 235,000
• Speciality	One year	Not available*
• Master's degree	Two years	Not available*
• Doctorate	Three years	Not available*
• Other (*Postgraduate in general)		Over 130

3. **Teaching staff:**

— Number of teaching staff in higher education:
— Academic level of teaching staff (percentages):
First degree: 60% Specialisation: Master's degree: 30% Doctorate: 10%

— Type of contract (percentages):
Full time: 30% Part time: 40% By hours: 30%

4. **Academic periods**

— Number of academic periods per year) 2 (generally)
— Dates of beginning and end of the periods: 1: January to June and 2: July to December.

5. **Scale of grades**

0 to 60: Fail 61 to 100 Points: Pass

6. **Enrolment or tuition fees**

— ¿Are enrolment or tuition fees charged in public HEIs? Yes X No ___
— Total amount or approximate range of the admission or tuition fees: $250 per month

7. **Admission and graduation criteria**

Admission

A general knowledge exam: if passed, on one month another exam basic knowledge; if passed the student is admitted; otherwise he/she must undergo a Preparatory Academic Programme over a 10 month period and then resit the basic admission exam and pass it.

Graduation

In some universities the system for preparing the thesis has been replaced by postgraduate courses; in others the thesis remains, and in most cases, students are required to do a «supervised professional assignment —SPA—» of around 600 hours or 5-6 months, in which they undergo applied practice in a community or public or private sector body, draw up a technical document with reports of the results or experience, on which a general private exam is based. If they pass the public deed of graduation is issued.

8. **Academic credits**

— Is a system of academic credits used: **Yes** ___ No ___ Partially X (in some cases)
— If so, what does the academic credit consist of? And how is it applied between HEIs?

The academic credit is a measure of the workload the students require to achieve the learning outcomes. It enables the studies taken in different institutions to be compared and standardised, and moreover is an effective instrument for achieving curricular flexibility, planning and allocation of the student's workload.

Application in HEIs

1. «Pregrado»:
An academic credit (AC) = 15 hours of contact class time. One hour of contact study requires, on average an additional workload of two hours study. One AC requires a total workload of 15+30 = 45 hours.

1.2 One AC = 30 to 45 hours of laboratory work.
1.3 One AC = 60 to 90 hours of extramural field work or supervised work experience.

2. Graduate study programmes

2.1 One AC= 12 hours of contact class time. One hour of contact study requires, on average an additional workload of three hours study. One AC requires a total workload of 12+36 = 48 hours.
2.2 One AC = 20 hours of supervised work, presentations and research.

— Within its autonomy, the institution defines the duration of its academic periods.
— The number of contact hours per week of work by a student for 1 credit depends on the number of weeks in the lecture period. Likewise the number of contact hours depends on the nature of the subject and the method used.
— The distribution of the time each week may not be uniform throughout the lecture period.

9. **Legal framework**

The legal framework governing higher education consists of Articles 82 to 90 of the Constitution of the Republic and Decree 82-87 of the Congress of the Republic, and specific regulations deriving therefrom.
Articles 82, 83 and 84 refer to the autonomy of the Universidad de San Carlos de Guatemala and its Basic Law, in accordance with Decree number 325, and under its statutes and regulations, governance of the university lies with the University Board of Governors and the budgetary assignment for the USAC.
Decree 421 of the Constitution of the Republic promulgated on 15 September 1966, set up the Private Higher Education Council and through Article 86 of the Constitution of the Republic of Guatemala the power to authorise and ensure that the academic level of private universities was transferred to it without prejudice to the independence of said institutions.
Article 85, refers to the private universities, independent institutions, with their own legal personality and freedom to create faculties and institutes.
Article 90 refers to the formation of professional associations, which is compulsory and those purpose shall be the moral, scientific, techniques and material advancement of the university professions and the supervision of their exercise.

10. **Responsibility for higher education**

Universidad de San Carlos de Guatemala: As the only state university, it is exclusively empowered to direct, organise and develop state higher education and state university professional education. (Article 82)
Private Universities: Independent institutions responsible for organising and developing the private higher education of the country, in order to contribute to professional education, scientific research, the dissemination of culture and the study and resolution of national problems. (Article 85)
The Private Higher Education Council: Shall have the functions of ensuring that the academic level is maintained in the private universities and of authorising the creation of new private universities. (Article 86)
Professional Colleges: As a professional association with legal personality they operate in accordance with the Law of compulsory professional association and the statutes of each college. (Article 90)

11. **Assessment/accreditation bodies**

The regulatory body for private higher education is the Private Higher Education Council, which has the constitutional mandate of «*ensuring that the academic level of the private universities is maintained*».
The Universidad de San Carlos de Guatemala is autonomous and is governed by its own laws.
At present there is no accreditation body for higher education in the country.
Accreditation is not compulsory; institutions are free to use the accreditation body of their choice.

HONDURAS

1. **Higher education institutions (HEIs):**

— Total number of HEIs in Honduras 19
— Number of HEIs by type (universities, technology institutes or others):
13 universities, 2 schools, 2 institutes, 1 specialist centre, 1 higher seminary
— Number of HEIs by legal system: Public: 6 Private: 13

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 139,976 (2006) - 127,918 (2004)
— Total enrolment by legal system:
Public 105,692 (2006) 101,222 (2004) Private 34,284 (2006) 26,692 (2004)

— Enrolment by degree type (2004)

Degree types	Duration of the degree	Enrolment
• Associated	2 years	9,362
• First degree	4 to 5 years	116,312
• Speciality	2 years	(Note: the totals of the 3
• Master's degree	1 year	postgraduates are totalled)
• Doctorate	3 years	Total 2,244
• Other		

— Percentage in higher level education (Total enrolment/ 18-24 age group or equivalent. Indicate the age group referred to): 14.9%

3. **Teaching staff:**

— Number of teaching staff in higher education: 6,413
— Academic level of teaching staff (percentages):
First degree: 3,277 Specialisation: 262 Master's degree: 731 Doctorate: 314
Others 150 No information 1,679
— Type of contract (percentages):
Full time: 47% Part time: 7% By hours: 43% No info 3%

4. **Academic periods**

— Number of academic periods per year: ranges from 3 to 4 with one additional short term
— Dates of beginning and end of the periods: begin in January or February, end in December

5. **Scale of grades**

Scale of 0 to 100%; by law the pass mark is 60%, but in some universities it is 70%

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes

— Total amount or approximate range of the admission or tuition fees (in dollars):

In the National University (UNAH) $14, in the Universidad Nacional de Agricultura, $424 - $105 per annum

7. **Admission and graduation criteria**

Admission

The Universidad Pedagógica has an admission exam, the Universidad Nacional Autónoma (UNAH) began in December 2006 an exam to assess the preparation of applicants. This was organised under the auspices of a specialist organism from Puerto Rico. Those who failed to obtain a given score were not accepted to the regular courses but were sent to levelling courses provided by the UNAH itself. Of 12,000 applicants, approximately 1700 were sent to levelling courses and the rest were accepted. Admission requirements in the private universities vary.

Graduation

The UNAH requires one of three requirements: A thesis, monograph, or a workshop on research. All degrees require supervised practical or social service.

8. **Academic credits**

— Is a system of academic credits used: Yes
— If so, what does the academic credit consist of? And how is it applied between HEIs?

The academic credits are known in Honduras as UVs or *unidades valorativas* [scoring units]. A one-semester subject gives 3 to 5 credits (basically it consists of the number of meetings per week). In order to obtain the different degrees, students require:

Associate 80 to 100 UVs
First Degree 160 UVs or more
Speciality 30-90 UVs above first degree
Master's degree 40 to 52 UVs above first degree
Doctorate 25 to 30 UVs above the Master's degree

9. **Legal framework**

The system is governed by three laws:

The Higher Education Act
The General Regulation of the Act
Academic Standards of the Higher Education Level

10. **Responsibility for higher education**

Under the constitution of Honduras, this responsibility lies with the Universidad Nacional Autónoma (UNAH) which exercises this power through the Directorate of Higher Education and three organisations: the Higher Education Council, the Technical Advisory Council, and the National Education Council. UNAH participates in all of these bodies.

11. **Assessment/accreditation bodies**

The bodies mentioned in Question 10 regulate the creation and continuance in the system of all universities. A plan exists for an accreditation and assessment system (SINAES).

MEXICO

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 1,892[75]
— Number of HEIs by type (universities, technology institutes or others):

- Public institutions (federal): 4
- Public universities (State): 46
- Public Technological Institutes: 211
- Public Technological Universities: 60
- Public Polytechnic Universities: 18
- Public Intercultural Universities: 4
- Institutions for teaching primary teachers: 433
- Private institutions: 995[76]
- Public Research Centres: 27
- Others: 94

— Number of HEIs by legal system: Public: 713 Private: 1,179

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 2,538,256
— Total enrolment by legal system: Public: 1,707,434 Private: 830,822
— Enrolment by degree type

Educational Level	Enrolment
Normal (First degree)	146,308
Higher university technician	83,494
First degree	2,141,951
Graduate studies	166,503
Total	2,538,256

Source: Form 911-SEP, Includes distance and direct enrolment

Percentage in higher level education (total enrolment/ 20-24 age group or equivalent. Indicate the age group referred to):
26% higher education registration among the 19-23 age group in the country

[75] Considering only the central units. If we take into account the decentralised units the number is 1,976. The 1,892 institutions include 433 schools for educating primary school teachers (normal schools) of which 249 are public and 184 private.

[76] Only includes central units. Does not include the private «normal schools» which are included under the sub-heading of «Institutions for teaching primary teachers».

3. **Teaching staff:**

Sub-systems	Higher university technician	First degree	Graduate studies	Doctorate	Total
Public	3,471 (2.2%)	84,920 (55.1%)	65,814 (42.7%) *	15,129 (9.8%)	154,205
Private	1,143 (1.2%)	55,032 (58.2%)	38,402 (40.6%) *	5,557 (5.9%)	94,577

** Includes teachers with a doctorate.*
Source: SEP. Form 911. Ciclo escolar 2004-2005.

Sub-systems	Higher university technician	First degree	Graduate studies	Doctorate	Total
Public	981 (1.7%)	22,224 (37.4%)	36,204 (60.9%)*	11,287 (19.0%)	59,409
Private	163 (1.7%	3,248 (33.8%)	6,198 (64.5%)*	1,880 (19.6%)	9,609

** Includes teachers with a doctorate*
Source: Sep, Form 911. Ciclo escolar 2004-2005.

4. **Academic periods**

— Number of academic periods per year: 2.3, 4 depending on the institution
— Dates of beginning and end of the periods: depends on the institution.

