

The analysis of Generic and Subject Specific Competences in three subject areas.

Based on the China-EU Tuning Joint Study Project Questionnaire

Pablo BENEITONE, Xianjin DOU and Robert WAGENAAR

1. China-EU Tuning Joint Study Project and the definition of generic competences in China

China-EU Tuning Joint Study Project¹ is a result of the CHINA-EU High Level People-to-People Dialogue. In order to strengthen the compatibility of EU and China Education System and enhance outcome-based education, and overcome obstacles to mobility between Europe and China, it's important to establish commonly acknowledged quality criteria and develop tools for mutual recognition. Therefore the first meeting of China-EU Tuning Joint Study Project was held in Beijing on 29 Nov.2012 following Ms Androulla Vassiliou, European Commissioner for Education, Culture Multilingualism and Youth visited Ministry of Education of P.R. China. and then both sides agree to set up the China-EU Tuning Joint Study Project. The Project is co-chaired by Professor Robert Wagenaar from EU and Professor Xianjin Dou from China.

Tuning is based on the assumption that higher education in the 21st century should be student driven, and learning outcome based. It's also consistent with the direction of China higher education reform and development. On the basis of consultation three subjects, Business Administration, Education Science and Civil Engineering, were selected for a pilot study by Professor Xianjin Dou and Robert Wagenaar. Three top universities in China, Xian Jiaotong University, Beijing Normal University and Tongji University are the leading university to organize Business Administration, Education Science and Civil Engineering respectively

One of the main objectives of Tuning is to contribute to the development of easily readable and comparable degrees at global level. For that purpose, Tuning proposes to look at the degrees in terms of competences and learning outcomes. Tuning deals with two types of competences: generic competences and subject-specific competences. In this respect, while the subject area related competences are essential for any degree and refer to the specific attributes of a field of study, the generic competences identify shared attributes which could be general to any degree. In a changing society where demands tend to be in constant reformulation, these generic competences become of great importance.

Change and variety of contexts both require a constant check on social demands for degree profiles. This underlines the need for consultation, and constant revision of information on adequacy. The language of competences, since it comes from outside higher education, could be

¹ Professor Xianjin Dou and Professor Wagenaar co-chaired the China-EU Tuning Joint Study project. The Paper was prepared by Pablo Beneitone in response to Professor Xianjin Dou's advice.

considered more adequate for consultation and dialogue with groups not directly involved in academic life, and can contribute to the necessary reflection for the development of new degrees and for permanent systems of updating the existing ones.

In Tuning, the need for consultation responded to the wish to initiate a joint discussion on this field of competences with groups from inside and outside academia. Furthermore, the attempt to gather updated information for reflection on possible trends and the degree of variety and change all over the world also inspired the relevance of consultation in Tuning methodology.

The China-EU Tuning joint project began at the end of 2012 and one of its first tasks was to define generic competences in the Chinese context. As a starting point for preparing this list, Professor Wagenaar gave the 31 generic competences identified in Europe², Professor Xianjin Dou arranged that each Subject Area Group (**Business, Civil Engineering and Education**) was asked to submit a list of generic competences considered to be relevant from their perspective.

A compilation of the generic competences proposed by Professor Xianjin Dou was presented in draft form in May 2013, and after discussing it with European experts the Project agreed a final list. It was decided to present a definitive list of **33 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 participating universities 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 add generic competences that had not been included in the original list.

1.1 List of generic competences agreed in the Chinese context

1. Capacity for analysis and synthesis.
2. Capacity for applying knowledge in practice.
3. Planning and time management.
4. Basic general knowledge in the field of study.
5. Grounding in basic knowledge of the profession in practice.
6. Oral and written communication in your native language.
7. Capacity to communicate with a second language.
8. Computing skills.
9. Research skills.
10. Capacity to learn actively.
11. Information management skills.
12. Critical and self-critical abilities.
13. Capacity to adapt to new situations.
14. Capacity for generating new ideas.
15. Problem solving.
16. Decision-making.
17. Teamwork.
18. Interpersonal skills.
19. Leadership.

² Gonzalez, J. and Wagenaar, R. (2008) *Universities contribution to Bologna Process*. Bilbao: University of Deusto, 2008.

20. Ability to work in an interdisciplinary team.
21. Ability to communicate with non-experts in the field.
22. Appreciation and understanding of culture diversity.
23. Ability to work in an international context.
24. Commitment to health and safety.
25. Ability to work autonomously.
26. Project design and management.
27. Initiative and entrepreneurial spirit.
28. Ethical commitment and professional attitude.
29. Social responsibility and civic awareness.
30. Concern for quality.
31. Will to succeed.
32. Environment awareness and commitment to sustainable development.
33. Ability of self-management.

If we compare the lists drawn up in the European project, the Latin American project, the African project and the Chinese project, we can see that there is a high degree of similarity in the definition of the main generic competences. There are many convergent competences, which are easily comparable, identified in the four projects. Besides the definition of generic competences, the three Subject Area Group Coordinators separately agreed on the lists of Subject Specific Competences for their fields (Business, Civil Engineering and Education). The consultation process was developed jointly for generic and subject specific competences.

2. Methodology for the consultation process

As in other Tuning projects, it was decided to use a system of cluster sampling, given that the people surveyed are grouped in the universities themselves. This decision was made because, given that the people surveyed are not strictly independent of each other, such sampling could not in all probability be considered to be random.

Cluster designs are widely used in research³ and do not represent a source of partiality. Cluster sampling can affect the error rate of sampling of the study 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 intra-class correlation. A high intra-class 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 inter-class

³ 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.

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.

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 university 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 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 = moderate; 4 = strong.

- **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 which and how many people to consult:

- **Academics**: University lecturers teaching in 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 successfully completed a full 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 **30 graduates** from the area in which they were participating. The selected graduates should have had 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.

- **Students:** people who are either studying in the last two years of a first degree in any of the project areas at the participating universities or still awaiting graduation despite having completed their studies. Each university was asked to sample a minimum of **30 students** from the subject area in which they were participating in the project.
- **Employers:** people and/or organisations who have employed graduates from the university, or people and/or organisations that, although there is no evidence of having hired graduates from the university, appear 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.

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

- **On-line survey:** the simplest of all variants. The technical staff of the project provided the universities with an electronic form to complete the questionnaire. The questionnaire was made available online . Access to the survey required a user code. Each institution choosing to work with this form had to inform the technical project staff who would then give each group a user code which the institution would use for the on-line survey. This alternative simplified the work of the participating university, in that it only had to send an e-mail to possible respondents, 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 English and Chinese. The consultation process was lead by Maida Marty, an ICT expert from the University of Deusto.
- **Face-to-face consultations with an explanatory meeting:** in this variant, the group in question was invited to a talk on the Tuning China Project and on its importance for the education system. Once the aims and the characteristics of the survey had been set out, the questionnaire was handed out in printed format to 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 printed format, had to be incorporated by the institution organising the questionnaire into an Excel spread sheet. This then had to be sent to the technical core, to begin the process of consolidating the information and the subsequent statistical analysis.

The survey was conducted in July and August 2013, predominantly through the on-line system, resulting in a very significant number of answers: more than 3.300 questionnaires (including generic and subject specific) were returned. The information was analysed by Jon Paul Laka, statistician from the University of Deusto. He was in charge of preparing the tables, graphs and analyses of the information the groups worked with, some of which are shown below.

3. Analysis of the results⁴

The data and results gleaned from the questionnaire allowed for three levels of analysis: general, by subject area, and by institution. The **general** analysis gives the results from the academics, graduates, students and employers throughout China. The analysis by **subject area** shows the opinions of these four groups, in relation to each discipline. Similarly, the results of the questionnaires by **institution** were sent to each institution, for the consideration and potential use of the participating universities. This paper is focused on the general analysis of the results.

3.1 General analysis of the results

First, to introduce the general analysis of the results of the questionnaires, we present the totals gathered in China, divided into the four groups considered:

Table 1. Total number of questionnaires of generic competences received by GROUP.

Academics	307
Graduates	482
Students	474
Employers	485
Total number of questionnaires received	1748

The general analysis will be presented at two levels:

- Analysis by group
- Analysis by variable

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 what needs to be re-thought. At the same time, where relevant, a comparison will be made between the Chinese and the European, Latin American and African projects, in terms of what each group in the four regions considered to be most and least important.

At the second level, the axis of analysis will consist 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.

3.2. Analysis by group

⁴ This paper contains only a summary of all the results related to the consultation process in Tuning China.

3.2.1 Academics

The following table refers to the means for each competence in the 1 to 4 scale. Each competence was rated in terms of *importance* and *achievement*, so there are two results for each competence. The 33 competences were ordered from the most important to the least important competence from the academic perspective. Of course the mean for *achievement* did not follow strictly a descending pattern, as the reference for this order is the mean for *importance*. The mean for *achievement* is normally lower than the mean for *importance*. The gap between both means is relevant as it shows how far both means are. A wide gap between two competences is more relevant if the competence is rated as a highly important competence.

Table 2. Importance and achievement of generic competences from ACADEMICS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Capacity for analysis and synthesis	3,64	2,92
10	Capacity to learn Actively	3,56	2,76
15	Problem solving	3,51	2,60
2	Capacity for applying knowledge in practice	3,49	2,57
6	Oral and written communication in your native language	3,39	2,79
28	Ethical commitment and professional attitude	3,38	2,56
17	Teamwork	3,36	2,62
14	Capacity for generating new ideas	3,34	2,45
33	Ability of self-management	3,31	2,50
29	Social responsibility and civic awareness	3,29	2,49
3	Planning and time management	3,27	2,40
5	Grounding in basic knowledge of the profession in practice	3,27	2,67
18	Interpersonal skills	3,24	2,52
27	Initiative and entrepreneurial spirit	3,24	2,31
25	Ability to work autonomously	3,22	2,38
13	Capacity to adapt to new situations	3,21	2,41
4	Basic general knowledge in the field of study	3,19	3,09
30	Concern for quality	3,18	2,42
31	Will to succeed	3,14	2,70
9	Research skills	3,11	2,76
16	Decision-making	3,08	2,33
32	Environment awareness and commitment to sustainable development	3,03	2,35
24	Commitment to health and safety	3,02	2,27
26	Project design and management	2,98	2,34
11	Information management skills	2,97	2,52
12	Critical and self-critical abilities	2,95	2,26
20	Ability to work in an interdisciplinary team	2,93	2,26
19	Leadership	2,93	2,29
22	Appreciation and understanding of culture diversity	2,91	2,41
23	Ability to work in an international context	2,90	2,32
7	Capacity to communicate with a second language	2,89	2,50
21	Ability to communicate with non-experts in the field	2,76	2,20
8	Computing skills	2,71	2,72

Academics: of the 33 competences, 23 were scored over 3. However, they scored almost all competences (32) below 3 in terms of their achievement. *Basic general knowledge in the field of study* is the only competence rated over 3 in terms of achievement.

Table 3. The five most and least important competences, according to Chinese ACADEMICS

MOST IMPORTANT COMPETENCES	LEAST IMPORTANT COMPETENCES
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Capacity for analysis and synthesis.	Computing skills.
Capacity to learn actively.	Ability to communicate with non-experts in the field.
Problem solving.	Capacity to communicate in a second language.
Capacity for applying knowledge in practice.	Ability to work in an international context.
Oral and written communication in your native language.	Appreciation and understanding of culture diversity.

Three competences rated as the five most important (*Capacity for analysis and synthesis*, *Oral and written communication in your native language* and *Capacity to learn actively*) were also present within the five most achieved.

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 33 competences between importance and achievement.

The competences with the least difference in the relative score for importance and achievement are: *Basic general knowledge in the field of study* and *Computing skills*. In particular, *Computing skills*, which is the least important competence from the academic perspective, shows no gap between importance and achievement. This suggests that, despite not being considered important, it is perceived as being properly carried out. At the other end are the competences with the greatest difference between what was considered important and the rating given to its achievement. In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *Problem solving* and *Capacity for applying knowledge in practice*. In these cases, there is a significant difference between the average scores for importance and for achievement. This point should be kept in mind in later reflections in order to see where the academics see challenges to the education process.

Some of the generic competences agreed in China were reformulated and are defined using different expressions, though in most cases equivalent to those presented in the Tuning Europe, Tuning Latin America and Tuning Africa projects. Furthermore, we made a comparative analysis in relation to the importance given to the generic competences by the different groups. In the Tuning project Europe (2008⁵), the academics considered the following competences the five most important ones: *Ability for abstract thinking, analysis and synthesis*, *Ability to apply knowledge in practical situations*, *Knowledge and understanding of the subject area and understanding of the profession*, *Ability to identify, pose and resolve problems* and *Capacity to learn and stay up-to-date with learning*. The least important competences were considered to be: *Ability to communicate with non-experts of one's field*, *Commitment to the conservation of the environment*, *Spirit of enterprise*, *ability to take initiative*, *Commitment to safety* and *Ability to show awareness of equal opportunities and gender issues*.

In the Tuning Latin America project (2007⁶), the academics considered that the five most important competences are: *Capacity for abstraction, analysis, and synthesis*, *Ability to apply knowledge in*

⁵ The working documents with all the tables and graphs are available on Tuning Europe website (<http://www.unideusto.org/tuningeu/>)

⁶ The working documents with all the tables and graphs are available on Tuning Latin America website (<http://www.tuningal.org>)

practice, Knowledge regarding the area of study and related professions, Capacity for investigation and Ability to identify, pose, and solve problems. The least important competences were considered to be: *Ability to motivate and work towards common goals, Interpersonal skills, Ability to work autonomously, Commitment to look after the environment and Ability to work in international contexts.*

In the Tuning Africa project (2012⁷), the academics considered that the five most important competences are: *Ability to translate knowledge into practice, Ability for conceptual thinking, analysis and synthesis, Professionalism, ethical values and commitment to UBUNTU (respect for the well being and dignity of fellow human beings), Objective decision making and practical cost effective problem solving and Ability for creative and innovative thinking.* The least important competences were considered to be: *Ability to work in an intra and intercultural and/or international context, Environmental and economic consciousness, Commitment to preserve African identity and cultural heritage, Ability to evaluate, review and enhance quality and Ability to communicate effectively in the official/ national and local language.*

Comparing the four projects (China, Europe, Latin America and Africa), we can see an overlap in three of the competences considered to be most important in ALL regions (*Capacity for analysis and synthesis, Problem solving and Capacity for applying knowledge in practice*).

Analysing the similarities and differences between the competences that the Chinese, African, European and Latin American academics consider to be least important, we can see that no common competence appears in the three "bottom-five" lists. In the case of Chinese, African and Latin American, there is a common competence in the bottom-five: *Ability to work in an international context.*

3.2.2 Graduates

Table 4. Importance and achievement of generic competences from GRADUATES in China. Measures in decreasing order of importance.

⁷ The working documents with all the tables and graphs are available on Tuning Africa website (<http://www.tuningafrica.org>)

#	Description	Importance	Achievement
15	Problem solving	3,61	2,65
1	Capacity for analysis and synthesis	3,60	2,81
10	Capacity to learn Actively	3,58	2,91
18	Interpersonal skills	3,58	2,72
2	Capacity for applying knowledge in practice	3,56	2,51
17	Teamwork	3,51	2,78
33	Ability of self-management	3,50	2,67
3	Planning and time management	3,45	2,49
28	Ethical commitment and professional attitude	3,39	2,82
13	Capacity to adapt to new situations	3,37	2,60
14	Capacity for generating new ideas	3,37	2,55
6	Oral and written communication in your native language	3,35	2,79
25	Ability to work autonomously	3,31	2,62
5	Grounding in basic knowledge of the profession in practice	3,28	2,67
29	Social responsibility and civic awareness	3,27	2,70
30	Concern for quality	3,27	2,63
27	Initiative and entrepreneurial spirit	3,26	2,31
16	Decision-making	3,25	2,43
31	Will to succeed	3,21	2,72
26	Project design and management	3,19	2,56
4	Basic general knowledge in the field of study	3,15	3,04
24	Commitment to health and safety	3,12	2,41
11	Information management skills	3,11	2,53
19	Leadership	3,10	2,42
20	Ability to work in an interdisciplinary team	3,08	2,42
32	Environment awareness and commitment to sustainable development	3,04	2,49
9	Research skills	3,04	2,77
12	Critical and self-critical abilities	2,95	2,36
21	Ability to communicate with non-experts in the field	2,94	2,40
22	Appreciation and understanding of culture diversity	2,93	2,67
23	Ability to work in an international context	2,92	2,34
7	Capacity to communicate with a second language	2,85	2,37
8	Computing skills	2,68	2,66

In the case of **graduates**, 27 generic competences were scored over 3 on importance. If we analyse the level of achievement, we can see that almost all (32) competences score below 3. As in the case of the academics, *Basic general knowledge in the field of study* is the only competence rated over 3 in terms of achievement.