5. **Scale of grades**

The great majority use the NA system: Fail, S: Pass, B.-: Good and MB: Very Good. The minimum pass grade is S (Pass).

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars):

The amount paid by students in fees naturally varies between the public and private sub-system and significantly between the institutions making up each sub-system. In the case of the private institutions, the fee varies depending on the prestige of the institution and come to between $50 and $1,000 per month
In some public institutions the fees are practically token or non-existent; however, most charge between $45 and $180 a month.

7. **Admission and graduation criteria**

Admission

The most general system is the selection exam using audited and certified processes. However, there are still a small number of institutions with automatic admission for anyone who has studied at higher secondary level in the institution itself.

Graduation

In order to obtain the qualification of higher university technician, associated professional or first degree professional, some institutions in the national education system require the student to have covered the number of subjects, modules or credits corresponding to the study programme taken and the completion of the social service. In most institutions, students also have to carry out some complementary activity, which may include preparation of a thesis, mini-thesis, company statements, social service accounts, accredited mastery of one or more languages in addition to Spanish, a degree seminar, or others.
To complete graduate studies students must have obtained their first degree from an institution of higher education that forms part of the national education system[77] and to obtain the degree, the student must have covered the subjects, modules or credits in the study plan and satisfy the requirements established by the institution (thesis, exams, mastery of a foreign language, arbitrated publications, etc).

8. **Academic credits**

— Is a system of academic credits used: Yes ___ No ___ Partially: X
— If so, what does the academic credit consist of? And how is it applied between HEIs?

Article 12, Clause VIII of the General Education Act states that it is the responsibility of the federal educational authority «to regulate a national system of credits» that will facilitate the transfer of students from one educational type or system to another. To date the national system of credits established in the act has not been established.
Because there is no (national) credit system, the criteria for allocating credits often vary from one public institution to another.
In the private sphere, private institutions are governed by the criteria set out in Agreement 279, but these criteria are difficult to match with those applied by the public institutions.
The credit is the unit used to measure the learning activities set out in any subject on the curriculum and it is expressed in hours-week-semester.
In the area of Mexican public institutions, the most common measurement used is:

2 credits = 1 hour x 15 weeks per semester

The value of the credit in private institutions incorporated in the SEP is:

1 credit = 16 hours-week-semester

[77] If studies have pursued studies abroad, they must have the necessary validation as established in the General Education Act.

9. **Legal framework**

The basic regulatory framework governing higher education in Mexico, comprises the Constitution of the United States of Mexico, the General Education Act, Higher Education Coordination Act, the Act Regulating Article 5 of the Constitution, state laws on education and higher education, the internal regulations of the Secretariat of Public Education, the organic laws of the public autonomous and non-autonomous universities, the government decrees of non-autonomous universities, Agreements 93, 243, 279, 286 and 328 of the SEP and the agreements on coordination, operation and financial support between the Federation, the States and the institutions. Labour relations in the higher education institutions are governed by the terms of the Federal Labour Act.

10. **Responsibility for higher education**

The *Federal Public Administration Planning Act* establishes that the Executive Power must formulate and implement a National Development Plan (NDP) and arising out of it, different sectoral programmes. The sectoral programme associated with education is drafted by the SEP, which contains strategic objectives, policies, particular targets, lines of action and goals to be achieved in the corresponding period. It is binding on those operating in the federal public administration and the decentralised institutions of the Federal Government. This programme constitutes a orientational framework for the governments of the states and their decentralised bodies, and for the autonomous public institutions of higher education.
The NDP is responsible for state plans and federal sectoral programmes and state sectoral programmes. In Mexico it is the responsibility of the Federal Government through the SEP. to establish national plans and policies on education and it is the responsibility of the state governments to establish plans and policies within the area of their powers. In the case of higher education, other offices of the Federal Government are responsible for defining national policies.

11. **Assessment/accreditation bodies**

Since 2001, the federal government has worked with the evaluating bodies seeking to coordinate them in a National Assessment and Accreditation System. These bodies are: the Inter-institutional Higher Education Assessment Boards (CIEES) which, since they were created in 1991, have made diagnostic assessments of educational programmes and the management and outreach functions of the institutions; the National Higher Education Assessment Centre (CENEVAL) created in 1994 to contribute to the knowledge of the quality of higher education through the design and application of standardised admission and graduation exams at this level and the Higher Education Accreditation Council (COPAES) created in 2000 to regulate the accreditation processes of the higher university technician, associated professional and first degree educational programmes in public and private institutions and particular, formally recognising the accredited bodies that meet the requirements set out by the Council.
To date, the COPAES has recognised 23 accredited bodies in of educational programmes of Higher university technician, associated professional and First degree in the areas of Engineering, Accounting and Administration, Medicine, Nursing,

Psychology, Dentistry, Veterinary Medicine and Zootechnics, Computing and Information Technology, Economics, Law, Social Sciences, Agricultural Sciences, Biology, Pharmacy, Nutriology, Tourism, Architecture, Communication, Design, Chemical Sciences, Marine Sciences and Physical Activity.

In order to assess the quality of the postgraduate programmes there are arrangements and procedures in the National Register of Graduate Studies SEP-CONACyT (PNP) and to confer the RVOE on educational programmes offered by the private institutions, with the parameters and assessment procedures of the SEP within the framework of the General Education Act and in particular Clause 279, as well as the stipulations of state governments. At the same time, to apply the system of «administrative simplification» to private institutions that satisfy the requirements established in Agreement 279, the SEP in 2002 agreed with the Federation of Mexican Private Institutions of Higher Education (FIMPES) to use the Institutional Accreditation System.

Since its creation in 1984, The National System of Researchers (SIN) has been the leading external body for the assessment of the quality of the output of the work of teachers-researchers in higher education institutions and researchers in the research centres. With this system the Federal Government has helped encourage full-time staff from the highest academic levels to remain on in the public institutions.

NICARAGUA

1. **Higher education institutions**[78] **(HEIS):**

— Total number of HEIs in the country: 47
— Number of HEIs by type (universities, technology institutes or others):
Universities: 45
*Higher Centre for Military Studies: 1
*Police Academy: 1

* The last two institutions confer specialist degrees of a military or police character at university level

— Number of HEIs by legal system: Public: 6 Private**:** 41

2. **Enrolment at higher level**[79]

— Total higher level enrolment in the country (2005): 119,789
— Total enrolment by legal system:
Public: 69,809 (official figure) Private: 49,980 (estimated figure).

— Enrolment by degree type

Types of degree	Duration of the degree (years)	Enrolment
• Technician	—	—
• Higher technician	3 - 4	6,439
• First degree	4 - 6	109,114
• Speciality	1 - 4	2,418
• Master's degree	2	2,343
• Doctorate	2 - 3	46

— Percentage of in higher level education: 18 - 23 years: 12%

3. **Teaching staff:**

— Number of teaching staff in higher education: 2,303
— Academic level of teaching staff **(**percentages):
First degree: 38% Specialisation: 9% Master's degree**:** 43% Doctorate: 10%

— Type of contract (percentages):
Full time: 51**%** Part time: 8% By hours**:** 41%

4. **Academic periods**

Numbers of academic periods per year:
Periods vary.
Public universities normally use semesters running from March to July and August to December.

78 Source: National Universities Council, 2006.
79 Source: Catálogo de Educación Superior, 2005.

Private universities use trimesters or quatrimesters. Trimesters go from January to March, April to June, July to September, October to December. Quatrimesters run from January to April, May to August, September to December.

5. **Scale of grades**

The grade scale used is quantitative and goes from 0 to 100 points. The minimum pass grade is 60 points. One private university has as minimum pass grade of 70 points.

6. **Enrolment or tuition fees**

— ¿Are enrolment or tuition fees charged in public HEIs? Yes ___ No **(X)**
— Total amount or approximate range of the admission or tuition fees (in dollars): Although no tuition fees are charge, each student must pay an enrolment fee every semester, which ranges from $6 to $12. In other words, the annual fee comes to between $12 and $24.

7. **Admission and graduation criteria**

Admission

Only two public universities holds admission exams in Spanish, mathematics and a psychometric test. Another public university has an exam solely in mathematics; the fourth public university in the country holds a preparatory course. On the basis of the results obtained in these exams, it is decided whether a student is suitable or not to pursue a higher level degree.
Private institutions do not set admission exams.

Graduation

The processes of graduation is governed by the following systems: Monographs, Degree Exam, Graduation Seminar, Graduation Project. The student must choose one of these four systems.

8. **Academic credits**

— Is a system of academic credits used: Yes X No Partially
— If so, what does the academic credit consist of? And how is it applied between HEIs?

There is no uniform concept of academic credit. It is normally calculated administratively in correspondence with the class hours a student receives per academic period. In some institutions a credit is equivalent to 15 hours of student class time. Practically all institutions apply the academic credit although it is calculated in different ways.

9. **Legal framework**

Higher Education is governed by Act 89 (Act governing the autonomy of the institutions of higher education).
Articles 1 and 2 of the act read as follows:

Tuning A Latina INGL.indd 379 19/7/07 10:46:37

Art. 1 Higher education institutions are a public service. Their social function is the professional and civic education of university students. Their provision is an irrevocable responsibility of the state.

Art. 2 Higher education will be linked to the needs of the political, economic, social and cultural development of the country.

10. **Responsibility for higher education**

Under Act 89, responsibility lies with the National Universities Council. Art. 56 of the act reads as follows: The National Universities Council is an organ of coordination and consultancy of the Universities and Higher Technical Education Centres. It also enjoy the power conferred upon it in Article 58 of this act.
Clauses 1, 3, 4 and 7 of Article 58, read as follows:

1. Establish its own operating regulation.
3. Prepare and coordinate national the country's higher education policies in accordance with the available resources.
4. Rule on the introduction or cancellation of degrees.
7. Authorise the creation of new universities or higher technical centres.

11. **Assessment/accreditation bodies**

The National Assembly recently approved the creation of the National Assessment and Accreditation Council, which, however, has not yet been structured. The candidates to form this Councils are currently being discussed.
The members of the Board will be approved by the National Assembly of the Republic, suggesting that the tendency will be more political than technical.
At this moment, nearly 30 higher education institutions practice self-assessment within the framework of the Project of Modernisation and Accreditation of Tertiary Education in Nicaragua.