Two of the competences within the five most important (*Capacity for analysis and synthesis* and *Capacity to learn actively*) were also present within the five most achieved.

Table 5. The five most and least important competences, according to Chinese GRADUATES

MOST IMPORTANT COMPETENCES	LEAST IMPORTANT COMPETENCES
Problem solving.	Computing skills.
Capacity for analysis and synthesis.	Capacity to communicate in a second language.
Capacity to learn actively.	Ability to work in an international context.
Interpersonal skills.	Appreciation and understanding of culture diversity.
Capacity for applying knowledge in practice.	Ability to communicate with non-experts in the field.

In relation to the gap between the scores given by graduates for importance and achievement in each of the generic competences, we can identify that the competences that display the greatest difference between the scores for importance and achievement were: *Capacity for applying knowledge in practice*, *Problem solving* and *Interpersonal skills*. These three competences are among the five generic competences considered to be most important by the graduates.

The competences with the least difference in the relative score for importance and achievement are: *Basic general knowledge in the field of study* and *Computing skills*. In particular, *Computing skills* showed no significant gap between importance and achievement and was considered to be among the least important by the graduates. This would suggest that although they are not considered to be important, there is a perception that they have been achieved.

Focusing on the comparative analysis of the results from China and other regions, in the Tuning Europe project, the graduates considered the most important competences to be: *Ability for abstract thinking, analysis and synthesis, Ability to apply knowledge in practical situations, Knowledge and understanding of the subject area and understanding of the profession, Ability to identify, pose and resolve problems and Capacity to learn and stay up-to-date with learning*. The least important competences were considered to be: *Commitment to the conservation of the environment, Commitment to safety, Ability to show awareness of equal opportunities and gender issues, Appreciation of and respect for diversity and multiculturalism and Ability to act with social responsibility and civic awareness*.

In Latin America, the graduates considered the five most important competences to be: *Ability to apply knowledge in practice, Capacity for abstraction, analysis, and synthesis, Ability to identify, pose, and solve problems, Knowledge regarding the area of study and related professions and Ability to learn and update learning*. The least important competences were considered to be: *Ability to work in international contexts, Ability to work autonomously, Commitment to socio-cultural environment, Value and respect for diversity and multiculturalism and Commitment to look after the environment*.

In Africa, the graduates considered the five most important competences to be: *Ability to translate knowledge into practice, Ability for conceptual thinking, analysis and synthesis, Objective decision making and practical cost effective problem solving, Professionalism, ethical values and commitment to UBUNTU (respect for the well being and dignity of fellow human beings) and Leadership, management and team work skills*. The least important competences were considered to be: *Ability to work in an intra and intercultural and/or international context, Environmental and economic consciousness, Ability to evaluate, review and enhance quality, Commitment to preserve African identity and cultural heritage and Ability to communicate effectively in official/ national and local language*.

If we compare the scores given by Chinese, African, European and Latin American graduates, we see that they agree on three of the most important competences (*Problem solving, Capacity for analysis and synthesis and Capacity for applying knowledge in practice*). Analysing the similarities and differences between the competences that the African, European and Latin American graduates consider to be least important, and as in the case of academics, we can notice that none of the competences appear in the "bottom-five" lists in the four projects, but as in the case of academics, Chinese, African and Latin American graduates ranked a common competence in the bottom-five: *Ability to work in an international context*.

3.2.3 Students

Table 6. Importance and achievement of generic competences from STUDENTS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Capacity for analysis and synthesis	3,57	2,71
15	Problem solving	3,53	2,70
2	Capacity for applying knowledge in practice	3,52	2,42
10	Capacity to learn Actively	3,52	2,87
33	Ability of self-management	3,44	2,62
18	Interpersonal skills	3,42	2,71
17	Teamwork	3,40	2,81
29	Social responsibility and civic awareness	3,37	2,77
3	Planning and time management	3,36	2,38
28	Ethical commitment and professional attitude	3,36	2,82
6	Oral and written communication in your native language	3,30	2,78
14	Capacity for generating new ideas	3,29	2,48
13	Capacity to adapt to new situations	3,29	2,63
5	Grounding in basic knowledge of the profession in practice	3,27	2,63
25	Ability to work autonomously	3,26	2,62
30	Concern for quality	3,24	2,62
24	Commitment to health and safety	3,23	2,50
16	Decision-making	3,22	2,46
27	Initiative and entrepreneurial spirit	3,20	2,27
31	Will to succeed	3,19	2,81
4	Basic general knowledge in the field of study	3,18	2,95
32	Environment awareness and commitment to sustainable development	3,12	2,56
9	Research skills	3,10	2,63
26	Project design and management	3,07	2,45
11	Information management skills	3,06	2,45
12	Critical and self-critical abilities	3,04	2,44
19	Leadership	3,04	2,38
20	Ability to work in an interdisciplinary team	2,99	2,31
23	Ability to work in an international context	2,98	2,35
7	Capacity to communicate with a second language	2,97	2,37
22	Appreciation and understanding of culture diversity	2,97	2,70
21	Ability to communicate with non-experts in the field	2,92	2,40
8	Computing skills	2,72	2,60

Students rated 27 competences over 3 in terms of importance. In terms of the level of achievement, all competences score below 2.8. One of the competences considered by them as most important (*Capacity to learn actively*) is, in turn, the one considered to have the highest level of achievement.

Table 7. The five most and least important competences, according to Chinese STUDENTS

MOST IMPORTANT COMPETENCES	LEAST IMPORTANT COMPETENCES
Capacity for analysis and synthesis.	Computing skills.
Problem solving.	Ability to communicate with non-experts in the field.
Capacity for applying knowledge in practice.	Appreciation and understanding of culture diversity.
Capacity to learn actively.	Capacity to communicate with a second language.
Ability of self-management.	Ability to work in an international context.

Analysing the gap between the scores given by Chinese students to the importance and achievement of each of the generic competences, we underline that the greatest differences between what was considered important and the rating given to its achievement are: *Capacity for analysis and synthesis*, *Capacity for applying knowledge in practice*, *Problem solving* and *Ability of self-management*. These are among the competences students consider to be most important yet they rate it low on level of achievement.

The competences with the least difference in the relative score for importance and achievement are: *Computing skills, Basic general knowledge in the field of study, Appreciation and understanding of culture diversity, Will to succeed and Research skills*. These five competences, where there is no significant gap between importance and achievement, include two which were considered to be among the least important by students (*Computing skills and Appreciation and understanding of culture diversity*). This would suggest that although they are not considered to be important there is a perception that they have been achieved.

For a comparative analysis between the different Tuning projects, European students consider the following competences to be the most important ones: *Ability to apply knowledge in practical situations, Ability for abstract thinking, analysis and synthesis, Ability to identify, pose and resolve problems, Knowledge and understanding of the subject area and understanding of the profession and Ability to work in a team*. The least important competences were considered to be: *Ability to act with social responsibility and civic awareness, Commitment to the conservation of the environment, Ability to communicate with non-experts of one's field, Commitment to safety and Ability to show awareness of equal opportunities and gender issues*.

In Latin America, the students considered the five most important competences to be: *Ability to apply knowledge in practice, Capacity for abstraction, analysis, and synthesis, Knowledge regarding the area of study and related professions, Ability to identify, pose, and solve problems and Ability to learn and update learning*. The least important competences were considered to be: *Ability to work in international contexts, Commitment to socio-cultural environment, Interpersonal skills, Ability to work autonomously and Commitment to look after the environment*.

In Africa, the students considered the five most important competences to be: *Ability to translate knowledge into practice, Ability for conceptual thinking, analysis and synthesis, Professionalism, ethical values and commitment to UBUNTU (respect for the well being and dignity of fellow human beings), Ability for creative and innovative thinking and Self confidence, entrepreneurial spirit and skills*. The least important competences were considered to be: *Ability to work in an intra and intercultural and/or international context, Ability to evaluate, review and enhance quality, Environmental and economic consciousness, Commitment to preserve African identity and cultural heritage and Ability to communicate effectively in official/ national and local language*.

If we compare the scores given by Chinese, African, European and Latin American students, we see that they agree on two of the most important competences (*Capacity for analysis and synthesis and Capacity for applying knowledge in practice*). As in the case of academics and graduates, Chinese, African and Latin American students ranked a common competence in the bottom-five: *Ability to work in an international context*.

3.2.4 Employers

Table 8. Importance and achievement of generic competences fromr EMPLOYERS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Capacity for analysis and synthesis	3,61	2,85
15	Problem solving	3,60	2,73
10	Capacity to learn Actively	3,55	2,88
18	Interpersonal skills	3,49	2,73
17	Teamwork	3,48	2,76
33	Ability of self-management	3,45	2,73
2	Capacity for applying knowledge in practice	3,44	2,58
25	Ability to work autonomously	3,34	2,64
14	Capacity for generating new ideas	3,34	2,57
28	Ethical commitment and professional attitude	3,34	2,78
6	Oral and written communication in your native language	3,34	2,81
3	Planning and time management	3,34	2,55
30	Concern for quality	3,31	2,67
13	Capacity to adapt to new situations	3,31	2,61
29	Social responsibility and civic awareness	3,26	2,75
27	Initiative and entrepreneurial spirit	3,24	2,44
31	Will to succeed	3,20	2,76
16	Decision-making	3,17	2,47
26	Project design and management	3,16	2,52
5	Grounding in basic knowledge of the profession in practice	3,14	2,70
24	Commitment to health and safety	3,12	2,51
4	Basic general knowledge in the field of study	3,09	3,00
32	Environment awareness and commitment to sustainable development	3,06	2,54
19	Leadership	3,04	2,39
9	Research skills	3,03	2,67
11	Information management skills	3,00	2,57
20	Ability to work in an interdisciplinary team	2,94	2,40
12	Critical and self-critical abilities	2,92	2,37
22	Appreciation and understanding of culture diversity	2,87	2,59
23	Ability to work in an international context	2,82	2,33
21	Ability to communicate with non-experts in the field	2,82	2,37
7	Capacity to communicate with a second language	2,77	2,43
8	Computing skills	2,62	2,68

Employers scored 26 competences over 3 in terms of their importance. In terms of achievement, all competences scored below 3.

Table 9. The five most and least important competences, according to Chinese EMPLOYERS

MOST IMPORTANT COMPETENCES	LEAST IMPORTANT COMPETENCES
Capacity for analysis and synthesis.	Computing skills.
Problem solving.	Capacity to communicate in a second language.
Capacity to learn actively.	Ability to communicate with non-experts in the field.
Interpersonal skills.	Ability to work in an international context.
Teamwork.	Appreciation and understanding of culture diversity.

If we look at the differences between the rating of the importance and achievement of each competence, we note that the competences with the greatest difference in the relative score for importance and achievement are: *Problem solving*, *Capacity for applying knowledge in practice*, *Initiative and entrepreneurial spirit*, *Planning and time management* and *Capacity for generating new ideas*. One of these (*Problem solving*) is among the competences employers consider to be most important, yet they rate it low when it comes to the level of achievement.

At the other end there are competences with the least difference between what was considered important and the rating given to its achievement: *Computing skills*, *Basic general knowledge in the field of study*, *Appreciation and understanding of culture diversity*, *Capacity to communicate with a second language* and *Research skills*. These five competences, where there is no significant gap between importance and achievement, include three which were considered to be among the least

important by students (*Computing skills, Capacity to communicate in a second language and Appreciation and understanding of cultural diversity*). This would suggest that, although they are not considered to be important, there is a perception that they have been achieved.

In terms of global comparison, European employers considered the following competences to be the most important: *Ability to apply knowledge in practical situations, Ability for abstract thinking, analysis and synthesis, Ability to identify, pose and resolve problems, Knowledge and understanding of the subject area and understanding of the profession and Ability to work in a team*. The least important competences were considered to be: *Ability to act with social responsibility and civic awareness, Ability to work in an international context, Ability to show awareness of equal opportunities and gender issues, Commitment to the conservation of the environment and Appreciation of and respect for diversity and multiculturality*.

In Latin America, the graduates considered the five most important competences to be: *Ability to apply knowledge in practice, Capacity for abstraction, analysis, and synthesis, Knowledge regarding the area of study and related professions, Ethical commitment and Ability to identify, pose, and solve problems*. The least important competences were considered to be: *Ability to work in international contexts, Ability to work autonomously, Commitment to socio-cultural environment, Value and respect for diversity and multiculturality and Commitment to look after the environment*.

In Africa, the graduates considered that the five most important competences are: *Ability to translate knowledge into practice, Ability for conceptual thinking, analysis and synthesis, Professionalism, ethical values and commitment to UBUNTU (respect for the well being and dignity of fellow human beings), Objective decision making and practical cost effective problem solving and Leadership, management and team work skills*. The least important competences were considered to be: *Ability to work in an intra and intercultural and/or international context, Environmental and economic consciousness, Commitment to preserve African identity and cultural heritage, Ability to evaluate, review and enhance quality and Ability to communicate effectively in official/ national and local language*.

A high level of coincidence can be seen in two of the five competences considered to be most important by Chinese, African, European and Latin American employers: *Capacity for analysis and synthesis and Problem solving*.

We find a similar level of overlap in competences considered least important by employers in the four projects, where they coincide in one of the five competences: *Ability to work in an international context*.

3.3. Analysis by variable

3.3.1 Importance

In the area of “importance”, it is significant that the majority of the 33 competences were rated above 3, on a scale in which 3 is equivalent to Moderate and 4 to Strong. This means that the 33 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 included in the definition of a university degree in China. At the same time, having qualitatively analysed the open question on other possible competences not included in the list of 33, the answers contained

no alternatives that were sufficiently significant to be incorporated into the list of 33. 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 three competences:

- *Problem solving.*
- *Capacity for analysis and synthesis.*
- *Capacity to learn actively.*

The **graduates** also agreed with the **academics** and **employers** on including *Capacity for applying knowledge in practice* among the five most important competences while the **students** rated this competence much lower. Among **employers and graduates**, *Interpersonal skills* scored highest while **students** and **academics** rated much lower.

At the other end of the scale the four groups agreed on the five least important competences: *Computing skills, Appreciation and understanding of culture diversity, Capacity to communicate with a second language, Ability to work in an international context and Ability to communicate with non-experts in the field.*

in the variable analysis a calculation is included of the correlations among the means given by the four groups. This correlation coefficient measures the sign and intensity of the relationship between the means of the four groups considered in each result: importance, achievement and ranking. This most used coefficient has a minimum value of -1 (maximum possible negative relationship) and a maximum value of +1 (maximum possible positive relationship). A zero would indicate the absence of relationship between the results of any pair of given groups. In this particular study in China all correlations are positive. A negative correlation would indicate that two given groups are behaving in an opposite manner. A correlation close to 1 for two groups shows that the means obtained for the set of competences behave in a very similar manner.

Table 10. Correlation matrix between averages, based on the level of IMPORTANCE between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,9312	1,0000		
<i>Student</i>	0,9543	0,9633	1,0000	
<i>Graduate</i>	0,9200	0,9814	0,9637	1,0000

The values of the correlation coefficient for importance were very high - over 0.92 in all cases. This means that there was a high degree of compatibility among the four groups with regard to the level of importance given to the 33 competences, with slightly less compatibility between academics and graduates, and a particularly high correlation between employers and graduates. This high correlation between employers and graduates (0,98) means that when a competence is judged by *employers* as very important, *graduates* have considered this competence as very important too (this does not imply that the means are equal in both groups, but both means will be high relatively in each group). In the same way, if a given competence is judged by *employers* among the least important ones, *graduates* will consider this competence as a competence of least importance

(once again this does not imply that the means are equal in both groups, but both means will be relatively low in each group).

Comparing the four groups in the four projects (China, Europe, Latin America and Africa) we identified a common competence for ALL on the top five in terms of importance: *Capacity for analysis and synthesis*.

3.3.2 Achievement

It is worth mentioning that in achievement, all 33 competences were rated between 2 and 3 on a scale in which 2 is equivalent to Weak and 3 to Moderate.

With regard to the competences considered to be highly achieved by each of the 4 groups consulted, there was agreement on two competences:

- *Basic general knowledge in the field of study.*
- *Capacity to learn actively.*

The **graduates, academics and employers** scored *Oral and written communication in your native language* and *Capacity for analysis and synthesis* higher than **students**. For their part, the **graduates, students and employers** included amongst the five most achieved competences the *Ethical commitment and professional attitude* and **academics** rated it much lower.

At the end of the scale, the **graduates, academics and employers** scored *Critical and self-critical abilities* and *Ability to communicate with non-experts in the field* among the least achieved competences. For their part, the **academics, students and employers** agreed on two competences which are the least achieved: *Leadership and Ability to work in an interdisciplinary team*.

Regarding the achievement of competences, there is a lower coincidence among the groups than with regard to the importance. This means that there was a high degree of compatibility among the four groups with regard to the level of achievement given to the 33 competences, with slightly less compatibility between academics and students, and a particularly high correlation between employers and graduates.

Table 11. Correlation matrix between the averages, based on the level of ACHIEVEMENT between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,8674	1,0000		
<i>Student</i>	0,7336	0,9173	1,0000	
<i>Graduate</i>	0,8514	0,9615	0,9350	1,0000

It is interesting to note that as in the case of the European, Latin American and African Tuning projects, the level of achievement is lower in the four groups than the level of importance. The four groups agreed on four competences out of the five ones with the greatest gaps between achievement and importance:

- *Capacity for applying knowledge in practice.*
- *Problem solving.*
- *Planning and time management.*
- *Initiative and entrepreneurial spirit.*

In both cases, these four competences were considered very important but the four groups scored them as the lowest achieved.

On the other hand, the four groups agreed on three competences with no gap between importance and achievement: *Computing skills*, *Research skills* and *Basic general knowledge in the field of study*.

3.3.3 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.

Table 12. Comparative ranking of generic competences by GROUP.

Competence	Academics	Employers	Students	Graduates
Capacity for analysis and synthesis.	1	1	1	1
Capacity for applying knowledge in practice.	2	2	2	3
Capacity to learn actively.	3	4	3	2
Problem solving.	4	3	4	4
Ability of self-management.	5	7	7	8
Teamwork.	6	6	8	7
Social responsibility and civic awareness.	7	16	14	14
Basic general knowledge in the field of study.	8	12	10	12
Initiative and entrepreneurial spirit.	9	13	12	11
Grounding in basic knowledge of the profession in practice.	10	9	9	9
Planning and time management.	11	8	6	6
Interpersonal skills.	12	5	5	5
Ethical commitment and professional attitude.	13	15	20	21
Capacity for generating new ideas.	14	10	11	17
Research skills.	15	17	15	13
Will to succeed.	16	19	16	18
Ability to work autonomously.	17	11	21	15
Oral and written communication in your native language.	18	18	17	16
Capacity to adapt to new situations.	19	14	13	10
Concern for quality.	20	21	26	26
Decision-making.	21	20	19	23
Capacity to communicate with a second language.	22	25	25	25
Commitment to health and safety.	23	24	18	19
Ability to work in an international context.	24	29	31	29
Appreciation and understanding of culture diversity.	25	30	27	28
Environment awareness and commitment to sustainable development.	26	31	28	33
Project design and management.	27	26	29	27
Computing skills.	28	32	32	30
Leadership.	29	27	24	20
Critical and self-critical abilities.	30	22	22	22
Information management skills.	31	23	23	24
Ability to work in an interdisciplinary team.	32	28	30	32
Ability to communicate with non-experts in the field.	33	33	33	31

If we examine the table above, we again see a high level of coincidence between the four groups consulted, both in terms of the competences they ranked to be very important and those they considered to be the least important. The four groups ranked in the top five four common competences:

- *Capacity for analysis and synthesis.*
- *Capacity for applying knowledge in practice.*
- *Capacity to learn actively*
- *Problem solving*

At the bottom five of the ranking, the four groups agreed on one competence: *Ability to communicate with non-experts in the field.*

In terms of correlation, there is a big coincidence among the four groups as it was shown with regard to the importance. This means that there was a high degree of compatibility among the four groups with regard to the ranking given to the 33 competences, with slightly less compatibility between academics and graduates, and a particularly high correlation between students and graduates.

Table 13. Correlation matrix between the averages, based on the RANKING between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,9503	1,0000		
<i>Student</i>	0,9268	0,9796	1,0000	
<i>Graduate</i>	0,9150	0,9787	0,9913	1,0000

It is interesting to note that in the case of Tuning China project, the correlation between the 4 groups consulted is very high. Another important issue is related to consistency: the results of the ranking were very close to the rating given in terms of importance. If we compare the results of the rating and the ranking, the four groups agreed on three competences on the top: *Capacity for analysis and synthesis*, *Capacity to learn actively* and *Problem solving*; and one competence on bottom: *Ability to communicate with non-experts in the field*.

3.4 Some reflections on the results of the survey of generic competences in China

The established procedure met with acceptance in China. The more than 1740 questionnaires focused on generic competences and 1600 related to subject specific competences show an interest generated among the different agents in the universities involved in the study.

There is evidence of high rates of correlation among the four groups consulted (academics, graduates, students and employers) with regard to the 33 competences, both in terms of importance, and the level of achievement. The correlation among the groups in China is higher than Europe. This shows that the groups in China are closer in their perception of the importance of the competences than in Europe.

All groups considered important the 33 established competences, awarding the majority of them ratings of over 3, on a scale in which 3 is equivalent to Moderate. This validates the list agreed by Chinese experts within the project.

Another important aspect of the consultation process in China is the comparability of the results with other Tuning projects, in particular Europe, Latin America and Africa. It is clear that the four groups consulted in the different regions rated and ranked some common competences as essential for a degree. These comparative results give elements for a global discussion.

Lower scores were given for level of achievement, indicating a good level of criticism and demand among those surveyed. The mean for *achievement* is normally lower than the mean for *importance*. This is the case in all other previous Tuning projects (and most studies using this double scale of 'importance' and 'achievement' show similar results). But of course the gap between both means is

relevant as it shows how far both means are apart. A wide gap between two competences is more relevant if the competence is rated as a highly important competence.

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 that this study has shown to be relevant for the different groups and, where nonetheless there is a perception of a lack of achievement. Competences that scored least in terms of importance showed less difference when compared to achievement. The results presented in this paper showed part of the analysis, mainly focused on the top and bottom of the importance, achievement and ranking. It will also be important to analyse what happened in the middle of the scale, where the majority of the competences were located.

The consultation process is one of the main stages in Tuning methodology and the starting point for an institutional, subject area related, national and global reflection. Tuning China contributes significantly to this discussion.

4. Subject Specific competences: summary of the main findings in Business, Civil Engineering and Education consultation process

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 three subject areas in the Tuning China Project engaged in a discussion in order to reach agreement on the competences for each area. 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, each subject area group exchanged information on the current situation in the institutions involved, the type of programmes currently available and prospects for the future. 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 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 and each discipline. The groups analysed differences and analogies in the existing systems and study programmes. As part of this phase, each of the subject area groups prepared their own questionnaires, containing a list of suggested **subject specific competences** for the discipline, and decided whom they should survey. This process was done in parallel with the generic competences definition and consultation explained above.

4.1. List of subject specific competences agreed for China

4.1.1. Business subject specific competences

1. Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).
2. Audit an organization and design consultancy plans.

3. Apply and transfer business knowledge to the work environment and provide practical solutions.
4. Identify and operate adequate software.
5. Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios).
6. Identify the constitutional characteristics of an organization.
7. Business communication ability.
8. Identify the functional areas of an organization and their relations.
9. Identify impact of macro & microeconomic elements on business organizations.
10. Learning to learn (how, when, where new personal developments are needed).
11. Ability to suggest solutions to and adapt to change.
12. Ability to apply business and managerial concepts in different organizational settings.
13. Use university knowledge to identify impact of different cultures on business.
14. Understand details of business functions, size, sectors & link with theories.
15. Understand and apply existent & new technology & its impact for new / future markets.
16. Understand principles of engineering & link them with business.
17. Demonstrate awareness and understanding of ethical standards for business organizations.
18. Understand the principles of law & link them with business / management.
19. Understand the principles of psychology, identify implications for organizations.
20. Understand & use bookkeeping and financial systems.
21. Written and oral communication in a foreign language.
22. Ability to conduct a business environment analysis using suitable instruments.
23. Work assignments abroad (e.g. work experience for 20 weeks).
24. Business negotiation ability.
25. Identify the cultural difference and cross-cultural communication in commercial activity.
26. Ability to identify and act upon opportunities in the business environment.

4.1.2. Civil Engineering subject specific competences

1. Broad knowledge on the essential features, processes, history and materials of civil engineering.
2. Awareness of the responsibilities of civil engineering in society.
3. Ability to do original researches in civil engineering independently.
4. Ability to use modern techniques and information tools in engineering practice.
5. Ability to organize and coordinate civil engineering projects.
6. Ability to communicate, collaborate and conduct engineering design/construction/management.
7. Comprehensive ability and leadership on civil engineering project management.
8. Sense of creativity & innovation in civil engineering.
9. Ability to define, determine and implement a strategy for solving a civil engineering problem and to produce a substantial report or thesis.
10. Ability to deal with engineering accident and engineering risk management.
11. Ability to apply the principles and methods of mechanics.
12. Ability on the application of basic performance of engineering materials.
13. Ability to master and apply the fundamental principles of structure analysis.
14. Ability to deal with general problems in construction and organization independently.
15. Knowledge for applying information technology in civil engineering. e.g. engineering software.
16. Ability to design and conduct experiments, investigations, and data analysis in civil engineering.
17. Ability to apply the knowledge of engineering geology to solve problems during the design and construction process.
18. Ability to apply the basic principles and methods for foundation design/construction.
19. Ability to apply the life-cycle design concept to an engineering project.

20. Capacity for observing and understanding the environment impact of engineering practices.
21. Knowledge on the working principle of common engineering equipment and their development trends.
22. Ability to use laws and regulations to implement engineering construction management.
23. Skills relevant to all major employment sectors in civil engineering.
24. Ability to read the specialty literatures in English or another foreign language.
25. Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water supply and drainage, architectural equipment and building electricity.
26. Ability to express for civil engineering.
27. Capacity for conceptual design in civil engineering.

4.1.3. Education subject specific competences

1. Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.
2. Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.
3. The ability to identify potential connections among educational theories, educational policies, and educational practices.
4. The ability to compare and contrast education systems in different countries.
5. The ability to analyse current educational thoughts.
6. The ability to relate educational policies and trends in different countries to the socio-economic and cultural contexts.
7. The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of comparative education.
8. The ability to understand and critically analyze commonality and diversity of educational development in different countries and regions of the world.
9. The ability to reflect on the nature, roles and underlying agendas of international organizations.
10. The ability to conduct international academic exchange and cross-cultural communication.
11. The ability to undertake cross-disciplinary and cross-cultural educational research from international perspectives.
12. The ability to provide policy consultation and services for international organizations, governments, and various educational institutions.
13. The ability to learn from international experiences to design and implement educational practices in local contexts.
14. The ability to adopt appropriate comparative approaches to solve problems in educational theory and practice.
15. The ability to design, implement and evaluate educational or developmental projects based on evidence and data obtained from comparative studies.
16. The ability to apply theories and methods of pedagogy to inform effective teaching.
17. The ability to lead and coordinate a multidisciplinary or multicultural team.
18. The ability to apply ICT in educational research, project and knowledge management, and independent study.
19. Commitment to analyze international experiences consciously and critically, making contributions to national educational development and reform.
20. Awareness and application of internationalization and localization of education.
21. An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions.

22. Understanding and appreciation of the social values of the profession, and commitment to professional ethics.

4.2. Analysis of the results

As was explained in section 2 and 3, the consultation process followed the same procedure for subject specific competences in terms of methodology and analysis as it did for generic competences. The data and results gleaned from each subject area group allowed for two levels of analysis:

- Analysis by group: it presents 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 **subject specific competences**. It analyses the differences between the degree of importance and the level of achievement, in order to highlight any that need to be re-thought.
- Analysis by variable: it shows comparatively, for the four groups, what the response was with regard to each of the variables (**importance, achievement and ranking**), in order to highlight the degree of correlation between them.

First, to introduce the subject specific analysis of the results of the consultation, we present the totals gathered in China (**over 1600 questionnaires**), divided up into the four groups considered:

Table 14. Total questionnaires of subject specific competences received by SUBJECT AREA and GROUP.

	Subject Specific Competences			
	Business	Civil Engineering	Education	Total
Academics	107	108	61	276
Employers	141	98	196	435
Students	150	166	122	438
Graduates	144	119	188	451
Total	542	491	567	1600

Section 5, 6 and 7 will present the results of each subject area in relation to the groups consulted and the variables included in the study.

5. Business

5.1. Analysis by group

5.1.1 Academics

As in the case of the generic competences analysis, the table below refers to the means for each subject specific competence in the 1 to 4 scale. Each competence was rated in terms of *importance* and *achievement*, so there are two results for each competence. The 26 subject specific competences for Business were ordered from the most important to least important competence from the academic perspective.

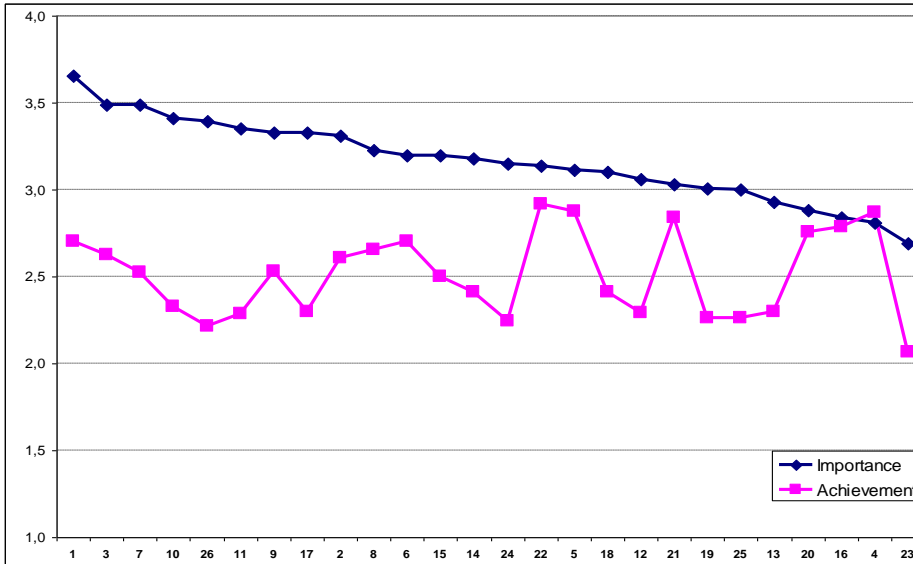
Table 15. Importance and achievement of subject specific competences in BUSINESS from ACADEMICS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market)	3,65	2,70
3	Apply and transfer business knowledge to the work environment and provide practical solutions	3,49	2,63
7	Business communication ability	3,49	2,53
10	Learning to learn (how, when, where new personal developments are needed)	3,41	2,33
26	Ability to identify and act upon opportunities in the business environment	3,39	2,21
11	Ability to suggest solutions to and adapt to change	3,35	2,29
9	Identify impact of macro & microeconomic elements on business organizations	3,33	2,53
17	Demonstrate awareness and understanding of ethical standards for business organizations	3,33	2,30
2	Audit an organization and design consultancy plans	3,31	2,61
8	Identify the functional areas of an organization and their relations	3,22	2,65
6	Identify the constitutional characteristics of an organization	3,20	2,70
15	Understand and apply existent & new technology & its impact for new / future markets	3,20	2,50
14	Understand details of business functions, size, sectors & link with theories	3,18	2,41
24	Business negotiation ability	3,15	2,24
22	Ability to conduct a business environment analysis using suitable instruments	3,14	2,92
5	Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)	3,11	2,88
18	Understand principles of law & link them with business / management	3,10	2,41
12	Ability to apply business and managerial concepts in different organizational settings	3,06	2,29
21	Written and oral communication in a foreign language	3,03	2,84
19	Understand the principles of psychology, identify implications for organizations	3,01	2,26
25	Identify the cultural difference and cross-cultural communication in commercial activity	3,00	2,26
13	Use university knowledge to identify impact of different cultures on business	2,93	2,30
20	Understand & use bookkeeping and financial systems	2,88	2,76
16	Understand principles of engineering & link them with business	2,84	2,79
4	Identify and operate adequate software	2,81	2,87
23	Work assignments abroad (e.g. work experience for 20 weeks)	2,69	2,07

21 of 26 subject specific competences in Business were scored over 3 from the academic perspective. However, the respondents scored all competences below 3 in terms of their achievement.