PANAMA

1. **Higher education institutions (HEIs):***

— Total number of HEIs in the country: 86
— Number of HEIs by type (universities, technology institutes or others): Universities 36 and Higher Technical Institutes 50

— Number of HEIs by legal system:
Public: Universities 5 and Higher Technical institutes 5
Private: Universities 31 Higher Technical Institutes 45

2. **Enrolment at higher level:***

— Total higher level enrolment in the country: 143,124
— Total enrolment by legal system:
Public: 106,473 Private: 36,651

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician		
• Higher technician	2 to 2 1/2 years	14,193
• First degree	3-5 years	108,200
• Speciality (postgraduates)	9 to 12 months	1,910
• Master's degree	1 1/2 to 2 years	4,315
• Doctorate	2 to 4 years	147
• Other		

— Percentage in higher level education (Total enrolment/ 20-24 age group or equivalent. Indicate the age group referred to):
Age group 20 - 24: 143,124 total enrolment /282,585 Total population = 50.6%

3. **Teaching staff:****

— Number of teaching staff in higher education: 12,264
— Academic level of teaching staff (percentages):
First degree: 12% Specialisation: (postgraduate) 25% Master's degree: 50% Doctorate: 13%

— Type of contract (percentages):
Full time: 20% Part time: 80% By hours

4. **Academic periods**

— Numbers of academic periods per year: Public: 2 semesters, Private: 3 quadrimesters.

* Contraloría General de la República de Panamá: Dirección de Estadísticas y Censo: Educación 2004
** Volume 7: Estudios de Postgrado en Panamá. 2004. Dr. Filiberto Morales - IESALC/UNESCO - CRP.

— Dates of beginning and end of periods Public: 1st. semester: March to July, 2nd semester August to December; Private 1st. quadrimester January/April; 2nd. quadrimester May/August, 3rd. quadrimester September/December

5. **Scale of grades**

Grade Scale: A -D
A: 100 -91; B: 90 -81; C: 80 -71; D: 70 -61,
maximum grade: A
minimum pass grade: C.

6. **Admission or tuition fees***

— Are enrolment or tuition fees charged in public HEIs? Yes X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars): Between $55 and $425 per year per student

7. **Admission and graduation criteria****

Admission

Students wishing to gain admission to the public universities for must meet the following requirements: general knowledge examinations (PCG), test of academic skills (PCA), psychological tests (GATB) to give a Predictive Index which must be greater than or equal to 1.00. (it is the product of the combined ratio of the admission tests: PCA, PCG and GATB), interviews and in accordance with the review of school credits and the presentation of a diploma, awarded by an national education institution or foreign institution recognised by the state.
In one official university in Panama all aspirants must sit a test of skill in mathematics (PAM) and English (ELASH) and an introductory seminar on university life.
Private Universities: Applicants undergo an interview and school credits are reviewed. Some universities require proof of knowledge of English. Admission exams are not required.

Graduation

The graduation requirements are as follows: fulfil the study plan for the degree, fulfil the graduation options: thesis, professional practice or to have taken two postgraduate subjects. They must also have obtained an accumulated index greater than or equal to 1.

8. **Academic credits****

— Is a system of academic credits used: Yes X No ___ Partially ___
— If so, what does the academic credit consist of? And how is it applied between HEIs?

* Contraloría General de la República de Panamá: Dirección de Estadísticas y Censo: Educación 2004
** Volume 7: Estudios de Postgrado en Panamá. 2004. Dr. Filiberto Morales - IESALC/UNESCO - CRP.

There is no national system of credits in Panama. Nonetheless, all universities quantify the academic workload in the form of credits. There are some differences with regard to the duration of the length of classes, which in some universities are 45 minutes long and in others 50 or 60 minutes long.

9. **Legal framework***

Regulation on higher education is contained in a great number of legal instruments contained in the country's constitution; Act 47 of 1946, governing Education, with additions and amendments introduced under Act 34 of 6 July 1995, the special acts of the official universities; Decree 16 of July 1963 regulating the creation and functioning of private universities; Executive Decrees that authorise the workings of the private universities:, the respective statutes and regulation of the Official and Private Universities. Act 30 of July 2006 creating the National Assessment and Accreditation System for the Improvement of the Quality of Higher Education, University of Panama —CONEAUPA—.

10. **Responsibility for higher education****

Application for an operating license for a private university or higher institute is awarded by the Ministry of Education. The CONEAUPA is in charge of all matters related to the assessment and/or accreditation of universities and official universities are by law require to approves the degrees and auditing of the private universities through the creation of the Technical Committee for the Auditing and Creation and Operation of Universities (Chapter IV Act 30 of 20 July 2006), as a body by means of which the Universidad de Panamá, in coordination with the other official universities, will audit operation of the private universities, for the purposes of guaranteeing the quality and relevance of their teaching, and of recognising the qualifications and degrees they issue.

11. **Assessment/accreditation bodies ****

Assessment and accreditation body: CONEAUPA.
CONEAUPA is a recently-created autonomous body which establishes under law the requirement for assessment and accreditation of the quality of official and private universities.

* Contraloría General de la República de Panamá: Dirección de Estadísticas y Censo: Educación 2004

** Volume 7: Estudios de Postgrado en Panamá. 2004. Dr. Filiberto Morales - IESALC/UNESCO - CRP.

PARAGUAY

1. **Higher education institutions (HEIs):**

Number of HEIs by type and legal system

HEIs	Official	Private	Total
Universities	4	24	28
Higher Institutes	5	18	23
Higher Technical Institutes	10	173	183
Teacher Training Institutes	40	78	118
General total	59	293	352

2. **Enrolment at higher level**

Enrolment by type of HEIs and Sex

HEIs	Population Male	Population Female	% Pop. Fem.	% Pop. Male.	Total
Universities	68,036	93,954	58	42	170,000
Higher Institutes	8,934	6,066	60	40	15,050
Higher Technical Institutes	11,040	11,960	52	48	25,000
Teacher Training Institutes	5,456	11,965	69	31	17,421
General total	**93,466**	**123,945**			**227,471**

Enrolment by degree type

<table>
<tr><th></th><th>Duration</th><th colspan="2">Enrolment</th></tr>
<tr><td>Undergraduates</td><td></td><td></td><td></td></tr>
<tr><td>Teacher</td><td>3</td><td>17,421</td><td>17,421</td></tr>
<tr><td>Higher Technician</td><td>2</td><td>25,000</td><td>25,000</td></tr>
<tr><td>Degrees</td><td></td><td></td><td></td></tr>
<tr><td>First degrees and equivalents</td><td>4-5</td><td></td><td rowspan="5">176,990</td></tr>
<tr><td>Graduate studies</td><td></td><td></td></tr>
<tr><td>Specialisation</td><td>1</td><td rowspan="3"></td></tr>
<tr><td>Master’s degree</td><td>2-3</td></tr>
<tr><td>Doctorate</td><td>3-4</td></tr>
<tr><td colspan="2">General total</td><td></td><td></td></tr>
<tr><td>Percentage of coverage *</td><td colspan="2">0.33</td><td></td></tr>
</table>

* (Enrolment / 18- 25 age group). Following the calculation criterion, the percentage of university attendance is 7.8.

3. **Teaching staff:**

HEIs	Total
Universities	17,539
Higher Institutes	950
Higher Technical Institutes	1,533
Teacher Training Institutes	2,088
General total	**22,110**

4. **Academic periods**

Academic periods per year

Degrees	Periods	Beginning	End
Undergraduates			
Teacher	1.	March	July
	2.	August	December
Higher Technician	1.	March	July
	2.	August	December
Degrees			
First degrees and equivalents	1.	March	July
	2.	August	December
Graduate studies			
Specialisation	1.	March	July
	2.	August	December
Master's degree	1.	March	July
	2.	August	December
Doctorate	1.	March	July
	2.	August	December

Some institutions have summer courses, held between the second fortnight in January and the month of February.

5. **Scale of grades**

Degrees	Scale	Minimum pass grade
Undergraduates		
Teacher	1-5	2
Higher Technician	1-5	2

Degrees	Scale	Minimum pass grade
Degrees		
First degrees and equivalents	1-5	2
Poss.degrees		
Specialisation	1-5	2
Master's degree	1-5	2
Doctorate	1-5	2

6. **Enrolment or tuition fees**

Fees for degree (in dollars)

Degrees	Fee	Years
Undergraduates		
Teacher	1,100	3
Higher Technician	836	2
Degrees		
First degrees and equivalents	5,225	5
Graduate studies		
Specialisation	800	1
Master's degree	2,300	2
Doctorate	3,500	3

7. **Admission and graduation criteria**

Admission Criteria

«Pregrads»	Teacher	The MEC sets exams for diagnosis and selection of future teachers
	Higher Technician	Access to the courses is free*
Degrees	First degrees and equivalents	Public universities and the Universidad Católica set exams for income admission, following a course. In the private universities, admission is unrestricted*.
Graduate studies	Specialisation	In some cases a selection is made taking into account the academic curriculum of the graduate. In other cases access to the courses is unrestricted*
	Master's degree	
	Doctorate	

All levels require basic documentation from students

Requirements for graduation

«Pregrads»	Teacher	Approval of all subjects in the study plan.
	Higher Technician	Approval of all subjects in the study plan.
Degrees	First degrees and equivalents	Mini thesis, thesis or Supervised Professional Dissertation
Graduate studies	Master's degree	Thesis
	Doctorate	

8. **Academic credits**

The credit system has been partially introduced in Paraguay. The universities the currently use it so do so at the level of graduate studies, the master's degree and the doctorate, but not at undergraduate level, except for some universities from the private sector which do use it at this level.
The credit is the unit of measurement of the academic results obtained by a student in a specific year. The curricular system implemented establishes that the student must accumulate a given number of credits to obtain the corresponding academic degree. In one of the institutions, a credit is equivalent to 20 hours of contact class and each subject represents a certain number of credits in direct proportion to the workload assigned to it. Credits are accredit to the student when he/she passes the corresponding assessment.

9. **Legal framework**

National Constitution

CHAPTER VII - CONCERNING EDUCATION AND CULTURE.

Article 75: Concerning responsibility for education
Education is the responsibility of society and particularly the family, the municipal area and the state. The state shall promote programmes of nutritional complements and supply of school instruments for pupils of limited resources.

Article 79: Concerning universities and higher institutes.
The main purpose of the universities and higher institutes will be higher professional education, scientific and technological research, and university extension.
Universities are autonomous. They shall establish their statutes and forms of government and prepare their study plans in accordance with national educational policies and development plans. Freedom of education and free right to teach is guaranteed.
Public and private universities alike, shall be created by law, which will determine which professionals require university qualifications to practise.