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 26 subject specific competences between importance and achievement. The graphic below shows the gap between both variables.

Graphic 1. Gap between Importance and achievement of subject specific competences in BUSINESS from ACADEMICS in China.



Comparing both variables, the subject specific competences with the least difference are:

- *Identify and operate adequate software.*
- *Understand principles of engineering & link them with business.*
- *Understand & use bookkeeping and financial systems.*

These three competences were also considered the least important from the academic perspective. This suggests that, despite not being considered important, they are perceived as being properly carried out. One competence (*Identify and operate adequate software*) was rated more in terms of achievement than in terms of importance.

At the other end there are the competences with the greatest difference between what was considered important and the rating given to its achievement:

- *Ability to identify and act upon opportunities in the business environment.*
- *Learning to learn (how, when, where new personal developments are needed).*
- *Ability to suggest solutions to and adapt to change.*
- *Demonstrate awareness and understanding of ethical standards for business organizations.*
- *Business communication ability.*

In these cases, there is a significant difference between the average scores for importance and for achievement, and all of them were rated among the 8 most important competences by the respondents.

5.1.2 Employers

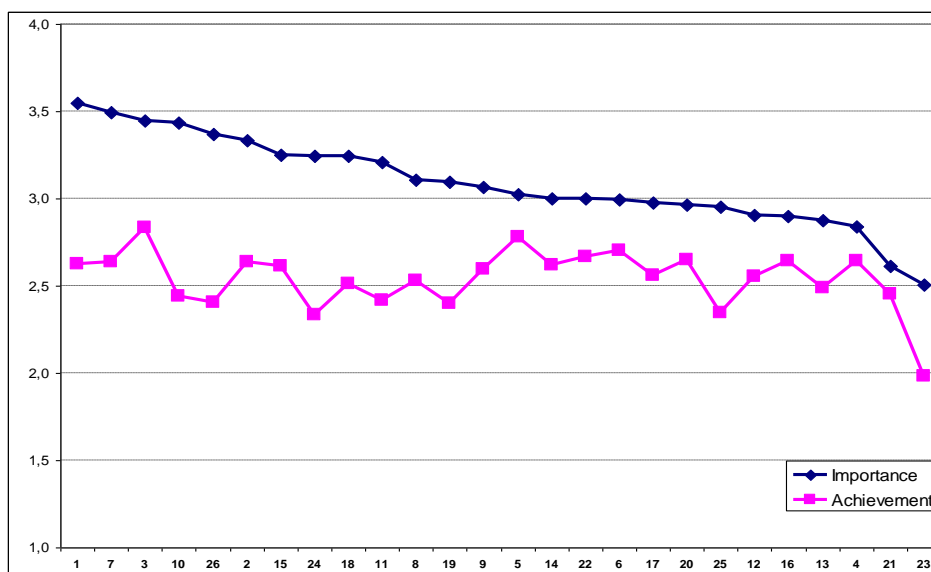
The Table below shows the means of each variable from the employer perspective.

Table 16. Importance and achievement of subject specific competences in BUSINESS from EMPLOYERS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market)	3,55	2,63
7	Business communication ability	3,50	2,64
3	Apply and transfer business knowledge to the work environment and provide practical solutions	3,45	2,84
10	Learning to learn (how, when, where new personal developments are needed)	3,43	2,44
26	Ability to identify and act upon opportunities in the business environment	3,37	2,41
2	Audit an organization and design consultancy plans	3,33	2,64
15	Understand and apply existent & new technology & its impact for new / future markets	3,25	2,61
24	Business negotiation ability	3,24	2,33
18	Understand principles of law & link them with business / management	3,24	2,51
11	Ability to suggest solutions to and adapt to change	3,21	2,42
8	Identify the functional areas of an organization and their relations	3,11	2,53
19	Understand the principles of psychology, identify implications for organizations	3,09	2,40
9	Identify impact of macro & microeconomic elements on business organizations	3,06	2,59
5	Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)	3,02	2,78
14	Understand details of business functions, size, sectors & link with theories	3,00	2,62
22	Ability to conduct a business environment analysis using suitable instruments	3,00	2,67
6	Identify the constitutional characteristics of an organization	2,99	2,70
17	Demonstrate awareness and understanding of ethical standards for business organizations	2,98	2,56
20	Understand & use bookkeeping and financial systems	2,96	2,65
25	Identify the cultural difference and cross-cultural communication in commercial activity	2,95	2,34
12	Ability to apply business and managerial concepts in different organizational settings	2,91	2,55
16	Understand principles of engineering & link them with business	2,90	2,64
13	Use university knowledge to identify impact of different cultures on business	2,88	2,49
4	Identify and operate adequate software	2,84	2,65
21	Written and oral communication in a foreign language	2,61	2,45
23	Work assignments abroad (e.g. work experience for 20 weeks)	2,51	1,98

Only 16 of 26 subject specific competences in Business were scored over 3. Employers were more critical with regard to the importance of almost half of the 26 subject specific competences. However, they scored all competences below 3 in terms of their achievement.

Graphic 2. Gap between Importance and achievement of subject specific competences in BUSINESS from EMPLOYERS inChina.



The competences with the least difference in the relative score for importance and achievement are:

- *Written and oral communication in a foreign language.*
- *Identify and operate adequate software.*
- *Understand principles of engineering & link them with business.*

As in the case of academics, these three competences were also considered the least important from the academics' perspective.

The competences with the greatest difference between what was considered important and the rating given to its achievement are:

- *Learning to learn (how, when, where new personal developments are needed).*
- *Ability to identify and act upon opportunities in the business environment.*
- *Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).*
- *Business negotiation ability.*
- *Business communication ability.*

Each of these competences was rated as one of the most important by the employers. This point should be kept in mind in later reflections in order to see where the employers see challenges for the education process in Business.

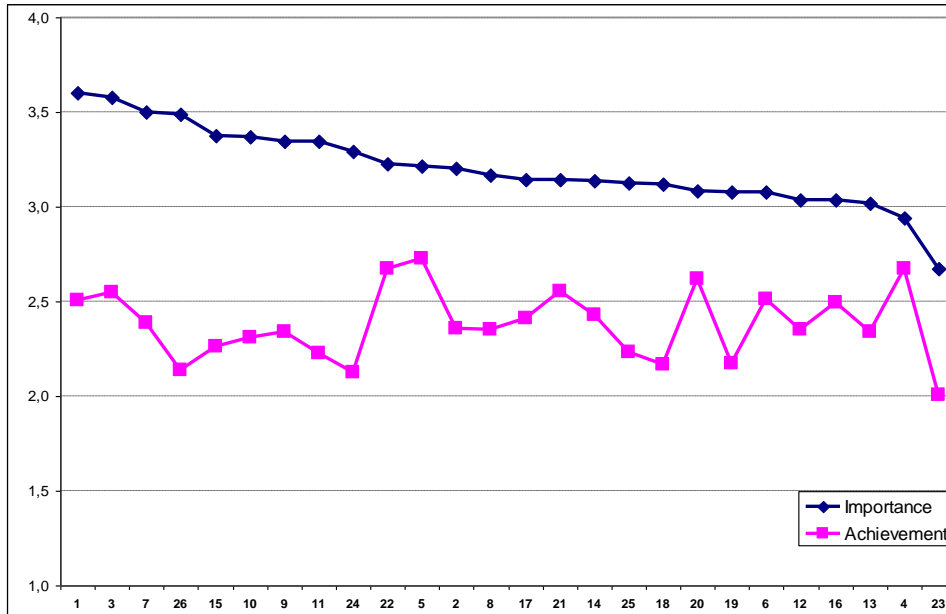
5.1.3 Students

Table 17. Importance and achievement of subject specific competences in BUSINESS from STUDENTS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market)	3,60	2,51
3	Apply and transfer business knowledge to the work environment and provide practical solutions	3,58	2,55
7	Business communication ability	3,50	2,39
26	Ability to identify and act upon opportunities in the business environment	3,49	2,13
15	Understand and apply existent & new technology & its impact for new / future markets	3,37	2,26
10	Learning to learn (how, when, where new personal developments are needed)	3,37	2,31
9	Identify impact of macro & microeconomic elements on business organizations	3,35	2,34
11	Ability to suggest solutions to and adapt to change	3,35	2,23
24	Business negotiation ability	3,29	2,13
22	Ability to conduct a business environment analysis using suitable instruments	3,23	2,68
5	Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)	3,21	2,73
2	Audit an organization and design consultancy plans	3,21	2,35
8	Identify the functional areas of an organization and their relations	3,17	2,35
17	Demonstrate awareness and understanding of ethical standards for business organizations	3,14	2,41
21	Written and oral communication in a foreign language	3,14	2,55
14	Understand details of business functions, size, sectors & link with theories	3,14	2,43
25	Identify the cultural difference and cross-cultural communication in commercial activity	3,12	2,23
18	Understand principles of law & link them with business / management	3,12	2,17
20	Understand & use bookkeeping and financial systems	3,08	2,62
19	Understand the principles of psychology, identify implications for organizations	3,08	2,18
6	Identify the constitutional characteristics of an organization	3,08	2,51
12	Ability to apply business and managerial concepts in different organizational settings	3,04	2,35
16	Understand principles of engineering & link them with business	3,04	2,49
13	Use university knowledge to identify impact of different cultures on business	3,02	2,34
4	Identify and operate adequate software	2,94	2,67
23	Work assignments abroad (e.g. work experience for 20 weeks)	2,67	2,01

In the case of students, 24 out of the 26 subject specific competences in Business were scored over 3. As in the other groups, students scored all competences below 3 in terms of their achievement.

Graphic 3. Gap between Importance and achievement of subject specific competences in BUSINESS from STUDENTS in China.



The competences with the least difference in the relative score for importance and achievement are:

- *Identify and operate adequate software.*
- *Understand & use bookkeeping and financial systems.*
- *Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios).*
- *Ability to conduct a business environment analysis using suitable instruments.*
- *Understand principles of engineering & link them with business.*

In particular, *Ability to conduct a business environment analysis using suitable instruments*, which is on the top ten most important competences from the student perspective, shows no gap between importance and achievement.

At the other end there are the competences with the greatest gap:

- *Ability to identify and act upon opportunities in the business environment.*
- *Business negotiation ability.*
- *Ability to suggest solutions to and adapt to change.*
- *Understand and apply existent & new technology & its impact for new / future markets.*
- *Business communication ability.*

As in the other groups (academics and employers) these competences were considered to be in the top 10 in terms of importance, but the students show a wider gap between the level of achievement and the degree of importance. In particular there is a significant difference between the average scores for importance and for achievement in relation to *Ability to identify and act upon opportunities in the business environment* (1.36).

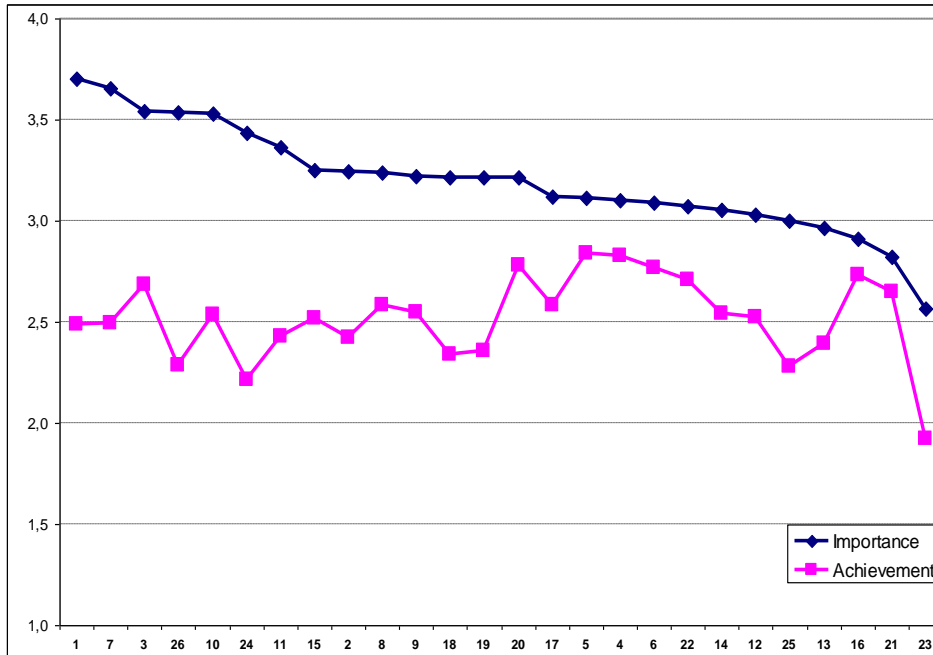
5.1.4 Graduates

Table 18. Importance and achievement of subject specific competences in BUSINESS from GRADUATES in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
1	Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market)	3,70	2,49
7	Business communication ability	3,65	2,49
3	Apply and transfer business knowledge to the work environment and provide practical solutions	3,54	2,69
26	Ability to identify and act upon opportunities in the business environment	3,54	2,28
10	Learning to learn (how, when, where new personal developments are needed)	3,53	2,54
24	Business negotiation ability	3,43	2,22
11	Ability to suggest solutions to and adapt to change	3,36	2,43
15	Understand and apply existent & new technology & its impact for new / future markets	3,25	2,52
2	Audit an organization and design consultancy plans	3,24	2,42
8	Identify the functional areas of an organization and their relations	3,24	2,58
9	Identify impact of macro & microeconomic elements on business organizations	3,22	2,55
18	Understand principles of law & link them with business / management	3,22	2,34
19	Understand the principles of psychology, identify implications for organizations	3,22	2,36
20	Understand & use bookkeeping and financial systems	3,22	2,78
17	Demonstrate awareness and understanding of ethical standards for business organizations	3,12	2,58
5	Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)	3,11	2,84
4	Identify and operate adequate software	3,10	2,83
6	Identify the constitutional characteristics of an organization	3,09	2,77
22	Ability to conduct a business environment analysis using suitable instruments	3,07	2,71
14	Understand details of business functions, size, sectors & link with theories	3,06	2,54
12	Ability to apply business and managerial concepts in different organizational settings	3,03	2,52
25	Identify the cultural difference and cross-cultural communication in commercial activity	3,00	2,28
13	Use university knowledge to identify impact of different cultures on business	2,96	2,39
16	Understand principles of engineering & link them with business	2,91	2,73
21	Written and oral communication in a foreign language	2,82	2,65
23	Work assignments abroad (e.g. work experience for 20 weeks)	2,57	1,92

Very similar to students, graduates scored 22 out of the 26 subject specific competences over 3. They also rated all competences below 3 in terms of their achievement.

Graphic 4. Gap between Importance and achievement of subject specific competences in BUSINESS from GRADUATES in China.



The competences with the least difference in the relative score for importance and achievement are:

- *Written and oral communication in a foreign language.*
- *Understand principles of engineering & link them with business.*
- *Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)*
- *Identify and operate adequate software.*
- *Identify the constitutional characteristics of an organization.*

The competences with the greatest difference between what was considered important and the rating given to its achievement by graduates are:

- *Ability to identify and act upon opportunities in the business environment.*
- *Business negotiation ability.*
- *Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).*
- *Business communication ability.*
- *Learning to learn (how, when, where new personal developments are needed).*

As it was clearly shown in the graphic, the competences considered to be the most important by graduates are also rated as the least achieved.

5.2. Analysis by variable

5.2.1 Importance

It is significant that the majority of the 26 subject specific competences were rated above 3, on a scale in which 3 is equivalent to Moderate and 4 to Strong. This means that the 26 competences

defined by the participants in the project received backing and/or confirmation from those consulted. With regard to the competences considered most important by each of the 4 groups consulted, there was agreement on four competences:

- *Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).*
- *Apply and transfer business knowledge to the work environment and provide practical solutions.*
- *Business communication ability.*
- *Ability to identify and act upon opportunities in the business environment.*

At the other end of the scale the four groups agreed on three least important competences:

- *Use university knowledge to identify impact of different cultures on business.*
- *Understand principles of engineering & link them with business.*
- *Work assignments abroad (e.g. work experience for 20 weeks).*

The Table below shows a calculation of the correlations among the means given by the four groups.

Table 19. Correlation matrix between averages, based on the level of IMPORTANCE between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,8450	1,0000		
<i>Student</i>	0,9009	0,8679	1,0000	
<i>Graduate</i>	0,8327	0,9515	0,8853	1,0000

The values of the correlation coefficient for importance were high - over 0.83 in all cases. This means that there was a high degree of compatibility among the four groups with regard to the level of importance given to the 26 subject specific competences, with slightly less compatibility between academics and graduates, and a particularly high correlation between employers and graduates.

5.2.2 Achievement

It is worth mentioning that regarding achievement all the 26 subject specific competences were rated between 2 and 3 on a scale in which 2 is equivalent to Weak and 3 to Moderate.

With regard to the competences considered highly achieved by each of the 4 groups consulted, there was agreement on one competence:

- *Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios).*

At the end of the scale, the four groups agreed on three common subject specific competences among the least achieved:

- *Work assignments abroad (e.g. work experience for 20 weeks)*
- *Business negotiation ability.*
- *Ability to identify and act upon opportunities in the business environment.*

It is interesting to underline that *Ability to identify and act upon opportunities in the business environment* was considered one of the most important subject specific competences by the four groups and it was also rated as one of the least achieved.

With regard to the achievement of competences, there is lower coincidence among the groups than in terms of importance. This means that there was a high degree of compatibility among the four groups with regard to the level of achievement given to the 26 subject specific competences, with slightly less compatibility between academics and employers, and a particularly high correlation between students and graduates.

Table 20. Correlation matrix between the averages, based on the level of ACHIEVEMENT between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,7310	1,0000		
<i>Student</i>	0,8913	0,7924	1,0000	
<i>Graduate</i>	0,8410	0,8536	0,9164	1,0000

The four groups agreed on two competences among five with the greatest gaps between achievement and importance:

- *Ability to identify and act upon opportunities in the business environment.*
- *Business communication ability.*

These two competences were considered very important by the four groups and were scored as the lowest achieved.

On the other hand, the four groups agreed on one competence with no gap between importance and achievement: *Identify and operate adequate software.*

5.2.3 Ranking

As it was explained in the generic competences section, 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 subject specific competences derived from the analysis of this variable.

Table 21. Comparative ranking of subject specific competences in BUSINESS by GROUP.

Competence	Academics	Employers	Students	Graduates
Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market)	1	1	1	1
Apply and transfer business knowledge to the work environment and provide practical solutions	2	2	2	2
Ability to identify and act upon opportunities in the business environment	3	6	3	5
Audit an organization and design consultancy plans	4	3	5	4
Ability to suggest solutions to and adapt to change	5	8	8	13
Business communication ability	6	5	4	3
Demonstrate awareness and understanding of ethical standards for business organizations	7	16	22	21
Learning to learn (how, when, where new personal developments are needed)	8	4	7	8
Identify the functional areas of an organization and their relations	9	13	13	10
Identify impact of macro & microeconomic elements on business organizations	10	17	11	12
Understand details of business functions, size, sectors & link with theories	11	12	16	15
Identify & use adequate tools (e.g. market research, statistical analysis, comparative ratios)	12	9	6	7
Ability to conduct a business environment analysis using suitable instruments	13	19	14	16
Understand and apply existent & new technology & its impact for new / future markets	14	7	10	11
Identify the constitutional characteristics of an organization	15	18	24	17
Ability to apply business and managerial concepts in different organizational settings	16	22	20	22
Identify and operate adequate software	17	11	9	9
Understand principles of law & link them with business / management	18	14	21	14
Business negotiation ability	19	10	12	6
Written and oral communication in a foreign language	20	25	15	25
Understand principles of engineering & link them with business	21	23	19	24
Understand the principles of psychology, identify implications for organizations	22	15	17	18
Use university knowledge to identify impact of different cultures on business	23	21	23	20
Work assignments abroad (e.g. work experience for 20 weeks)	24	24	25	26
Identify the cultural difference and cross-cultural communication in commercial activity	25	26	26	23
Understand & use bookkeeping and financial systems	26	20	18	19

If we examine the table above, we again see a high level of coincidence between the four groups consulted, both in terms of the competences they ranked to be very important and those they found to be least important. The four groups ranked in the top five three common competences:

- *Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).*
- *Apply and transfer business knowledge to the work environment and provide practical solutions.*
- *Audit an organization and design consultancy plans.*

At the bottom five of the ranking, the four groups agreed on two competences:

- *Identify the cultural difference and cross-cultural communication in commercial activity.*
- *Work assignments abroad (e.g. work experience for 20 weeks).*

In terms of correlation, there is great coincidence among the four groups as it was shown with regard to the importance. This means that there was a high degree of compatibility among the four groups with regard to the ranking given to the 26 subject specific competences, with slightly less compatibility between academics and graduates, and a particularly high correlation between students and graduates.

Table 22. Correlation matrix between the averages, based on the RANKING between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,9222	1,0000		
<i>Student</i>	0,9329	0,9469	1,0000	
<i>Graduate</i>	0,9094	0,9512	0,9621	1,0000

It is interesting to note that in the case of the Business Subject Area Group, the correlation between the 4 groups consulted is very high. Another important issue is related to consistency: the results of the ranking were very close to the rating given in terms of importance. If we compare the results of the rating and the ranking, the four groups agreed on two competences on the top:

- *Ability to analyze & structure an enterprise problem + design solution (e.g. entering a new market).*
- *Apply and transfer business knowledge to the work environment and provide practical solutions.*

As a conclusion, it is interesting to underline that the four groups (academics, graduates, students and employers) validated the 26 subject specific competences, awarding the majority of them ratings of over 3, on a scale in which 3 is equivalent to Moderate. Lower scores were given for the level of achievement, indicating a good level of criticism and demand among those surveyed.

There is evidence of high rates of correlation among the four groups consulted with regard to the 26 competences, in terms of importance, the level of achievement and ranking. This shows that the groups in China are closer in their perception of the three variables.

One important aspect for further analysis is that for most of the competences considered to be very important by the four groups, there are significant gaps when comparing it to the perceived level of achievement. It will be relevant in the future to review the subject specific competences that the consultation has shown to be relevant for the different groups and, where nonetheless there is a perception of a lack of achievement.

6. Civil Engineering

6.1. Analysis by group

6.1.1 Academics

As in the case of Business subject specific competences analysis, the table below refers to the means for each subject specific competence in the 1 to 4 scale.

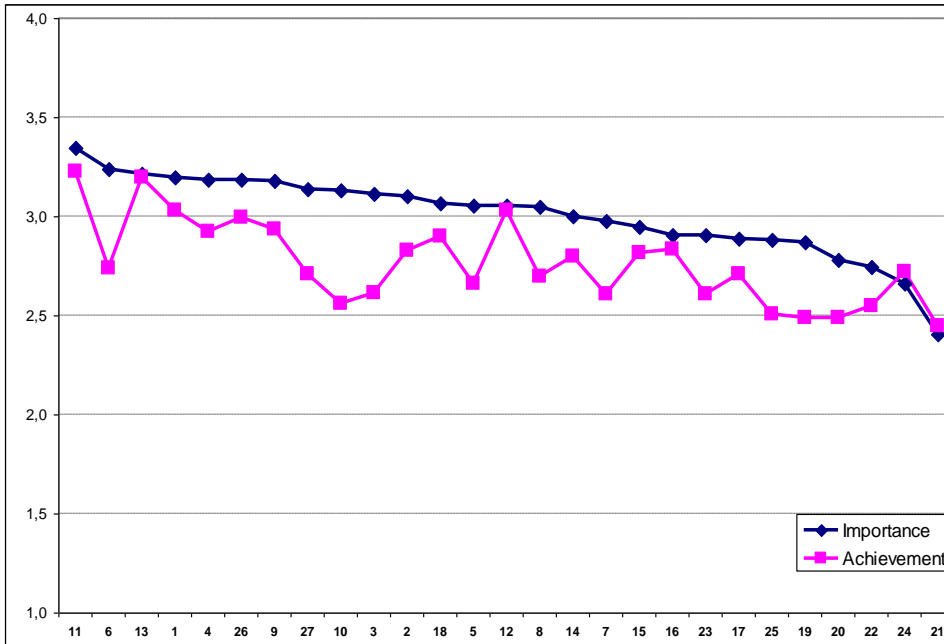
Table 23. Importance and achievement of subject specific competences in CIVIL ENGINEERING from ACADEMICS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
11	Ability to apply the principles and methods of mechanics	3,34	3,23
6	Ability to communicate, collaborate and conduct engineering design/construction/management	3,24	2,74
13	Ability to master and apply the fundamental principles of structure analysis	3,21	3,20
1	Broad knowledge on the essential features, processes, history and materials of civil engineering	3,20	3,03
4	Ability to use the modern techniques and information tools in engineering practice	3,19	2,92
26	Ability to express for civil engineering	3,18	3,00
9	Ability to define, determine and implement a strategy for solving a civil engineering problem and to produc	3,18	2,94
27	Capacity of conceptual design in civil engineering	3,14	2,71
10	Ability to deal with engineering accident and engineering risk management	3,13	2,56
3	Ability to do original researches in civil engineering independently	3,11	2,61
2	Awareness of the responsibilities of civil engineering in society	3,10	2,83
18	Ability to apply the basic principles and methods for foundation design/construction	3,06	2,90
5	Ability for organizing and coordinating civil engineering projects	3,06	2,66
12	Ability on the application of basic performance of engineering materials	3,06	3,03
8	Sense of creative & innovation in civil engineering	3,05	2,70
14	Ability to deal with general problems in construction and organization independently	3,00	2,80
7	Comprehensive ability and leadership on civil engineering project management	2,97	2,61
15	Knowledge for applying information technology in civil engineering.e.g. engineering software	2,95	2,81
16	Ability to design and conduct experiments, investigations, and data analysis in civil engineering	2,91	2,83
23	Skills relevant to all major employment sectors in civil engineering	2,91	2,61
17	Ability to apply the knowledge of engineering geology to solve problems during the design and constructic	2,89	2,71
25	Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water su	2,88	2,51
19	Ability to apply the life-cycle design concept on engineering project	2,87	2,49
20	Capacity for observing and understanding the environment impact of engineering practices	2,78	2,49
22	Ability to use laws and regulations to implement engineering construction management	2,74	2,55
24	Ability to read the specialty literatures in English or another foreign language	2,66	2,72
21	Knowledge on the working principle of common engineering equipment and their development trends	2,40	2,45

16 out of the 27 subject specific competences in Business were scored over 3 from the academics perspective. In terms of achievement, some competences were scored over 3 but the majority were rated below 3.

The graphic below shows the gap between importance and achievement in each of the 27 subject specific competences.

Graphic 5. Gap between Importance and achievement of subject specific competences in CIVIL ENGINEERING from ACADEMICS inChina.



It is interesting to underline that the gap between the level of importance and achievement is not so significant in Civil Engineering from the academic perspective. The means of importance and achievement are close, indicating that what academics consider important, is also perceived as being properly carried out. The competences with the least difference in the relative score for importance and achievement are:

- *Ability to read the specialty literatures in English or another foreign language.*
- *Knowledge on the working principle of common engineering equipment and their development trends.*
- *Ability to master and apply the fundamental principles of structure analysis.*
- *Ability on the application of basic performance of engineering materials.*
- *Ability to design and conduct experiments, investigations, and data analysis in civil engineering.*

At the other extreme are the competences with more differences between what was considered important and the rating given to its achievement:

- *Ability to deal with engineering accident and engineering risk management.*
- *Ability to do original researches in civil engineering independently.*
- *Ability to communicate, collaborate and conduct engineering design/construction/management.*
- *Capacity of conceptual design in civil engineering.*
- *Ability for organizing and coordinating civil engineering projects.*

In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *Ability to communicate, collaborate and conduct engineering design/construction/management.*

6.1.2 Employers

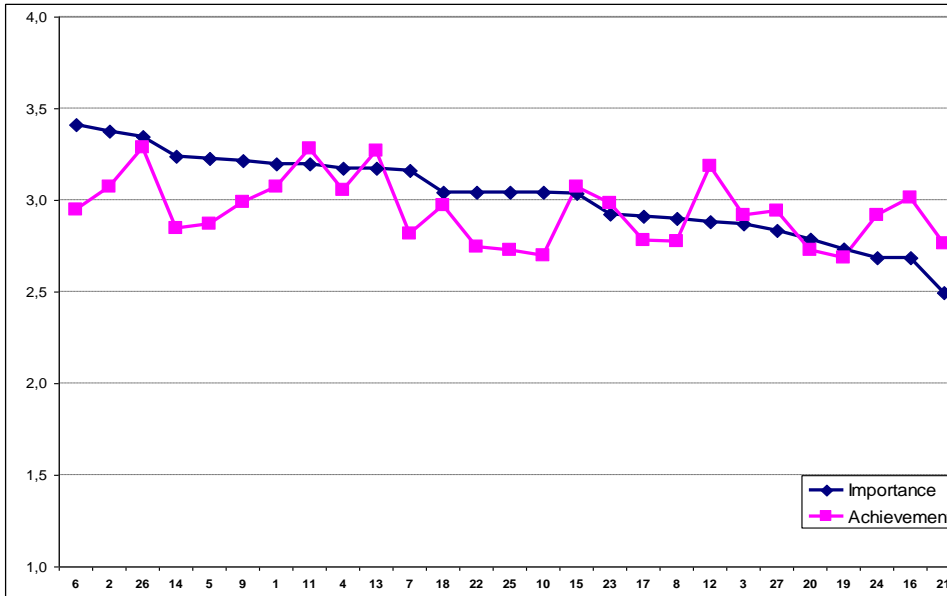
The Table below shows the means of the level of importance and the level of achievement of 27 subject specific competences in Civil Engineering from the employer perspective.