Article 83°: Concerning cultural dissemination and exemption from taxes.
Fiscal and municipal taxes shall not be levied on the objects, publications and activities of significant value for cultural dissemination and education. The law shall regulate these exemptions and will establish a system for fostering the introduction and

incorporation into the country of the elements required for the exercise of the arts and of scientific and technological research, as well as for their dissemination within the country and abroad.

General Education Act

Article 3. The state shall guarantee the right to learn and equal opportunities of access to knowledge and to the benefits of humanistic culture, of science and of technology, with no discrimination whatsoever. It shall also guarantee freedom to teach, without any requirement except the suitability and ethical integrity, the right to religious education and ideological pluralism.

Article 8. Universities shall be autonomous. The universities and the higher institutes shall establish their own statutes and forms of government, and prepare their plans and programmes, in accordance with education policy and to contribute to the national development plans. Coordination of the plans and study programmes concerning universities and higher institutes shall be compulsory, within the framework of a single national education system that shall be public in nature.

Article 27. Formal education is structured on three levels: The first level comprises initial education and primary education; the second level consists of secondary (medium-level) education; the third level is higher education.

Section VI. Higher education

Article 47. Higher education shall be regulated by the Higher Education Act and will be developed through universities and higher institutes and other third-level institutions of professional education.

Article 49. Higher Institutes are institutions that perform in a specific field of knowledge fulfilling the mission of research, professional education and service to the community.

Section VII. Postgraduate Education

Article 54. Postgraduate education (graduate studies) shall be the responsibility of the universities or higher institutes. Those admitted shall be required to have completed the degree stage or to show sufficient knowledge and experience to take said studies.

Act of Creation of the National Higher Education Assessment and Accreditation Agency

Article 1°. The National Higher Education Assessment and Accreditation Agency, known henceforth as the «Agency», is hereby created for the purpose of assessing and as appropriate, accrediting the academic quality of the higher education institutions that submit to its scrutiny and produce technical reports on the academic requirements of the degrees and of the higher education institutions.

Article 2°. Participation in processes of external assessment and accreditation shall be voluntary except for the degrees of law, medicine, dentistry, engineering, architecture and agricultural engineering, and for those that award qualifications that entitle their holders to exercise professions whose practice might harm the wellbeing of persons or their property.

Article 3°. The Agency shall answer the Ministry for Education and the Arts, but shall enjoy technical and academic autonomy for exercising its functions.

10. **Responsibility for higher education**

The universities and higher institutes enjoy autonomy under Article 79 of the Constitution. The National Congress is the body in charge of creating university institutions. The universities meet in the Universities Council, a body which is in charge of authorising degrees.
The Higher Technical Institutes and the Teacher Training Institutes are created by the Ministry for Education and the Arts and depend on the General Directorate of Higher Education, through the Directorate of Higher Technical Institutes and of Teacher Training, respectively. (Decree No. 98/03)

11. **Assessment/accreditation bodies**

The National Higher Education Assessment and Accreditation Agency (Law No. 2072/03) is the organisation responsible for the assessment and accreditation of *degrees* in higher education.

PERU[80]

1. Higher education institutions (HEIs):

— Total number of HEIs in the country 83
— Number of HEIs by type (universities, technology institutes or others):
Universities: 83
Institutes: Institutes are not HEIs in Peru

— Number of HEIs by legal system: Public 35 Private: 48

Note: The former technical schools of arable farming, engineering, education and business administration were turned into universities

2. Enrolment at higher level (only first degree for the moment)

— Total enrolment by legal system: Public 282,485 Private 232,632
— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician	—	—
• Higher technician	—	—
• First Degree	5 years	515 117
Second Speciality	1 year	Not available
• Master's degree	2 years	Not available
• Doctorate	2 years	Not available

3. Teaching staff:

— Number of teaching staff in higher education: 48,600
— Academic level of teaching staff (percentages):
First degree 86.0 Second Speciality 2.0 Master's degree 8.4 Doctorate 3.6

Note: The number of teachers is as follows:

First degree	41,784	88.0%
Master's degree	4,324	9.1
Doctorate	1,299	2.8
Second Speciality	14	0.1
National Total	47,421	100.0

All of these figures are estimates. Several universities were late in submitting their information

Type of employment (percentages): Full-time 69.7 Part time 30.3

Notes: The figure of 69.7% includes full-time teachers (also 40 hours, but in a single institution)
The figure of 30.9% also includes teachers by hours

[80] Data updated in 2004 (Amended, Sect. 3)

4. **Academic periods**

— Number of academic periods per year: 2 semesters
— Dates of beginning and end of the periods: Beginning: 20 March End: 20 Dec

5. **Scale of grades**

Scale: 0 - 20
Minimum pass grade: 11

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs?
In undergraduate studies: No
In all others: Yes

— Total amount or approximate range of the admission or tuition fees (in dollars):
Approximate range of fees for master's degree or doctorate: $75 -$150

7. **Admission and graduation criteria**

Admission

Admission exams are always held. These exams are written.

Graduation

There are two ways of graduating from the first degree course:

1. Immediate, by completing the full curriculum and a pass mark in the thesis
2. Mediate, by completing the full curriculum, approval of report of work experience and passing a series of short courses, plus payment of a fee of between $1,000 and $2,000

Graduation with a master's degree or doctorate requires passing the full curriculum and passing of theses

8. **Academic credits**

— Is a system of academic credits used: Yes
— If so, what does the academic credit consist of? And how is it applied between HEIs?

The statute of each university sets out the credits (the law does not). Common practice is to ascribe x + y credits to a course of x hours per week theory and 2 hours per week practice or laboratory work over a minimum of 17 weeks. Credits are widely used, but the «hour» may consists of 50 or 45 minutes, depending on the university

9. **Legal framework**

The current University Act (No. 23733 dates from 1983; a new one is expected soon). The universities are made up of teachers, students and graduates. They may be public or private. They are dedicated to the study, research, education and dissemination of knowledge and culture and to its social outreach and projection. They have academic, regulatory and administrative autonomy within the law.

The university degree requires the possession of a master's degree or doctorate and a certain number of years service for the different categories (Principal, Associate and Auxiliary). No minimum academic qualities have been established (the quality of the Master's degree and Doctorates depends on the university that confers them, the quality of the publications depends on the journal or book in which they appear; none of these qualities has established minimums).
The universities offer undergraduate and/or postgraduate degrees.
Qualifications and degrees are awarded in the name of the State. The rectors of all the universities constitute the National Assembly of Rectors whose aims include the study, coordination and general guidance of university activities. Its performs these actions in accordance with the University Act through the Meeting of Rectors, the Interuniversity Coordination Council and the Regional Interuniversity Council. In particular, it coordinates the creation of degrees, designates which universities can convalidate foreign qualifications or degrees, resolve internal problems of the universities, etc. In general they ensure that the University Act is respected.
The economic resources of the universities come: from the Public Treasury (in the case of the state), from the monies allocated by special laws (such as the fee paid by some companies extracting natural resources, also only in the case of the state) and own resources which each university can obtain through the sale of services.
Private universities may be profit making or not by virtue of legislative decree 882 which promotes investment in education.

Notes: Previously, all teachers were required to teach and conduct research, but now they can perform either or both or of these activities. The immense majority limit themselves to teaching.
The disparity in academic quality between universities is sometimes quite large.
The university act, complemented by the CONAFU Act, Num. 26439 for the creation of new universities and Legislative Decree 882 already mentioned

10. **Responsibility for higher education**

The National Assembly of Rectors ensures compliance with university legislation.
The Ministry of Education has an office for coordinating secondary education with the requirements on admission to university.
The CONAFU is the National Council for Authorisation of the Operation of Universities, created under Act 26439.
The CONEAU will regulate assessment and certification of university quality.

11. **Assessment/accreditation bodies**

Yes. There is a National System of Assessment, Accreditation and Certification of Educational Quality (SINEACE), created under Act 28740 on May 2006, whose organ for the universities is the University Education Quality Assessment, Accreditation and Certification Council (CONEAU). The related regulation still has to be prepared. This law will involve registering the assessment institutions. Participation by the universities in the assessment and accreditation processes will be voluntary.
A prior experience top the establishment of the SINEACE was the action of the Board for Accreditation of Faculties or School of Human Medicine (CAFME) which was entrusted with defining the minimum standards of accreditation and leading the subsequent process.

Tuning A Latina INGL.indd 392 19/7/07 10:46:42

DOMINICAN REPUBLIC

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 48
— Number of HEIs by legal system: Public: 8 Private: 40

2. **Enrolment at higher level** (as of 31 December 2005)

— Total higher level enrolment in the country: 322.311
— Total enrolment by legal system:
Public: 167,856 Private: 154,455

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Higher Technician	—	12,501
• First degree	—	301,665
• Speciality	—	3,218
• Master's degree	—	4,712
• Doctorate	—	215
• Other	—	—
• Technician	Maximum 2 years	565,045

Note 1: IN the case of the Technician there is another body which regulates that particular educational sector, the Institute of Professional Technical Education: —INFOTEC— which does not answer to the SEESCYT and is therefore not higher education.

Note 2: The higher education institutions —HEIs— are divided into:

Technical Institutes of Higher Studies

With technical level	Minimum 85 Credits

Specialist Institute of Higher Studies

With undergraduate level	
First degree	140-200 Credits
With postgraduate level	
Speciality	Minimum 20 Credits
Master's degree	Minimum 40 Credits
Doctorate	

University

With technical level	85 Credits
With undergraduate level	140-200 Credits
With postgraduate level	
Speciality	Minimum 20 Credits
Master's degree	Minimum 40 Credits
Doctorate	

The figure for the 20 - 24 age group is 111,682 which is equivalent to 44.0% of enrolment

3. **Teaching staff:**

— Number of teaching staff in higher education: 11,250
— Academic level of teaching staff:
First degree qualifications predominate: 7,351; Specialisation 1,248; Master's degree: 2,399; Doctorate: 152.

4. **Academic periods**

— Number of academic periods per year
Semesters: January - May and a summer course from June to July and August - December
Quadrimesters: January - April, May - August, September - December
Trimesters: February - April, May - July, August - October, November - January.

— Dates of beginning and end of the periods
The first semester begins on 29 January and ends on 19 May, with a summer course that begins on 4 June and ends on 28 July. The second semester begins on 13 August and ends on 15 December.
The first quadrimester begin on 2 (4) January and ends on 21 (9) April; the second quadrimester begins on 7 (2) May and ends on 18 (12) August; the third begins on 3 (29) September and ends on 8 (2) December each year.