Table 24. Importance and achievement of subject specific competences in CIVIL ENGINEERING from EMPLOYERS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
6	Ability to communicate, collaborate and conduct engineering design/construction/management	3,41	2,95
2	Awareness of the responsibilities of civil engineering in society	3,38	3,07
26	Ability to express for civil engineering	3,35	3,29
14	Ability to deal with general problems in construction and organization independently	3,24	2,85
5	Ability for organizing and coordinating civil engineering projects	3,22	2,87
9	Ability to define, determine and implement a strategy for solving a civil engineering problem and to produ	3,21	2,99
1	Broad knowledge on the essential features, processes, history and materials of civil engineering	3,19	3,07
11	Ability to apply the principles and methods of mechanics	3,19	3,28
4	Ability to use the modern techniques and information tools in engineering practice	3,17	3,05
13	Ability to master and apply the fundamental principles of structure analysis	3,17	3,27
7	Comprehensive ability and leadership on civil engineering project management	3,16	2,82
18	Ability to apply the basic principles and methods for foundation design/construction	3,04	2,97
22	Ability to use laws and regulations to implement engineering construction management	3,04	2,74
25	Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water st	3,04	2,72
10	Ability to deal with engineering accident and engineering risk management	3,04	2,69
15	Knowledge for applying information technology in civil engineering.e.g. engineering software	3,04	3,07
23	Skills relevant to all major employment sectors in civil engineering	2,92	2,98
17	Ability to apply the knowledge of engineering geology to solve problems during the design and constructi	2,91	2,78
8	Sense of creative & innovation in civil engineering	2,90	2,78
12	Ability on the application of basic performance of engineering materials	2,88	3,18
3	Ability to do original researches in civil engineering independently	2,87	2,92
27	Capacity of conceptual design in civil engineering	2,83	2,94
20	Capacity for observing and understanding the environment impact of engineering practices	2,79	2,72
19	Ability to apply the life-cycle design concept on engineering project	2,73	2,68
24	Ability to read the specialty literatures in English or another foreign language	2,69	2,92
16	Ability to design and conduct experiments, investigations, and data analysis in civil engineering	2,69	3,01
21	Knowledge on the working principle of common engineering equipment and their development trends	2,49	2,76

Only 16 out of the 27 subject specific competences in Civil Engineering were scored over 3 from the employer perspective in terms of level of importance. On the other hand, analysing the level of achievement, 9 competences were rated over 3. This particular situation, one third of the competences below 3 in terms of importance and almost one third over 3 in terms of achievement, requires further analysis.

Graphic 6. Gap between Importance and achievement of subject specific competences in CIVIL ENGINEERING from EMPLOYERS in China.



As in the case of academics, there is not a significant gap between both variables (less than 0.5 points). Besides, there are many competences (10) rated higher in terms of achievement than in terms of importance. The competences with the least difference in the relative score for importance and achievement are:

- *Ability to design and conduct experiments, investigations, and data analysis in civil engineering.*
- *Ability on the application of basic performance of engineering materials.*
- *Knowledge on the working principle of common engineering equipment and its development trends.*
- *Ability to read the specialty literatures in English or another foreign language.*
- *Capacity for conceptual design in civil engineering.*

The competences with the greatest difference between what it was considered important and the rating given to its achievement are:

- *Ability to communicate, collaborate and conduct engineering design/construction/management.*
- *Ability to deal with general problems in construction and organization independently.*
- *Ability to deal with engineering accident and engineering risk management.*
- *Ability to organize and coordinate civil engineering projects.*
- *Comprehensive ability and leadership on civil engineering project management.*

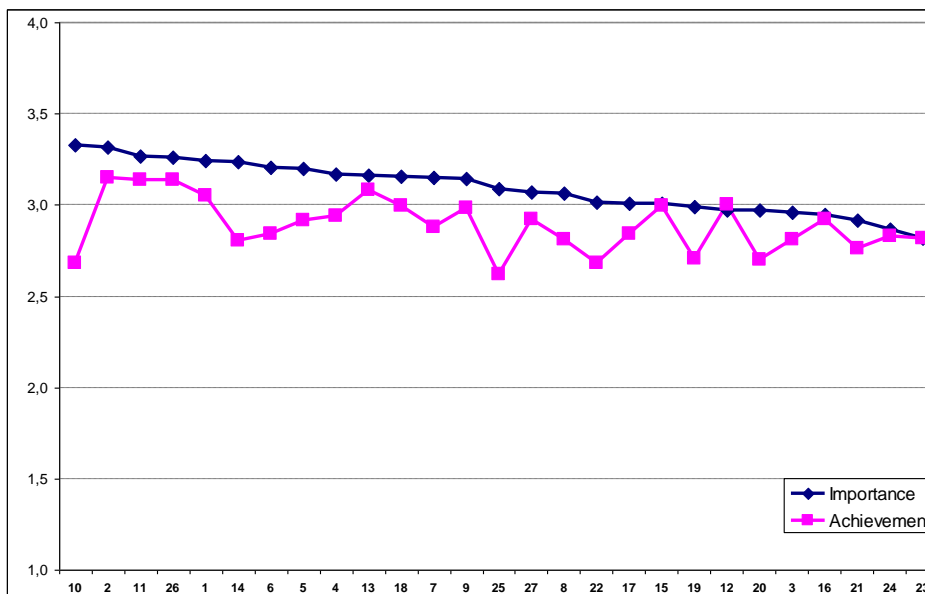
6.1.3 Students

Table 25. Importance and achievement of subject specific competences in CIVIL ENGINEERING from STUDENTS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
10	Ability to deal with engineering accident and engineering risk management	3,33	2,68
2	Awareness of the responsibilities of civil engineering in society	3,32	3,15
11	Ability to apply the principles and methods of mechanics	3,27	3,14
26	Ability to express for civil engineering	3,26	3,14
1	Broad knowledge on the essential features, processes, history and materials of civil engineering	3,24	3,05
14	Ability to deal with general problems in construction and organization independently	3,24	2,81
6	Ability to communicate, collaborate and conduct engineering design/construction/management	3,21	2,84
5	Ability for organizing and coordinating civil engineering projects	3,20	2,92
4	Ability to use the modern techniques and information tools in engineering practice	3,17	2,94
13	Ability to master and apply the fundamental principles of structure analysis	3,16	3,08
18	Ability to apply the basic principles and methods for foundation design/construction	3,16	2,99
7	Comprehensive ability and leadership on civil engineering project management	3,15	2,88
9	Ability to define, determine and implement a strategy for solving a civil engineering problem and to produ	3,14	2,98
25	Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water su	3,09	2,62
27	Capacity of conceptual design in civil engineering	3,07	2,92
8	Sense of creative & innovation in civil engineering	3,06	2,81
22	Ability to use laws and regulations to implement engineering construction management	3,02	2,68
17	Ability to apply the knowledge of engineering geology to solve problems during the design and constructi	3,01	2,84
15	Knowledge for applying information technology in civil engineering.e.g. engineering software	3,01	3,00
19	Ability to apply the life-cycle design concept on engineering project	2,99	2,70
12	Ability on the application of basic performance of engineering materials	2,97	3,00
20	Capacity for observing and understanding the environment impact of engineering practices	2,97	2,70
3	Ability to do original researches in civil engineering independently	2,96	2,81
16	Ability to design and conduct experiments, investigations, and data analysis in civil engineering	2,95	2,92
21	Knowledge on the working principle of common engineering equipment and their development trends	2,92	2,76
24	Ability to read the specialty literatures in English or another foreign language	2,87	2,83
23	Skills relevant to all major employment sectors in civil engineering	2,82	2,82

In the case of students, 19 out of the 27 subject specific competences in Civil Engineering were scored over 3. As in the other groups, students scored some competences over 3 in terms of their achievement (7).

Graphic 7. Gap between Importance and achievement of subject specific competences in CIVIL ENGINEERING from STUDENTS in China.



The graphic shows that the two variables are very close. Although there is not a significant gap, there are some competences with the least difference in the relative score for importance and achievement:

- *Ability on the application of basic performance of engineering materials.*
- *Skills relevant to all major employment sectors in civil engineering.*
- *Knowledge for applying information technology in civil engineering. e.g. engineering software.*
- *Ability to design and conduct experiments, investigations, and data analysis in civil engineering.*
- *Ability to read the specialty literatures in English or another foreign language.*

Having a look at the other end, there are competences with a bigger gap between importance and achievement:

- *Ability to deal with engineering accident and engineering risk management.*
- *Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water supply and drainage, architectural equipment and building electricity.*
- *Ability to deal with general problems in construction and organization independently.*
- *Ability to communicate, collaborate and conduct engineering design/construction/management.*
- *Ability to use laws and regulations to implement engineering construction management.*

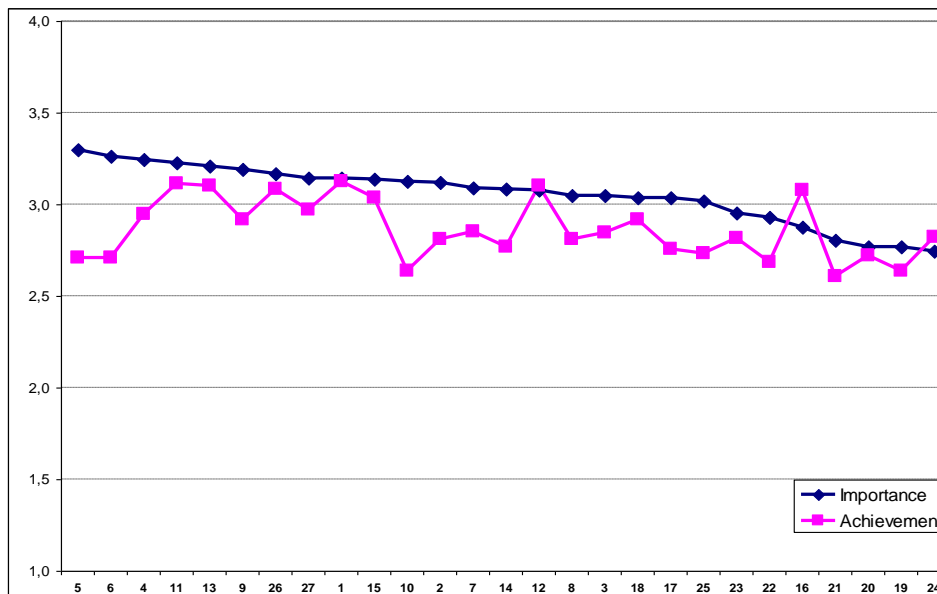
6.1.4 Graduates

Table 26. Importance and achievement of subject specific competences in CIVIL ENGINEERING from GRADUATES in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
5	Ability for organizing and coordinating civil engineering projects	3,30	2,71
6	Ability to communicate, collaborate and conduct engineering design/construction/management	3,26	2,71
4	Ability to use the modern techniques and information tools in engineering practice	3,24	2,95
11	Ability to apply the principles and methods of mechanics	3,23	3,11
13	Ability to master and apply the fundamental principles of structure analysis	3,21	3,10
9	Ability to define, determine and implement a strategy for solving a civil engineering problem and to produ	3,19	2,92
26	Ability to express for civil engineering	3,17	3,08
27	Capacity of conceptual design in civil engineering	3,14	2,97
1	Broad knowledge on the essential features, processes, history and materials of civil engineering	3,14	3,12
15	Knowledge for applying information technology in civil engineering.e.g. engineering software	3,13	3,03
10	Ability to deal with engineering accident and engineering risk management	3,13	2,64
2	Awareness of the responsibilities of civil engineering in society	3,12	2,81
7	Comprehensive ability and leadership on civil engineering project management	3,09	2,85
14	Ability to deal with general problems in construction and organization independently	3,08	2,77
12	Ability on the application of basic performance of engineering materials	3,08	3,10
8	Sense of creative & innovation in civil engineering	3,05	2,81
3	Ability to do original researches in civil engineering independently	3,05	2,85
18	Ability to apply the basic principles and methods for foundation design/construction	3,04	2,92
17	Ability to apply the knowledge of engineering geology to solve problems during the design and constructi	3,03	2,76
25	Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water su	3,02	2,73
23	Skills relevant to all major employment sectors in civil engineering	2,95	2,82
22	Ability to use laws and regulations to implement engineering construction management	2,93	2,68
16	Ability to design and conduct experiments, investigations, and data analysis in civil engineering	2,87	3,08
21	Knowledge on the working principle of common engineering equipment and their development trends	2,80	2,61
20	Capacity for observing and understanding the environment impact of engineering practices	2,77	2,72
19	Ability to apply the life-cycle design concept on engineering project	2,77	2,64
24	Ability to read the specialty literatures in English or another foreign language	2,75	2,82

Very similar to students, graduates scored 20 out of the 27 subject specific competences over 3 in terms of importance and they also rated some competences (7) over 3 in terms of their achievement.

Graphic 8. Gap between Importance and achievement of subject specific competences in CIVIL ENGINEERING from GRADUATES in China.



As in the case of the other three groups, the difference between the rating given by graduates to importance and achievement is not very significant. There is one competence (*Ability to design and conduct experiments, investigations, and data analysis in civil engineering*) rated higher in terms of achievement than in terms of importance. The competences with the least difference in the relative score for importance and achievement are:

- *Ability to read the specialty literatures in English or another foreign language.*
- *Ability on the application of basic performance of engineering materials.*
- *Broad knowledge on the essential features, processes, history and materials of civil engineering.*
- *Capacity for observing and understanding the environment impact of engineering practices.*

Furthermore, the competences with the greatest difference between what was considered important and the rating given to its achievement are:

- *Ability for organizing and coordinating civil engineering projects.*
- *Ability to communicate, collaborate and conduct engineering design/construction/management.*
- *Ability to deal with engineering accident and engineering risk management.*
- *Ability to deal with general problems in construction and organization independently.*
- *Awareness of the responsibilities of civil engineering in society.*

In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *Ability for organizing and coordinating civil engineering projects* and *Ability to communicate, collaborate and conduct engineering design/construction/management*. In these cases, there is a bigger difference between the average scores for importance and for achievement. This should be further reflected on by the Civil Engineering group.

6.2. Analysis by variable

6.2.1 Importance

It is significant to underline that many competences were rated below 3 (in some groups like academics and employers almost half of the list was rated between 2 and 3 points). This particular aspect should open a debate within the Civil Engineering group in order to revise the competences. With regard to the competences considered most important by each of the 4 groups consulted, there is no agreement on a top five. The **graduates** also agreed with the **academics** and **employers**, in including *Ability to communicate, collaborate and conduct engineering design/construction/management* among the five most important competences while the **students** rated this competence much lower. Among **academics, students and graduates**, *Ability to apply the principles and methods of mechanics* scored highest while **employers** rated it much lower.

At the other end of the scale the four groups agreed on three least important competences:

- *Knowledge on the working principle of common engineering equipment and their development trends.*
- *Ability to read the specialty literatures in English or another foreign language.*

Below, there is a calculation of the correlations between the four groups.

Table 27. Correlation matrix between averages, based on the level of IMPORTANCE between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,7305	1,0000		
<i>Student</i>	0,6964	0,8153	1,0000	
<i>Graduate</i>	0,8361	0,8100	0,7237	1,0000

The values of the correlation coefficient for importance show a low compatibility between academics and students, and a particularly high correlation between academics and graduates.

6.2.2 Achievement

It is worth mentioning that in relation to achievement, many competences were rated over 3. In comparison with other subject areas this is very significant. With regard to the competences considered highly achieved by each of the 4 groups consulted, there was agreement on four competences:

- *Ability to express for civil engineering.*
- *Broad knowledge on the essential features, processes, history and materials of civil engineering.*
- *Ability to master and apply the fundamental principles of structure analysis.*
- *Ability to apply the principles and methods of mechanics.*

At the end of the scale, the four groups agreed on two common subject specific competences among the least achieved:

- *Ability to use laws and regulations to implement engineering construction management.*
- *Ability to apply the life-cycle design concept on engineering project.*

With regard to the level of achievement of competences there is a higher coincidence among the groups than in terms of importance. This means that there was a high degree of compatibility among the four groups with regard to the level of achievement given to the 27 subject specific competences, with slightly less compatibility between students and graduates, and a particularly high correlation between employers and students.

Table 28. Correlation matrix between the averages, based on the level of ACHIEVEMENT between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,9020	1,0000		
<i>Student</i>	0,8686	0,9039	1,0000	
<i>Graduate</i>	0,8598	0,8703	0,7986	1,0000

The four groups agreed on two competences among five with the greatest gaps between achievement and importance:

- *Ability to communicate, collaborate and conduct engineering design/construction/management.*
- *Ability to deal with engineering accident and engineering risk management.*

On the other hand, the four groups agreed on three competences with no gap between importance and achievement:

- *Ability to read the specialty literatures in English or another foreign language.*
- *Ability on the application of basic performance of engineering materials.*
- *Ability to design and conduct experiments, investigations, and data analysis in civil engineering.*

6.2.3 Ranking

As was explained before, 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 drawn in the paragraphs above. The table below compares the four groups, showing the ranking of the subject specific competences derived from the analysis of this variable.