Note: For the dates between brackets teaching is given from Monday to Sunday.
The first trimester begins on 5 February and ends on 21 April; the second begins on 7 May and ends on 21 July; the third begins on 6 August and ends on 20 October; and the fourth begins on 5 November and ends on 26 January. These are the dates for the period between 5 February 2007 and 26 January 2008.

5. **Scale of grades**

At technical and undergraduate levels

Numerical grade	**Letter grade**	**Equivalence**
90 - 100	A (Pass)	Excellent.
80 - 89	B ″	Good.
75 - 79	C ″	Fair.
70 - 74	D ″	Pass.
0 - 69	F (Fail)	—

The minimum pass grade is 70 points on a scale of 0-100 or its equivalent on any scale.
At postgraduate level
The minimum pass grade is 80 points on a scale of 0-100 or its equivalent on any scale.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes X No
— Total amount or approximate range of the admission or tuition fees (in dollars):

There are various categories and lowest rate is 44c per credit and $5.88 for registration if the student is a graduate from a public school; if it is a private school, the rate is $2.94 per credit and the registration fee is $23.53 at a dollar exchange rate of $1 per 34 Dominican pesos.

7. **Admission and graduation criteria**

Admission

In order to access the higher education system it is compulsory under law to pass the test of vocational skills and interests and general knowledge.
Attend an interview and/or talk with the admission and guidance departments.
If the student then applies for registration he/she has to submit the original documents necessary for joining the higher education institutions —HEIs— recognised by the SEESCYT.

Graduation

In most cases in the HEIs in the country students are required have completed all the credits for the degree or study programme and have approved an assignment in any of the systems approved by the CONESCYT of the SEESCYT or a thesis as a requirement for graduation.

8. **Academic credits**

— Is a system of academic credits used: Yes X No ____ Partially ____
— If so, what does the academic credit consist of? And how is it applied between HEIs?

The credit is applied in all higher education institutions —HEIs— approved by the CONESCYT of the SEESCYT.
The credit is the unit of measurement of the student workload and represents the academic work involved in one of the following options:

— 15 hours of theoretical teaching.
— 30 hours of practice supervised and/or directed by the teacher.
— 45 hours of individual research; all of these are independent of the type of academic period the institution uses to organise its work.

Independent work
The time the student spends on bibliographical research, field work, laboratory work and any other system of work assigned by the teacher that requires forty-five hours or more to obtain one credit and whose results must be assessed by the teacher.

9. **Legal framework**

The legal framework governing the HEIs in the country is regulated under Act 139 - 01, governing Higher Education, Science and Technology] and its Regulation and Standards.

10. **Responsibility for higher education**

The Secretary of State of Higher Education in Science Technology —SEESCYT— Act 139 - 01 gives the National Council for Higher Education, Science and Technology —CONESCYT—, the higher organ of the SEESCYT the power to advise on the crea-

tion and assessment of institutions, degrees and programmes at technical, undergraduate and postgraduate levels.
The SEESCYT certifies the studies carried out in the institutions recognised by the CONESCYT.

11. **Assessment/accreditation bodies**

There are two assessments carried out by the SEESCYT under the auspices of Act 139 - 01, every 5 years which are carried out by recognised private assessment institutions, made up of academic peers.
The body responsible for the five-year assessment is the Technical Assessment Team from the SEESCYT and the organ that approves assessments is the CONESCYT (compulsory)
The body responsible for accreditation is the Dominican Association for Self-Learning and Accreditation —AADAC—. (voluntary)

URUGUAY

1. **Higher education institutions (HEIs)**[81]**:**

— Total number of HEIs in the country: 17
— Number of HEIs by type: 5 universities, 12 university institutes
— Number of HEIs by legal system: Public: 1 Private: 16

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 97,461[82]
— Total enrolment by legal system:
Public: 88,167[83] Private: 9,294[84]

— Enrolment by degree type:

Degree types	Duration of the degree	Enrolment[85]
• Technician	—	—
• Higher technician	2 to 3 years	—
• First degree	Min. 4 years	—
• Speciality	Min. 1 year	—
• Master's degree	Mín. 2 years	—
• Doctorate	Mín. 3 years	—
• Other	—	—

[81] University Third Level is seen as a Subsector. Source: Ministry for Education and the Arts, Directorate of Higher Education, September 2006.

«Higher Education is divided into Third Level University and Third Level non-University. In the public sphere, the tertiary level university institution is the Universidad de la República (autonomous and free of charge). The non-University public third-level sector comprises the Naval School (which has a level equivalent to third-level university), the teacher training institutes, the Centre of Industrial Design (Ministry for Education and the Arts), third-level military and police education (Ministries of Defence and the Interior respectively), the Municipal School of Dramatic Arts (under the municipal administration of Montevideo) and the training centre and studies of the INAU (Instituto Niño y del Adolescente del Uruguay).

Within the private sector, university-type institutions are the private universities and the private university institutes. The former are institutions authorised to perform the activities of teaching, research and outreach in three or more disciplinary related areas not organically structured in faculties, departments or equivalent academic units. The university institutes are those that offer at least one complete first level degree, a master's degree or a doctorate. The non-university-type institutions (or "other third level") in the private sector are the institutes of non- university third-level teaching , which can request from the Ministry recognition for the suitable academic level of the teaching given and the degrees they issue, in accordance with generally accepted evaluation guidelines in the national and international area.» (Description taken from the *Anuario Estadístico 2004* issued by the Ministry for Education and the Arts).

[82] Approximate figure resulting from the sources referred to below.

[83] Corresponds to active students from 2005. Source: Central Computer Service, Universidad de la República.

[84] Source: *Anuario Estadístico de Educación 2004*, Ministry for Education and the Arts.

[85] Information not available in all cases.

— Population in higher level education: Gross Rate of Registration CINE 5A, 20 to 24 age group, years of reference 2002/2003: 28%[86]

3. **Teaching staff:**

Number of teaching staff in higher education:

— Public university: 7,528 teaching posts[87]
— Private Universities: 1,780 teaching posts[88].

Academic level of teaching staff[89]:

Public university[90]
With graduate studies: 42% of teachers.
Type of contract (percentages)[91]:

Public university[92]
Part time (up to 20h h/w.): 63%
Full-time (up to 40 h/w and 60 h/w): 31%
Full time: 6%.

4. **Academic periods**

Lecture period: March - November
Ordinary assessment periods: July, December, February.

5. **Scale of grades**

Scale of 12 levels; depending on the institutions, the pass threshold corresponds to Level 3 (Fair) or 6 (Good).

6. **Enrolment or tuition fees**

¿Are enrolment or tuition fees charged in public HEIs? Yes __ No X

7. **Admission and graduation criteria**

Admission

Process for admitting students to the HEIs:
Unrestricted access in nearly all degrees.

---

[86] Source: *World Compendium of Education in the World 2005*, UNESCO Institute of Statistics, Montreal, 2005.
[87] Source: *Estadísticas Básicas 2005*, Dirección General de Planeamiento, Universidad de la República.
[88] Source: *Anuario Estadístico de Educación 2004*, Ministry for Education and the Arts.
[89] Information not available for private universities.
[90] Source: *Censo de Docentes 2000*, Universidad de la República.
[91] Information not available for private universities.
[92] Source: Estadísticas Básicas 2005, Dirección General de Planeamiento, Universidad de la República.

Graduation

Process of student graduation:
There are no common requirements established under legislation. The requirement for a thesis or final graduation project varies depending on the field and level of education. There are no final exams.

8. **Academic credits**

Is a system of academic credits used: Yes ___ No ___ Partially X

The public university is currently applying a common credit system for all technical, technological and degree qualifications. This has a value of 15 hours of student work, which covers the hours of class, contact work and private study, like the conditions for postgraduate degrees.
A «downward» system for applying credits has been established, with two options for calculating the annual number of credits: 80 / 90.
In the case of the Private universities we no not know of any system of academic credits in use.

9. **Legal framework**

— Basic Law of the Universidad de la República, Act 12,549, passed on 29/10/58.
— Act 15,661 authorising the operation of private universities and the recognition of their qualifications by the state, passed into law on 23/10/84;
— Act 15,739 creating the autonomous National Administration of Public Education (ANEP), which is in charge of education and advanced teaching, passed into law on 25/03/85.
— Decree 308/95 of «Planning of the Tertiary Private Teaching System», which regulates the authorisation and regulation of the universities and private university institutes by the executive power and the existence of a consultant body from the Minister of Education —Advisory Board— made up of representatives from the Ministry of Education (2), from the Universidad de la República (3), from the ANEP (1) and from the private universities (2).

10. **Responsibility for higher education**[93]

The area of public education, at primary, secondary and university level, is regulated constitutionally by autonomous bodies.
The Universidad de la República enjoys technical, administrative and governmental autonomy; Primary and secondary education enjoy technical and administrative autonomy.
In this way the Uruguayan education system differs from the model common in countries where the ministries of education are responsible for the planning and execution of the public education policies.
Private third-level education is regulated by the executive power through the Ministry for Education and the Arts.

[93] Description taken from *Anuario Estadístico 2004*, Ministerio de Educación y Cultura.

The general coordination of education is the responsibility of the Coordinating Commission for Education, which has advisory powers and no authority to act at a political or institutional level. It is presided over by the Minister of Education and Culture with participation from representatives of public and private bodies from the three levels of education.
At the level of the private and university sector, there is a Council of University Rectors made up of four private universities:.

11. **Assessment/accreditation bodies**

Uruguayan universities in both sub-systems —public and private— have participated in Mercosur's experimental degree accreditation mechanism (MEXA), responding to calls o qualifications in Agricultural Science (2003), Engineering (2004) and Medicine (2005). The Universidad de la República was involved in all of the processes with a total of six from its degrees. Three private institutions also did the same in engineering, with one degree each. In accordance with the provisions that regulated the mechanism in the country fifteen foreign peer assessors and seven national ones were involved.
Since 1998, the Universidad de la República has had an institutional assessment programme whose purpose is to work on the following areas (strategy development plan 2001):

- Self-learning of each of the university services and of the organisation as a whole, as a basis for the improvement of its academic quality.
- In its capacity to produce useful results that adequately inform the processes of decision making on the reforms within the organisation which can be focused and categorised as necessary;
- In defining policies and in the assignment of resources as a means of promoting more rationally and with greater effectiveness the functions of the institution.

Supervision of the private institutions of higher education is the responsibility of the Ministry for Education and the Arts, which acts under advice from the Advisory Board of Private Third Level Education (Decree 308/95), a body which has faculties for carrying out actions to assess study plans and academic programmes that will bake it possible to verify compliance with the conditions taken into account for in awarding authorisations.
This year a National System of Accreditation and Promotion of Quality in Higher Education was established by law in Uruguay, and will begin operating from March 2007 with the following immediate tasks:

- preventive monitoring and external validation of the processes of self-assessment of legally constituted private institutions: four universities, eleven university institutes and three non-university third- level institutes;
- the installation of the National Accreditation Agency for the administration of the ongoing design of the mechanism designated in the area of Mercosur;
- the formulation of a voluntary national pilot programme for accrediting university degrees;
- accreditation and comptrollership of the transnational provisions of educational services.

VENEZUELA[94]

1. **Higher education institutions (HEIs):**

— Total number of HEIs in the country: 167
— Number of HEIs by type (universities, technology institutes or others):

- Universities: 48
- University Institutes and Schools: 119

— Number of HEIs by legal system: Public: 73 Private: 94

2. **Enrolment at higher level**

— Total higher level enrolment in the country: 1,154,845
— Total enrolment by legal system:
Public: 655,341 Private: 499,504

— Enrolment by degree type

Degree types	Duration of the degree	Enrolment
• Technician	—	—
• Higher technician	2 - 3 years	300,052
• First degree or equivalent	4 - 7 years	599,022
• Unspecified type of undergraduate degree	2 - 7 years	255,771
• Speciality	Maximum 4 years	Data Not available
• Master's degree	Maximum 4 years	Data Not available
• Doctorate	Maximum 5 years	Data Not available
• Other: Specialisation Technical	Maximum 3 years	Data Not available

— Percentage of in higher level education: ((1,154,845)/(2,419,714)) × 100= 47.73%.

3. **Teaching staff:**

— Number of teaching staff in higher education: 117,234
— Academic level of teaching staff (percentages):
Higher university technician: 5.68%; first degree or equivalent: 55.99%; Specialisation: 12.77%; Master's degree: 18.20%; Doctorate: 5.15%; No information on the academic level: 2.21%

— Type of contract (percentages):
Full time: 6.27%; Full time: 4.75%; part time: 3.16%; By hours: 17.02%; No information on the workload: 68.80%

4. **Academic periods**

— Numbers of academic periods per year: By trimester, quadrimester, semester or year

[94] 2004- Data provided by the University System Planning Office (OPSU). Ministry of Higher Education (Venezuela). website: http//:www.opsu.gob.ve/ www.cnu.gob.ve

— Dates of beginning and end of periods Academic periods in the degrees or programmes are generally divided into semesters. The first semester of a give year begins in September-October and ends in February-March. The second semester begins in March-April and ends in July-August.

5. **Scale of grades**

There are three types of grading scales in use in higher education institutions in Venezuela.
According to the Venezuelan Institution of Higher Education, it is:

— From 1 to 5 points with a minimum pass grade of 3 points.
— From 1 to 10 points, with an average pass grade of 6 points.
— From 1 to 20 points with a minimum pass grade of 10 points.

6. **Enrolment or tuition fees**

— Are enrolment or tuition fees charged in public HEIs? Yes: X No ___
— Total amount or approximate range of the admission or tuition fees (in dollars): The tuition fee is: 6000 Bolivars. ($3.58) to 39,520 Bs. ($18.38) per year (at the official exchange rate of 2150 Bs./$1).

7. **Admission and graduation criteria**

Admission

Students coming from secondary, diversified and professional education enter higher education through several ways: through an internal admission test set by the school, faculty or institution, by way of the National Universities Council, through agreements and by means of the Misión Sucre.

Graduation

Students graduate once that have passed all the subjects established in the study plan and met all the final requirements of a given degree or programme (degree assignment, dissertation or both).

8. **Academic credits**

— Is a system of academic credits used: Yes X No ___ Partially ___
— If so, what does the academic credit consist of? And how is it applied between HEIs?

It refers to the academic workload of a given degree or programme: credit units, academic hours, number of subjects, etc.

9. **Legal framework**

The Basic Law on Education, the Universities Act and the Organic Regulation of the Ministry of Higher Education. For further reading, we recommend the Higher Education Bill [Proyecto de Ley de Educación Superior].

10. **Responsibility for higher education** Ministry of Higher Education - Planning Office of the University Sector (MES-OPSU) and higher education institutions.
11. **Assessment/accreditation bodies** At present, there are no accreditation bodies for higher education at undergraduate level in the country; however, the tendency in accordance with studies carried out by the Ministry of Higher Education, is to make such assessment compulsory for all institutions. The Ministry of Higher Education and the Planning Office of the University Sector through its Directorate of Academic Development and the Programme of Institutional Assessment, respectively, restrict themselves to monitoring the universities on completion of the 5 years in operation. At the level of graduate studies, there is a National Advisory Board of Graduate Studies, which is the sole assessment body at that level. Assessment is mandatory for authorisation while accreditation is optional.

Appendix III

Information on academic credit systems in Latin America

This table was prepared using information from representatives of the sixteen Latin American countries in theTuning Latin America Project.

Definitions

Credit: a unit of measurement of the academic work a student requires to achieve higher level professional competences. It may be based on various parameters, such as contact hours, independent study, practical field work, work in the laboratory, workshop or other, or on the results of learning.

Credit system: a systematic way of describing an education programme by assigning credits to its components.

1. ***Is there a national system of academic credits in your country?***

Country	Answer
Argentina	There is no system of credits on a national scale. However, for the case of engineering there is an Argentinean Credit Transfer System (SATC), although this has yet to be implemented.
Bolivia	There is no national system of credits. The universities have adopted different criteria for establishing academic credits.
Chile	In 2005, a project was begun for designing and implementing a Transferable Credit System (TCS), for the 25 Universities in the Council of Rectors of Chilean Universities (CRUCH). The project is led by the academic vice-rectors of these universities with support from the MECESUP Programme. At present, the 25 universities are assessing students' real workload, in degrees associated with projects in networks of the Competitive Fund of the Ministry of Education's MECESUP Programme.

Country	Answer
Colombia	There is a requirement to express any curricular work that the students are required to perform in academic credits. This requirement forms part of the minimum quality conditions for the operation of academic programmes (Decree 2566 of 2003).
Costa Rica	There is an agreement to unify credit definitions which has been signed by the public universities of Costa Rica
Cuba	It exists only for postgraduate activities.
Ecuador	No system exists at present. However, at technical and postgraduate level there is a clear definition of what the credit is and the number of credits needed to confer the corresponding degrees.
El Salvador	Yes. There is a system of compulsory scoring units.
Guatemala	While there is no system of academic credits, there is consensus among Guatemalan universities in this regard
Honduras	Yes.
Mexico	Article 12, Clause VIII of the General Education Act states that it is the responsibility of the federal educational authority «to regulate a national system of credits» that will facilitate the transfer of students from one educational type or system to another. To date the national system of credits established in the act has not been established.
Nicaragua	There is no national system. Most of the state universities and some private ones are governed by a system of credits. Some universities use the block system.
Panama	There is no national system of credits in Panama. Nonetheless, all universities quantify the academic workload in the form of credits. There are some differences with regard to the duration of the length of classes, which in some universities are 45 minutes long and in others 50 or 60 minutes long.
Paraguay	There is still no official system of academic credits for all university institutions at official level. However, a system does exist in public universities at postgraduate level under different names and with differences as to the number of credits awarded for access to the postgraduate course. In some private universities at degree level a system of academic credits has been established with different scores, i.e. there is no single criterion in the public and private universities.
Peru	There is no national system of academic credits. Credits are mentioned, but not defined, in the University Act.
Uruguay	There is a system of credits approved for «pregrad» and undergraduate courses in the Universidad de la República. It only affects the Universidad de la República which accounts for 90% of all enrolments in Uruguay.
Venezuela	There is a system of academic credits approved by the National Universities Council in the 1970s which is used by most universities, although there are other different criteria for quantifying credits.

2. ***Is the system compulsory for all higher education institutions?***

Country	Answer
Argentina	There is no national system, but policies are being implemented in this direction through the implementation of Common Cycles of Basic Education (CCs) between categories of degrees and General Cycles of Basic Knowledge (GCBKs).
Bolivia	There is no system
Chile	No.
Colombia	It is compulsory for all programmes, including both pre-grad (undergraduate) and postgraduate, in all higher education institutions operating in the country.
Costa Rica	The agreement is compulsory for the public universities. No information available on the private ones.
Cuba	Yes, for postgraduate activities
Ecuador	Yes at higher technical, technology and postgraduate levels. Not at degree level.
El Salvador	Yes.
Guatemala	No information available
Mexico	Because there is no (national) credit system, the criteria for allocating credits often vary from one public institution to another. In the private sphere, private institutions are governed by the criteria set out in Agreement 279, but these criteria are difficult to match with those applied by the public institutions.
Nicaragua	No.
Paraguay	There is no official system regulating the credits allocated for the students' work for accessing courses.
Panama	The information submitted suggests that nearly all universities evaluate credits using a very similar unit of measurement.
Peru	Yes, in the sense that all study certificates must show the credits for each course, determined by the Statute of the corresponding university.
Uruguay	The system of credits approved for the Universidad de la República seeks to standardise incorporation of the credits system in technical, technological and undergraduate courses taking the student's academic work time as a unit of measurement. This resolution corresponds to the Universidad de la República and is not binding for private universities.
Venezuela	No.

3. ***Describe what the credit or unit of measurement consists of***

— Classroom time, practice work, etc.
— Levels or cycles in which they are used
— Number of credits per course.