Table 29. Comparative ranking of subject specific competences in CIVIL ENGINEERING by GROUP.

Competence	Academics	Employers	Students	Graduates
Broad knowledge on the essential features, processes, history and materials of civil engineering	1	4	2	4
Awareness of the responsibilities of civil engineering in society	2	1	1	2
Ability to apply the principles and methods of mechanics	3	9	5	3
Ability to do original researches in civil engineering independently	4	7	6	5
Ability to define, determine and implement a strategy for solving a civil engineering problem and to produce a substantial report or thesis	5	5	11	7
Capacity of conceptual design in civil engineering	6	10	13	9
Ability for organizing and coordinating civil engineering projects	7	3	3	1
Sense of creative & innovation in civil engineering	8	16	7	12
Ability to use the modern techniques and information tools in engineering practice	9	13	9	10
Ability to master and apply the fundamental principles of structure analysis	10	8	16	17
Ability to communicate, collaborate and conduct engineering design/construction/management	11	2	4	8
Ability to express for civil engineering	12	12	10	13
Comprehensive ability and leadership on civil engineering project management	13	11	8	6
Ability to apply the basic principles and methods for foundation design/construction	14	17	22	23
Skills relevant to all major employment sectors in civil engineering	15	18	17	22
Ability to deal with engineering accident and engineering risk management	16	15	12	15
Ability to use laws and regulations to implement engineering construction management	17	21	21	16
Ability to apply the knowledge of engineering geology to solve problems during the design and construction process	18	25	26	21
Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water supply and drainage, architectural equipment and building electricity	19	19	19	18
Ability on the application of basic performance of engineering materials	20	20	15	27
Capacity for observing and understanding the environment impact of engineering practices	21	23	27	26
Knowledge for applying information technology in civil engineering, e.g. engineering software	22	14	18	11
Ability to apply the life-cycle design concept on engineering project	23	22	20	19
Ability to deal with general problems in construction and organization independently	24	6	14	14
Ability to read the specialty literatures in English or another foreign language	25	26	24	24
Ability to design and conduct experiments, investigations, and data analysis in civil engineering	26	27	23	20
Knowledge on the working principle of common engineering equipment and their development trends	27	24	25	25

If we examine the table above, we find again a high level of coincidence between the four groups consulted, both in terms of the competences they ranked to be very important and those they described as least important. The four groups ranked on the top five two common competences:

- *Broad knowledge on the essential features, processes, history and materials of civil engineering.*
- *Awareness of the responsibilities of civil engineering in society.*

At the bottom five of the ranking, the four groups agreed on two competences:

- *Ability to use laws and regulations to implement engineering construction management.*
- *Ability to apply the life-cycle design concept on engineering project.*

In terms of correlation, there is a big coincidence among the four groups as it was shown with regard to the importance. This means that there was a high degree of compatibility among the four groups with regard to the ranking given to the 27 subject specific competences, with slightly less

compatibility between academics and employers, and a particularly high correlation between students and employers.

Table 30. Correlation matrix between the averages, based on the RANKING between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,7928	1,0000		
<i>Student</i>	0,8391	0,9109	1,0000	
<i>Graduate</i>	0,8279	0,8384	0,8806	1,0000

As a conclusion, it is interesting to highlight that the gap between the level of importance and the level of achievement is not so significant in Civil Engineering for the four groups consulted (academics, graduates, students and employers). This would suggest that although there is a different degree of importance, there is a perception that the subject specific competences have been achieved.

Not all the 27 subject specific competences were rated over 3 in terms of degree of importance. In some cases (academics and employers) almost half of the competences were scored between 2 (weak) and 3 (moderate). Probably this requires further analysis within the subject area group in relation to the validation of the subject specific competences proposed. On the other hand, the rating given to the level of achievement was not so low as in other subject areas. Besides, there are many competences rated higher in terms of achievement than in terms of importance.

The degree of correlation in terms of importance is not as high as in other subject area groups; this means that it was not possible to find common competences on the top 5 for the four groups consulted. This shows that the 4 stakeholder groups in China are not so close in their perception of the degree of importance. In the other variables (achievement and ranking) the correlation is higher.

7. Education

7.1. Analysis by group

7.1.1 Academics

Following the same process of analysis as for the other subject areas, the table below refers to the means for each subject specific competence in Education in the 1 to 4 scale for both variables. The 22 subject specific competences for Education were ordered from the most important to least important competence from the academic perspective.

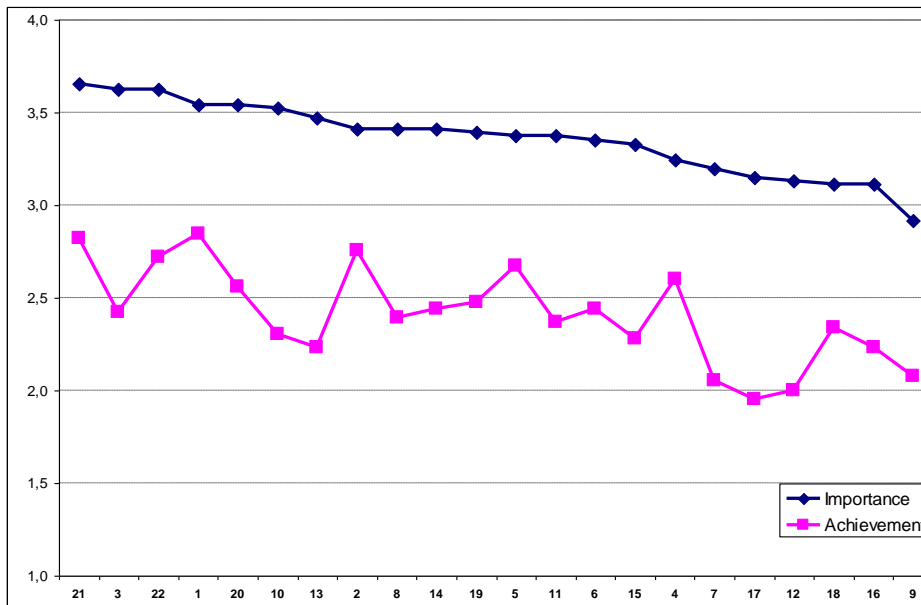
Table 31. Importance and achievement of subject specific competences in EDUCATION from ACADEMICS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
21	An open mind to rich and diverse educational practices, and respect for the unique characteristics of education	3,66	2,82
3	The ability to identify potential connections among educational theories, educational policies, and educational practices	3,62	2,42
22	Understanding and appreciation of the social values of the profession, and commitment to professional ethics	3,62	2,72
1	Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them	3,54	2,85
20	Awareness and application of internationalization and localization of education	3,54	2,56
10	The ability to conduct international academic exchange and cross-cultural communication	3,52	2,30
13	The ability to learn from international experiences to design and implement educational practices in local contexts	3,47	2,23
2	Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to apply them	3,41	2,76
8	The ability to understand and critically analyze commonality and diversity of educational development in different countries	3,41	2,39
14	The ability to adopt appropriate comparative approaches to solve problems in educational theory and practice	3,41	2,44
19	Commitment to analyze international experiences consciously and critically, making contributions to national education	3,39	2,47
5	The ability to analyse current educational thoughts	3,38	2,67
11	The ability to undertake cross-disciplinary and cross-cultural educational research from international perspectives	3,38	2,37
6	The ability to relate educational policies and trends in different countries to the socio-economic and cultural contexts	3,35	2,44
15	The ability to design, implement, and evaluate educational or developmental projects based on evidence and theory	3,32	2,28
4	The ability to compare and contrast education systems in different countries	3,25	2,60
7	The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of education	3,20	2,05
17	The ability to lead and coordinate a multidisciplinary or multicultural team	3,15	1,95
12	The ability to provide policy consultation and services for international organizations, governments, and various stakeholders	3,13	2,00
18	The ability to apply ICT in educational research, project and knowledge management, and independent study	3,11	2,34
16	The ability to apply theories and methods of pedagogy to inform effective teaching	3,11	2,23
9	The ability to reflect on the nature, roles and underlying agendas of international organizations	2,92	2,08

21 out of the 22 subject specific competences in Education were scored over 3 from the academics perspective. However, the respondents scored all competences below 3 in terms of their achievement.

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 22 subject specific competences between importance and achievement. The graphic below shows the gap between both variables.

Graphic 9. Gap between Importance and achievement of subject specific competences in EDUCATION from ACADEMICS in China.



There is a big gap between importance and achievement. Academics' responses show a wide difference between both variables (over 1.20 in many cases). The competences with the least difference in the relative score for importance and achievement are:

- *The ability to compare and contrast education systems in different countries.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *The ability to analyse current educational thoughts.*
- *The ability to apply ICT in educational research, project and knowledge management, and independent study.*

The competences with the greatest difference between what was considered important and the rating given to its achievement:

- *The ability to learn from international experiences to design and implement educational practices in local contexts.*
- *The ability to conduct international academic exchange and cross-cultural communication.*
- *The ability to identify potential connections among educational theories, educational policies, and educational practices.*
- *The ability to lead and coordinate a multidisciplinary or multicultural team.*
- *The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of comparative education.*

In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *The ability to identify potential connections among educational theories, educational policies, and educational practices*. In this case, there is a significant difference between the average scores for importance and for achievement.

7.1.2 Employers

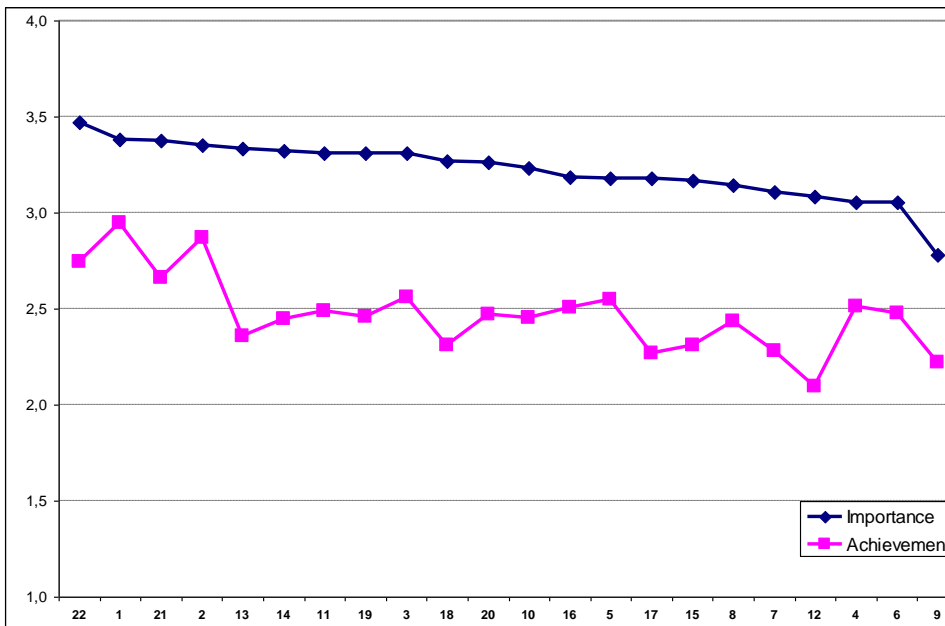
As in the case of academics, the table below compares the level of importance and the level of achievement of 22 subject specific competences in Education.

Table 32. Importance and achievement of subject specific competences in EDUCATION from EMPLOYERS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
22	Understanding and appreciation of the social values of the profession, and commitment to professional ethic:	3,47	2,75
1	Awareness of an appropriate range of theories and methodologies of education, and the ability to describe th	3,38	2,94
21	An open mind to rich and diverse educational practices, and respect for the unique characteristics of educati	3,38	2,66
2	Awareness of an appropriate range of theories and methodologies of comparative education, and the ability t	3,35	2,87
13	The ability to learn from international experiences to design and implement educational practices in local con	3,33	2,36
14	The ability to adopt appropriate comparative approaches to solve problems in educational theory and practic	3,32	2,45
11	The ability to undertake cross-disciplinary and cross-cultural educational research from international perspec	3,31	2,49
19	Commitment to analyze international experiences consciously and critically, making contributions to national	3,31	2,46
3	The ability to identify potential connections among educational theories, educational policies, and educationa	3,31	2,56
18	The ability to apply ICT in educational research, project and knowledge management, and independent study	3,27	2,31
20	Awareness and application of internationalization and localization of education	3,26	2,47
10	The ability to conduct international academic exchange and cross-cultural communication	3,23	2,45
16	The ability to apply theories and methods of pedagogy to inform effective teaching	3,18	2,51
5	The ability to analyse current educational thoughts	3,18	2,55
17	The ability to lead and coordinate a multidisciplinary or multicultural team	3,18	2,27
15	The ability to design, implement, and evaluate educational or developmental projects based on evidence and	3,17	2,31
8	The ability to understand and critically analyze commonality and diversity of educational development in diffe	3,14	2,44
7	The ability to use theories and methodologies from other disciplines to enable the student to theorize in the fi	3,11	2,28
12	The ability to provide policy consultation and services for international organizations, governments, and vario	3,09	2,10
4	The ability to compare and contrast education systems in different countries	3,06	2,51
6	The ability to relate educational policies and trends in different countries to the socio-economic and cultural c	3,05	2,48
9	The ability to reflect on the nature, roles and underlying agendas of international organizations	2,78	2,22

Only 21 out of the 22 subject specific competences in Education were scored over 3 from the employer perspective. In terms of level of achievement, all competences were rated below 3.

Graphic 10. Gap between Importance and achievement of subject specific competences in EDUCATION from EMPLOYERS in China.



The competences with the least difference in the relative score for importance and achievement are:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *The ability to compare and contrast education systems in different countries.*
- *The ability to reflect on the nature, roles and underlying agendas of international organizations.*
- *The ability to relate educational policies and trends in different countries to the socio-economic and cultural contexts.*

In particular, *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately* and *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately* which are in the top five most important competences from the employers' perspective, show no gap between the degree of importance and the level of achievement.

At the other end there are the competences with the greatest gap:

- *The ability to provide policy consultation and services for international organizations, governments, and various educational institutions.*
- *The ability to learn from international experiences to design and implement educational practices in local contexts.*
- *The ability to apply ICT in educational research, project and knowledge management, and independent study.*
- *The ability to lead and coordinate a multidisciplinary or multicultural team.*
- *The ability to adopt appropriate comparative approaches to solve problems in educational theory and practice.*

In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *The ability to learn from international experiences to design and implement educational practices in local contexts*. This competence was rated in the top five in terms of importance and shows one of the biggest gap in relation to the level of achievement.