Country	Answer
Argentina	For the case of *engineering* an Argentinean System of Credit Transfer (SATC) has been agreed upon. This stipulates that for a 5 year degree (38-40 weeks of study per year) 300 credits are allocated (60 credits per year). 1 SATC credit = 25 and 30 hours study. The courses recognised by the Ministry of Education: —Technical 2-3 years —First degree (licenciatura): 4-5 years, workload of 2700 hours. —Teachers: 4-5 years —Specialisation: minimum workload of 360 hours —Master's degree: minimum workload of 540 hours and must include at least 160 hours of tutorials and research tasks. From 1-3 years. —Doctorate: not stipulated. Usually 3 or more years.
Bolivia	It is not possible to give a single description, given the diversity of definitions in the country; in general terms, however, credits reflect the minimum workload, in terms of theoretical, practical and study time, that a student needs to devote to a subject to pass it. The academic credit is used at the levels of medium-level technician, higher technician, *licenciatura*, specialisation, master's degree and doctorate levels.
Chile	1 credit = 1 chronological hour or teaching hour (45 Min), generally considered in weekly terms. In allocating credits, most universities take into account academic activities and the student's independent work. The qualifications: —Technologist, 3 years —First degree (licenciatura) 4-6 years —Specialisation, 1-2 years —Master's Degree, 2-3 years —Doctorate, 3-5 years
Colombia	One credit is equivalent to 48 hours of academic work by the student, which includes time with direct accompaniment by the teacher and other time spent by the student on independent activities study, practice, or others which may be necessary to achieve the goals of learning. This time does not include the time spent on submitting the final assessment tests. The student's total average number of hours of academic work per week corresponding to one credit, can be calculated by dividing the total of 48 hours work by the number of weeks each institution specifies for the corresponding lecture term. The number of credits for an academic activity shall be expressed taking into account that:

Country	Answer
	One hour academic with direct teacher accompaniment represents two additional hours of independent work in *pregrado* and specialisation programmes, and three in Masters' programmes. This does not prevent higher education institutions from proposing the use of a greater or lesser proportion of contact time as opposed to independent hours, indicating the reasons for this change, when the specific methodology of the academic activity so requires. In doctoral courses, the proportion of independent hours corresponds to the nature of this educational level. The minimum number of credits that must be accumulated to obtain the title of *pregrado* (undergraduate) was defined by agreement with the faculties associations and established in a range of between 150 and 170, depending on the profession, except in the case of medicine (240 credits). Programmes at professional technician and technologist levels require a lower number of academic credits. The postgraduate programmes also set totals based on academic demands and on the level.
Costa Rica	Credit is a scoring unit (*unidad valorativa*) = 3 hours per week of work by the student over 15 weeks applied to a supervised activity, assessed and approved by the teacher. The curriculum for a degree course will have a maximum workload of 18 credits per 15-week cycle. The qualifications: —Diploma: 4 to 6 lecture term of 15 weeks (60-90 credits) —Profesorado: minimum 6 lecture terms of 15 weeks (98-110 credits) —University *bachillerato*: 8 lecture terms of 15 weeks (120-144 credits) —First degree (licenciatura): 10 lecture terms of 15 weeks (150-180 credits) —Master's Degree: minimum 4 lecture terms of 15 weeks (60-72 credits) —Doctorate: minimum 4 lecture terms of 15 weeks (50-70 credits)
Cuba	They are only being used in postgraduate and it an academic credit is considered to be equivalent to a total of 48 hours of student work; these hours include class activity, as well as time the students has to use in independent activities: practical work, work experience, scientific publications, preparation for exams, writing texts, research and other requirements in order to achieve the proposed objectives. The qualifications: —Technician: 2 years (not a university level) —First degree (licenciatura) or Engineering degree: 5-6 years —Diploma: (at least 15 credits) —Postgraduate speciality: (100 credits at least) —Master's degree: (at least 70 credits) —Doctorate: 4-6 years
Ecuador	A credit is considered to be equivalent to sixteen (16) hours of class or nine hundred and sixty (960) minutes. For other educational components they are classified depending on the level, such as practicals, laboratories, final essays, etc.

Country	Answer
	The qualifications: —Technician: 2 years (120 credits) —Technologist: 3 years (185 credits) —Graduate: 4 years (240 credits) —Engineer: 5 years (300 credits) —Higher diploma: 6 months (15 credits) —Specialist: 1 year (30 credits) —Master's degree: 2 years (60 credits) —Doctorate in science: 4 years (90 credits)
El Salvador	The scoring unit used is equivalent to a minimum of 20 hours work by the student in front of the teacher in a classroom during a 16-week cycle. The qualifications: —Technician: 2 years (minimum of 64 su) —Teachers: 3 years (minimum of 96 su) —Technologist: 4 years (minimum 128 su) —First degree: 5 years (minimum of 164 su) —Master's degree: 2 years (minimum 64 su) —Doctorate: 3 years minimum (at least 96 su) —Specialist (medical doctors and dental surgeons): 3 years (96 su)
Guatemala	An investigation on the 10 degree courses with the greatest knowledge and market concludes as follows: —The average length of the course is 5 years —The average number of subjects in the course is 56 —The mode for the duration of a class period is 45 minutes —The average number of credits per course is 225 —The average number of educational cycles is 2 semesters In *pregrado*: 1 credit = 15 hours of contact class time. 1 hour of contact study time requires 2 hours study, and one credit therefore requires 45 hours of time by the student. In postgraduate: 1 credit = 12 hours of contact class time. 1 hour of classroom study requires 3 hours of study. 1 credit requires 48 hours workload. The qualifications: —Technician: 1.5 years —First degree (licenciatura): 4-6 years —Master's Degree: 1.5 - 2 years —Doctorate: 3 years
Honduras	The credit or scoring unit in *pregrado* is equal to one hour of academic activity per week over a period of 15 weeks or its equivalent in another period. This means one academic hour with the professor plus two hours of individual academic work. One scoring unit is equal to 3 hours of work in a laboratory, workshop, seminar, or field work. The academic years can be organised in one period with a minimum of 32 weeks of academic work, or in periods with a minimum of 18, 15, 11 or 9 weeks.

Country	Answer
	The qualifications require a minimum of scoring units: —Short degree: 80-100 su —First degree (licenciatura): 4-6 years: 160 or more su —Doctorate in Medicine: 320 su minimum (6-8 years) —Medical speciality: 2-3 years: 90 su on top of the doctorate in medicine (minimum 3 years) —Master's degree: 2 years: 40-50 su (one and half to two years) —Doctorate: 2-3 years: 52 to 70 su on top of First degree (licenciatura) or 25-30 su on top of two year postgraduate. (only covers study stage)
Mexico	The credit is the unit used to measure the learning activities set out in any subject on the curriculum and it is expressed in hours-week-semester. In the area of Mexican public institutions, the most common measurement used is: 2 credits = 1 hour by 15 weeks. The value of the credit in private institutions answering to the Secretariat of Public Education is: 1 credit = 0.0625 hours-week-semester or 16 hours-week-semester = 1 credit —Higher university technician or associated professional (minimum 180 credits) —First degree (licenciatura) (300 credits) —Speciality (minimum 45 credits) —Master's degree (minimum 75 credits) —Doctorate (after the Master's degree, 75 credits) —Doctorate (after the speciality, 105 credits) —Doctorate (after the licenciatura, 150 credits)
Nicaragua	Concept of credit: There is no single concept in undergraduate courses. In general, the unit of measurement for a subject is based on the overall composition of the curriculum, according to the number of classes given very week over a 16-week semester. In undergraduate courses in general a credit is equivalent to 15 class hours independently of whether they are theoretical or practical. In general, the number of credits for undergraduate courses is as follows: —Higher Technician courses: between 96 and 120 credits —Undergraduate courses or equivalent: between 200 and 220 credits —Degrees in Medicine and Surgery: between 249 and 291 credits for the first 5 years of the course. The sixth and last year is not included in the this range. Concept of credit: In postgraduate courses a similar concept is used to that of the undergraduate one. Equivalences of credits with classroom hours: there is no single concept; most universities do not offer postgraduate courses. In general terms the reference is as follows: —A credit is equivalent to 15 hours theoretical class per period and to 40 hours for non theoretical but supervised activities. The number of credits at postgraduate level uses the following references:

Country	Answer
	—The Specialisation Courses take between 750 and 1100 hours, with the number of credits depending on the balance between theoretical and non-theoretical activities. —The Master's Courses take between 1200 and 2500 hours, with the number of credits depending on the balance between theoretical and non-theoretical activities.
Paraguay	In public universities the credit is considered to be the unit or score assigned to each subject or discipline calculated using the following indicators or criteria. Objectives to be achieved. —Work Time —Field work or laboratory work —Monographic essay, monographs, written and oral reports. —Preparation of Projects. —Exams and others. It is used at postgraduate level in public institutions and in private institutions at undergraduate and postgraduate level. On average, the number of credits for the master's courses in public universities is 1,200 teaching hours, two years duration, with supervised work experience and university outreach. Preparation and defence of a thesis is an indispensable requirement for the degree.
Panama	Most universities establish that a credit is equal to one hour of class (or seminar) per week and per semester (15-16 weeks of class). One credit is awarded for 2-3 hours of laboratory work or practical work. The number of credits required to obtain the degrees has yet to be specified. The qualifications: —Technician: 1.5-2 years (120 to 150 credits) —First degree (licenciatura): 4-5 years (180 to 215 credits) —Specialisation: 1 year (20 to 25 credits) —Master's degree: 1.5-2 years (30 to 40 credits) —Doctorate: 2 years (60 credits plus dissertation)
Peru	The credit consists of: —classroom time, practice work, etc. —levels or cycles in which they are used —number of credits per course Generally, the credits for a course are associated with the number of hours per week for same. The association is x+y credits for a course with x hours per week of contact class time and 2y hours per week of guided practice. (If there are no practical, y=0). However, some universities use a 60-minute hour and others use a 50 or 45 minute one. By law the lecture semester must be at least 17 weeks long. The law also specifies the following: The first degree [Bachillerato], which is the university degree, after which, if required, students may take the professional qualification of *Licenciado*, requires a minimum of 10 lecture semesters and a thesis or exam.

Country	Answer
	The master's degree and doctorate require a minimum of 4 semesters and a thesis each. These three qualifications are known as degrees (*grados*) and are acquired successively. There are also professional qualifications, the most important of which is that of *Licenciado*, which requires a *bachillerato* plus a thesis or professional exam.
Uruguay	The value of the credit is set at 15 hours of student work, encompassing class time, contact time and private study. There is a minimum of 80 or 90 credits per course per year. The services and areas are responsible for defining the criteria and the means of allocating credits to their curricular units. —2-year technical courses: 160-180 credits —3-year technical courses: 240-270 credits —4 years *licenciaturas*: 320-360 credits —Degrees of 5 years or more: 400-450 credits
Venezuela	The credit system is established for semesters of 14 to 16 weeks, in which 1 hour/week/semester of theory is equivalent to one credit, 1 to 3 hours/week/semester = one credit '. The system does not take into account the student's learning time.

4. ***If no system of credits is used, how are studies quantified?***

Country	Answer
Argentina	Studies are rated by contact hours.
Bolivia	Each institution quantifies using its own criterion for defining credits. For the purposes of validation of studies between institutions, the theoretical and practical workloads assigned to the subject or programme are used.
Colombia	Before Decree 2566 of 2003 was issued, the programmes could be quantified in lecture semesters which could be semesters or academic years; each period was expressed in weeks and the duration of the subjects was established in hours. Currently, each institution is free to organise the curriculum and express it in the units it decides on; however, it must report the curriculum to the National Ministry of Education in academic credits, in accordance with current legislation.
Cuba	The curriculum for each programme establishes the total number of subjects to be passed and the way of completing the studies (project, thesis or state exam). For each subject, the aims to be fulfilled, system of knowledge, system of skills, values, contact activities and their typology and other activities are established. In general terms, the subject courses are six months long but students advance in academic years and must pass all the compulsory and optional subjects corresponding to an academic year before they can move on to the next one.