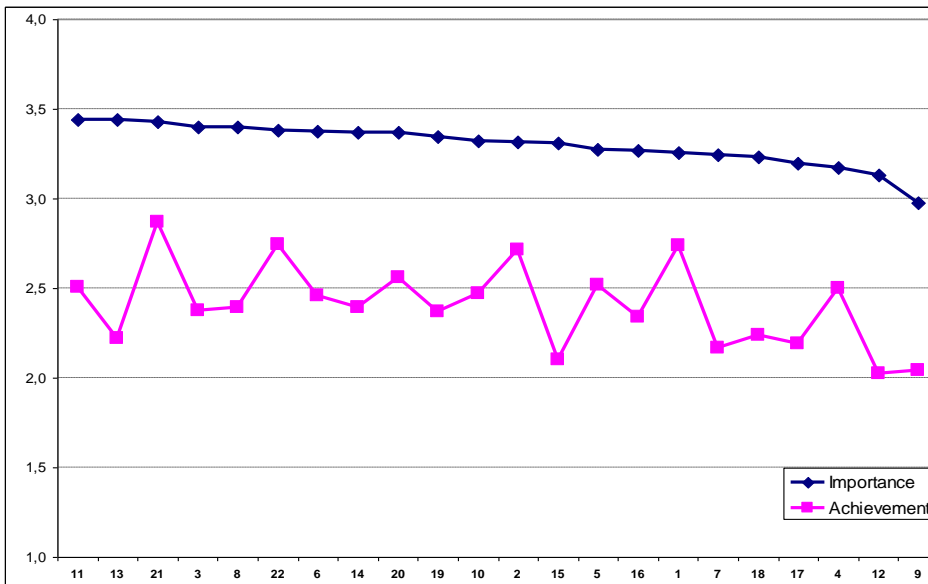
7.1.3 Students

Table 33. Importance and achievement of subject specific competences in EDUCATION from STUDENTS in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
11	The ability to undertake cross-disciplinary and cross-cultural educational research from international perspec	3,44	2,51
13	The ability to learn from international experiences to design and implement educational practices in local con	3,44	2,22
21	An open mind to rich and diverse educational practices, and respect for the unique characteristics of educati	3,43	2,87
3	The ability to identify potential connections among educational theories, educational policies, and educationa	3,40	2,38
8	The ability to understand and critically analyze commonality and diversity of educational development in diffe	3,40	2,40
22	Understanding and appreciation of the social values of the profession, and commitment to professional ethic:	3,38	2,74
6	The ability to relate educational policies and trends in different countries to the socio-economic and cultural c	3,38	2,46
14	The ability to adopt appropriate comparative approaches to solve problems in educational theory and practica	3,37	2,39
20	Awareness and application of internationalization and localization of education	3,37	2,56
19	Commitment to analyze international experiences consciously and critically, making contributions to national	3,34	2,37
10	The ability to conduct international academic exchange and cross-cultural communication	3,32	2,47
2	Awareness of an appropriate range of theories and methodologies of comparative education, and the ability t	3,32	2,72
15	The ability to design, implement, and evaluate educational or developmental projects based on evidence and	3,31	2,10
5	The ability to analyse current educational thoughts	3,27	2,52
16	The ability to apply theories and methods of pedagogy to inform effective teaching	3,27	2,34
1	Awareness of an appropriate range of theories and methodologies of education, and the ability to describe th	3,26	2,74
7	The ability to use theories and methodologies from other disciplines to enable the student to theorize in the fi	3,24	2,16
18	The ability to apply ICT in educational research, project and knowledge management, and independent study	3,23	2,24
17	The ability to lead and coordinate a multidisciplinary or multicultural team	3,20	2,19
4	The ability to compare and contrast education systems in different countries	3,17	2,50
12	The ability to provide policy consultation and services for international organizations, governments, and vario	3,13	2,02
9	The ability to reflect on the nature, roles and underlying agendas of international organizations	2,98	2,04

As in the case of academics and employers, students scored 21 out of the 22 subject specific competences over 3 in terms of level of importance and rated all below 3 in terms of their achievement.

Graphic 11. Gap between Importance and achievement of subject specific competences in EDUCATION from STUDENTS in China.



As was shown in the other groups, there is a wide gap between both variables. The subject specific competences with the least difference in the relative score for importance and achievement are:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *Understanding and appreciation of the social values of the profession, and commitment to professional ethics.*
- *The ability to compare and contrast education systems in different countries.*

The competences with the greatest difference between what was considered important and the rating given to their achievement are:

- *The ability to learn from international experiences to design and implement educational practices in local contexts.*
- *The ability to design, implement, and evaluate educational or developmental projects based on evidence and data obtained from comparative studies.*
- *The ability to provide policy consultation and services for international organizations, governments, and various educational institutions.*
- *The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of comparative education.*
- *The ability to identify potential connections among educational theories, educational policies, and educational practices.*

It is interesting to look at the gaps between the competences considered to be the most important, such as *The ability to learn from international experiences to design and implement educational practices in local contexts* and *The ability to identify potential connections among educational*

theories, educational policies, and educational practices. Both competences were rated in the top five in terms of importance from the student perspective.

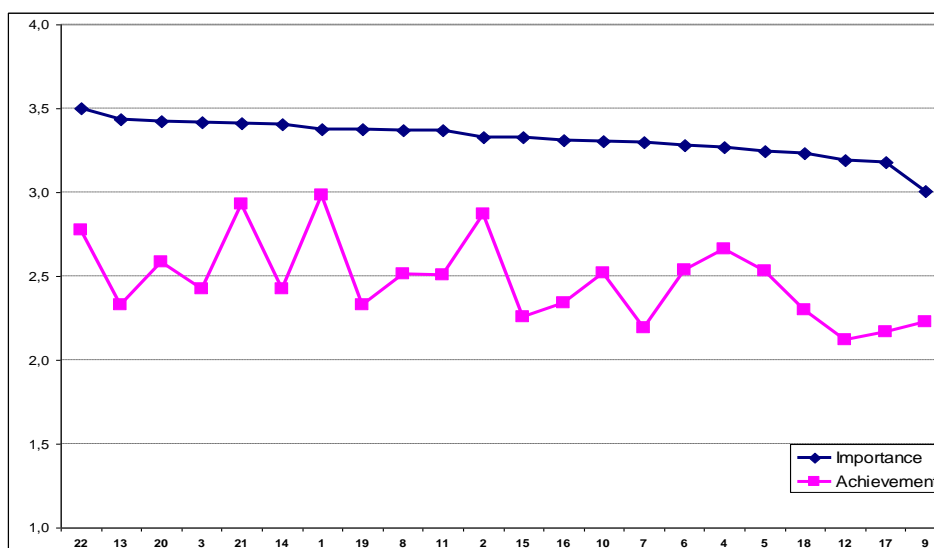
7.1.4 Graduates

Table 34. Importance and achievement of subject specific competences in EDUCATION from GRADUATES in China. Measures in decreasing order of importance.

#	Description	Importance	Achievement
22	Understanding and appreciation of the social values of the profession, and commitment to professional ethic:	3,50	2,78
13	The ability to learn from international experiences to design and implement educational practices in local con	3,43	2,33
20	Awareness and application of internationalization and localization of education	3,42	2,58
3	The ability to identify potential connections among educational theories, educational policies, and educationa	3,41	2,42
21	An open mind to rich and diverse educational practices, and respect for the unique characteristics of educati	3,41	2,93
14	The ability to adopt appropriate comparative approaches to solve problems in educational theory and practic	3,40	2,42
1	Awareness of an appropriate range of theories and methodologies of education, and the ability to describe th	3,37	2,98
19	Commitment to analyze international experiences consciously and critically, making contributions to national	3,37	2,33
8	The ability to understand and critically analyze commonality and diversity of educational development in diffe	3,37	2,51
11	The ability to undertake cross-disciplinary and cross-cultural educational research from international perspec	3,37	2,50
2	Awareness of an appropriate range of theories and methodologies of comparative education, and the ability t	3,33	2,87
15	The ability to design, implement, and evaluate educational or developmental projects based on evidence and	3,32	2,26
16	The ability to apply theories and methods of pedagogy to inform effective teaching	3,31	2,34
10	The ability to conduct international academic exchange and cross-cultural communication	3,30	2,52
7	The ability to use theories and methodologies from other disciplines to enable the student to theorize in the fi	3,30	2,19
6	The ability to relate educational policies and trends in different countries to the socio-economic and cultural c	3,28	2,54
4	The ability to compare and contrast education systems in different countries	3,27	2,66
5	The ability to analyse current educational thoughts	3,24	2,53
18	The ability to apply ICT in educational research, project and knowledge management, and independent study	3,23	2,30
12	The ability to provide policy consultation and services for international organizations, governments, and vario	3,19	2,12
17	The ability to lead and coordinate a multidisciplinary or multicultural team	3,18	2,16
9	The ability to reflect on the nature, roles and underlying agendas of international organizations	3,01	2,23

All subject specific competences in Education were scored over 3 from graduate the perspective. They also rated all competences below 3 in terms of their achievement.

Graphic 12. Gap between Importance and achievement of subject specific competences in EDUCATION from GRADUATES inChina.



It is interesting to underline that in Education, the gap between the level of importance and the level of achievement is significant from the graduates' perspective. The competences with the least difference in the relative score for importance and achievement are:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions.*
- *The ability to compare and contrast education systems in different countries.*
- *The ability to analyse current educational thoughts.*

At the other end there are the competences with more differences between what was considered important and the rating given to their achievement:

- *The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of comparative education.*
- *The ability to learn from international experiences to design and implement educational practices in local contexts.*
- *The ability to provide policy consultation and services for international organizations, governments, and various educational institutions.*
- *The ability to design, implement, and evaluate educational or developmental projects based on evidence and data obtained from comparative studies.*
- *Commitment to analyze international experiences consciously and critically, making contributions to national educational development and reform.*

In this analysis, it is interesting to look at the gaps between the competences considered to be the most important, such as *The ability to learn from international experiences to design and implement educational practices in local contexts.*

7.2. Analysis by variable

7.2.1 Importance

In terms of level of importance, it is significant that the majority of the 22 subject specific competences were rated above 3, on a scale in which 3 is equivalent to Moderate and 4 to Strong. This means that the 22 competences defined by the participants in the project received backing and/or confirmation from those consulted. With regard to the competences considered most important by each of the 4 groups consulted, there was agreement on one competence:

- *An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions.*

At the other end of the scale the four groups agreed on two least important competences:

- *The ability to reflect on the nature, roles and underlying agendas of international organizations.*
- *The ability to provide policy consultation and services for international organizations, governments, and various educational institutions*

The analysis includes a calculation of the correlations among the means given by the four groups.

Table 35. Correlation matrix between averages, based on the level of IMPORTANCE between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,7671	1,0000		
<i>Student</i>	0,7985	0,7286	1,0000	
<i>Graduate</i>	0,8565	0,8388	0,8790	1,0000

The values of the correlation coefficient for importance given to the 22 subject specific competences were slightly low between students and employers, and particularly high between students and graduates.

7.2.2 Achievement

It is worth mentioning that for achievement, all 22 subject specific competences were rated between 2 and 3 on a scale in which 2 is equivalent to Weak and 3 to Moderate.

With regard to the competences considered highly achieved by each of the 4 groups consulted, there was agreement on four competences:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions.*
- *Understanding and appreciation of the social values of the profession, and commitment to professional ethics.*

At the end of the scale, the four groups agreed on three common subject specific competences among the least achieved:

- *The ability to lead and coordinate a multidisciplinary or multicultural team.*
- *The ability to provide policy consultation and services for international organizations, governments, and various educational institutions.*
- *The ability to reflect on the nature, roles and underlying agendas of international organizations.*

It is important to underline that with regard to the achievement of competences, there is higher coincidence among the groups than in terms of importance. This means that there was a high

degree of compatibility among the four groups with regard to the level of achievement given to the 22 subject specific competences, with slightly less compatibility between academics and employers, and a particularly high correlation between students and graduates.

Table 36. Correlation matrix between the averages, based on the level of ACHIEVEMENT between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,8886	1,0000		
<i>Student</i>	0,9115	0,9015	1,0000	
<i>Graduate</i>	0,9274	0,9199	0,9543	1,0000

The four groups agreed on one competence among five with the greatest gaps between achievement and importance:

- *The ability to learn from international experiences to design and implement educational practices in local contexts.*

This competence was considered very important but the four groups scored them as the lowest achieved.

On the other hand, the four groups agreed on three competences with no gap between importance and achievement:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*
- *The ability to compare and contrast education systems in different countries.*

7.2.3 Ranking

The table below compares the four groups, showing the ranking of the subject specific competences derived from the analysis of this variable.

Table 37. Comparative ranking of subject specific competences in EDUCATION by GROUP.

Competence	Academics	Employers	Students	Graduates
Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately	1	2	3	2
Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately	2	1	2	3
The ability to identify potential connections among educational theories, educational policies, and educational practices	3	5	12	6
The ability to understand and critically analyze commonality and diversity of educational development in different countries and regions of the world	4	12	4	12
The ability to conduct international academic exchange and cross-cultural communication	5	13	11	11
The ability to compare and contrast education systems in different countries	6	21	19	19
The ability to relate educational policies and trends in different countries to the socio-economic and cultural contexts	7	15	17	20
Awareness and application of internationalization and localization of education	8	10	15	4
The ability to undertake cross-disciplinary and cross-cultural educational research from international perspectives	9	9	7	8
An open mind to rich and diverse educational practices, and respect for the unique characteristics of education and culture in different countries and regions	10	8	5	5
Commitment to analyze international experiences consciously and critically, making contributions to national educational development and reform	11	7	6	9
The ability to adopt appropriate comparative approaches to solve problems in educational theory and practice	12	6	8	7
The ability to learn from international experiences to design and implement educational practices in local contexts	13	4	1	1
Understanding and appreciation of the social values of the profession, and commitment to professional ethics	14	3	14	10
The ability to use theories and methodologies from other disciplines to enable the student to theorize in the field of comparative education.	15	16	13	17
The ability to design, implement, and evaluate educational or developmental projects based on evidence and data obtained from comparative studies	16	14	10	15
The ability to apply theories and methods of pedagogy to inform effective teaching	17	20	9	14
The ability to analyse current educational thoughts	18	17	16	16
The ability to lead and coordinate a multidisciplinary or multicultural team	19	19	20	21
The ability to provide policy consultation and services for international organizations, governments, and various educational institutions	20	18	18	13
The ability to apply ICT in educational research, project and knowledge management, and independent study	21	11	21	18
The ability to reflect on the nature, roles and underlying agendas of international organizations	22	22	22	22

The four groups ranked in the top five two common competences:

- *Awareness of an appropriate range of theories and methodologies of education, and the ability to describe them appropriately.*
- *Awareness of an appropriate range of theories and methodologies of comparative education, and the ability to describe them appropriately.*

At the bottom five of the ranking, the four groups agreed on two competences:

- *The ability to lead and coordinate a multidisciplinary or multicultural team.*
- *The ability to reflect on the nature, roles and underlying agendas of international organizations.*

In terms of correlation, there is not a great coincidence among the four groups as was shown with regard to the importance. The highest correlation was between employers and graduates and the lowest was between academics and students.

Table 38. Correlation matrix between the averages, based on the RANKING between the different groups.

	<i>Academic</i>	<i>Employer</i>	<i>Student</i>	<i>Graduate</i>
<i>Academic</i>	1,0000			
<i>Employer</i>	0,6884	1,0000		
<i>Student</i>	0,6213	0,6957	1,0000	
<i>Graduate</i>	0,6706	0,8640	0,8602	1,0000

To conclude, it is interesting to stress that the four groups (academics, graduates, students and employers) validated the 22 subject specific competences, awarding the majority of them ratings of over 3, on a scale in which 3 is equivalent to Moderate. Lower scores were given for level of achievement, indicating a good level of criticism and demand among those surveyed.

One important aspect for further analysis is the big gap between importance and achievement. In most of the competences considered to be very important by the four groups, there are significant gaps when comparing them to the perceived level of achievement. It will be relevant in the future to review the subject specific competences which the consultation has shown to be relevant for the different groups and, where nonetheless there is perceived to be a lack of achievement.

Finally, and in terms of correlation, there is not a great coincidence among the four groups as was shown with regard to the importance.

8. Some final conclusions

China's higher education is at a cross-road to adapt from an input and certificate-based higher education system and society to a competence and outcomes higher education system and society. It's very important to take into account views of academics, students, graduates and employers as stakeholders of higher education, and to modernize higher education curriculum design by making use of the Tuning methodology.

This project has tried to make clear that Tuning contributes to a global discussion of comparability and compatibility. For this purpose, one of the steps in the Tuning methodology is consultation of stakeholders. The results gathered in the China-EU Tuning joint study project were presented, for generic and subject specific competences, in a broad manner. It is probably at the level of subject-related competences where Tuning makes its greatest contribution, since those subject-related competences are crucial for the identification of degrees, as well as for comparability and compatibility. Each of the three groups has identified a list of competences related to their subject and consulted with stakeholders to reflect on the relative importance of these competences.

To make educational programmes more transparent and comparable on an international level, it is necessary to develop learning outcomes and competences. The fact that the higher education sector has been internationalised and that nowadays institutions and disciplines compete on a global level makes it necessary that the competences for each discipline or field are designed on a supranational level.

It has to be concluded that the findings of Tuning with regard to the understanding of curricula and the identification of shared descriptors has only been possible through the *discipline approach*. The results presented might contribute to further discussions in China. From the Tuning perspective, China brought an opportunity for a real global reflection.

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