Country	Answer
Ecuador	Nearly all programmes are quantified in credits. There are exceptions at undergraduate level where the scoring is based on semesters.
Mexico	There is no national system of credits but the two most common ones are: 1. *Tepic Accord (1972)* Based on teaching work 1 hour by 15 = 1 credit Hours spent on theory are worth twice those spent on practicals There is no recognition for work experience and other activities that involve a work-learning-supervision relationship The accord does not include transfers, only validations It is based on relatively rigid programmes with a closed vision for certain systems 2. *Accord 279* Based on student's learning 1 credit = 16 hours learning Distinction between teaching hours and independent hours: both are worth the same Involves a system of transfers by means of mutual recognition of credits Allows flexible programmes to be developed that facilitate exchange and mobility
Nicaragua	Universities that use the system of blocks rather than the credit system allocate a volume of hours every week, every semester and for the entire curriculum without determining how many credits the student gains.
Paraguay	Because there is no official state-regulated credit system, interim tests and an overall test are used which tends to measure the contents of the discipline.
Panama	Not applicable.
Peru	If credits are not used, the number of pages of the course text covered are used as a quantitative measurement, provided that it is a recognised text
Uruguay	Pass by semesters or by year with continuous and/or final assessment and a score scale of 0-12.

5. ***State the advantages and disadvantages of using a credit system in the institutions in your country***

Country	Answer
Argentina	*Advantages:* Implementation of a credit system makes is expected to allow greater flexibility for articulation between different levels. This will facilitate mobility of students between different degree courses in the same institution, and between the same degree courses or different courses in different institutions in the same country and with other countries. It will also make it easier to compare curricular information. *Disadvantages:* Difficulty in consigning a common measurement for degree courses that involve different skills, knowledge and competences (for example social and human sciences versus exact or pure sciences). Another difficulty involves the change in mentality among teachers involving training and extending awareness of the new model, which often does not take place immediately and meets with some resistance. Generally, credit systems are designed for full-time students, but in the case of Argentina are not applicable to all students.
Bolivia	*Advantages:* It would aid mobility and recognition of qualifications. It would allow greater objectivity in analysis of equivalences between studies. *Disadvantages:* The diversity of the university system would make the assimilation of a national credit system very complex.
Colombia	*Advantages:* 1) Facilitate analysis and comparison of curricular information. 2) Facilitate mobility, exchange and transfer of students, standardisation of courses. 3) Promotes curricular flexibility by setting proportions that may be elective. 4) Stimulates the adoption of alternatives forms of academic, teaching or administrative organisation. 5) Facilitates students' individual progress. 5) Facilitates transparency in the educational processes. 6) Offers students new educational options through elective courses. 7) Promotes institutional change because they are an effective instrument for stimulating thought on the best ways of achieving relevance and quality in education. 8) Helps in rationalisation of syllabi. 9) Facilitates interdisciplinarity. 10) Facilitates processes of internationalisation. 11) Encourages relations between the different academic units in an institution and among the institutions. 12) Encourages student independence in choosing educational activities on the basis if their own interests and motivations. 13) Encourages access to different types of experiences and learning scenarios. 14) Stimulates in the institutions an offering of new academic activities and diversification of educational systems. 15) Facilitates different routes of access to vocational education. 16) Facilitates organisation of the students requirements in each lecture term.

Country	Answer
	Disadvantages and challenges: 1) Little knowledge and preparation on the workings of an academic credit system and its implications on curricular, educational, organisational, administrative and financial aspects of the institutions. 2) Assuming the process as a mathematical exercise and not as an opportunity for change. 3) The need for investments to adapt institutions to the academic credit system and for teacher training.
El Salvador	The advantages of the system of scoring units: it facilitates processes of equivalences or validation of subjects between higher education institutions. With the establishment of the scoring units, the Higher Education Act empowers the Ministry of Education to establish the number of credits required to opt for the different degrees established in the Act, and this system is used by all institutions. It also facilitates the processes of standardisation and validation of subjects or qualifications obtained abroad, since the majority of countries now use the system of higher level academic credits.
Ecuador	The advantages are on the one hand that it is a much more flexible system both for the student and for the educational institution, and at the same time, it is easier to understand for comparing and recognising studies. The disadvantage is that because of the greater flexibility, it requires greater management and resources in order to meet the aim of offering students a variety of valid options.
Mexico	*Advantages:* —Having a common language between higher education institutions that will facilitate student mobility and allow public authorities to compare studies using equivalence or validation. —The great diversity of criteria for allocating credits used by the public institutions hinders the creation of a uniform system of credits. In 2003 a work group from ANUIES prepared a proposal with generic recommendations for establishing a national exchange value that would facilitate transfer and serve as a reference without affecting the institutions curricula. A system was proposed based on the learning activities provided for students, an approach shared by Accord 279 (described in the answer to Question 4), although the proposal goes further, recommending that credits should be awarded for in supervised work in the professional field (stays, assistance, professional practice, consultancy and social service), at a rate of 50 hours per credit.
Nicaragua	*Advantages:* —Allows study equivalences to be awarded with greater objectivity —Offers a reference point which, although not unique, is important for equivalences of studies and recognition of qualifications. *Disadvantages:* —The concept and quantification of academic credit varies greatly, making the assignment of study equivalences very complex.

Country	Answer
	—The credit system is essentially conceived as an administrative action and does not take into consideration the real time a student need to devote to each of the courses.
Paraguay	Advantages of applying a credit system include: It allows: —the competences achieved by students to be assessed. —Greater objectivity in assessment. —Better assessment based on students' performance —Greater internal and external student mobility. —Greater ease in comparing qualifications or equivalences between qualifications. —Better comparison of academic offerings available to the student. The disadvantages include: —Consignment of a common unit of measurement for some degree courses. —Unifying criteria on the student's workload to obtain the academic credit.
Panama	Advantages include: It facilitates mobility within the system of higher education; It allows better comparison of academic offerings; It facilitates supervision of particular centres.
Uruguay	—Rationalisation and rewriting of syllabi. —Recognition of the student's academic achievements. —Instrument of horizontal and vertical student mobility.

Other models of academic credits

ECTS (European Credit Transfer System)	This system is based on the workload required by the student to achieve the objectives of a programme and the objectives are specified in terms of the results of learning and the competences to be acquired. The system is based on the convention that 60 credits represent the workload of a full-time student in an academic year of 36-40 weeks. A credit is equal to 25-30 hours of work, including lecture, practice and study time. Credits are allocated to all educational components: modules, courses, practices, theses. 30 credits represent one semester and 20 credits one trimester. An academic year represents between 1500 and 1800 hours of work for the student. The workload to obtain a first degree qualification requires 180 or 240 credits (3 or 4 years). The workload includes time spent attending classes, seminars, independent study and preparing and sitting exams.

Argentinean Credit Transfer System: SATC	This system considers all hours (classes, laboratories, independent study, final project and supervised professional practice) which a student, studying exclusive during 38-40 weeks a year, needs to complete all the subjects on the curriculum and graduate in five years. This number of hours is allocated a total of 300 credits, which are then divided into 60 credits per year of study. An SATC credit represents between 25 and 30 hours devoted to study. In order to qualify as engineers, students must fulfil a curriculum of at least 300 credits, for which the recommendation is for a curriculum divided into 5 years or 10 semesters for full-time students, who show when starting their engineering studies prove that they possess the basic necessary competences required.
UMAP (University Mobility in Asia and the Pacific)	Has adopted the ECTS scale: 60 credits represent the workload of a full-time student in one year (30 credits per semester). The workload of the student represents the amount of work required to complete one complete academic year/semester, and may include lectures, practicals, seminars, tutorials, field work, study time, exams and other assessment activities.

Concluding remarks

1. ***Concept of academic credit***

— Among Latin American higher education institutions that use the academic credit as a unit for measuring students' academic work, this is commonly based on the number of class/hours the student has to complete for each subject. In addition academic activities and additional independent work by the student are also considered.
— There is no generalised application of academic credits among Latin American higher education institutions, although there is a relative degree of uniformity in the criteria used by Latin American universities for defining or quantifying them.
— The concept of the academic credit is sometimes known by other names, as is the case in El Salvador and Honduras, where they are known as scoring units [unidades valorativas].

2. ***Credit systems***

— Generally speaking, most Latin American countries have no credit systems that apply to all universities in the country. The only report of the existence of a system of compulsory scoring units for all universities comes from the Republic of El Salvador.
— In various Latin American countries there are initiatives of different kinds to create and apply systems for academic credits and for transferring them. In some cases it is the educational authority that creates a legislation, promoting generalised application of academic credits (Colombia, Cuba, El Salvador, Mexico). In other countries, such as Chile, it is an initiative by the universities which is supported by the government, whereas in Argentina, the proposal for engineering degrees comes from a federal board of deans in the speciality. In Costa Rica and Venezuela the agreement is the result of consensus among the universities. In Peru, application of the academic credits is compulsory insofar as the studies certificates must show the credits for each course.

— The substantial difference between the way academic credits are determined in Latin American universities and European ones is that in the former they are based on class/hours, whereas the ECTS seeks to measure the student's learning for obtaining competences.

3. ***Compulsory nature.*** The use of credits in curricula is compulsory in Peru, El Salvador and Colombia. In Costa Rica it is compulsory for state universities. In other countries it is not compulsory.

4. ***Duration of degrees.*** In general terms, the duration of the degrees is similar amongst Latin American countries: First degree (*licenciaturas*) of 4-5 years and in the case of medicine, 5-6 years. Specialisations generally take one year, or 2-3 in the case of medical specialities. Master's degree courses generally last 2 years and the doctorate 3 or more.

5. ***How much is a credit worth?*** In general, in Latin American universities, 1 credit is equivalent to 1 class hour by 16 weeks in a semester, and each hour is estimated to result in 2 hours independent student work in undergraduate courses and 3 at postgraduate level. In Mexico, 1 class/week/semester hour is generally equivalent to 2 credits. Based on the information obtained, the main criterion for allocating credits in Latin American universities appears to be the number of class hours, which are presumed to involve a number of individual work hours or practical or laboratory work.

6. ***When are credits not used?*** Generally blocks of subjects are allocated to each semester, with a volume of class hours per week.