

Perceptions of the Skills of Graduates in the Library and Information Science and Technology Degree of P. Porto, Portugal: A Statistical Data Analysis of the Alignment Between Students, Teachers, and Employers

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Article abstract

Objective – The objective of this research was to identify the four professional competences of graduates in Library and Information Sciences and Technologies (LIST) considered most pertinent, from the points of view of students, teachers, and employers. We also sought to compare the perceptions of the different groups. The study was based on the premise that alignment of these perceptions may enhance the employability of LIST graduates.

Methods – A questionnaire, used and validated by Arias-Coello et al. (2014), was further translated by Martins and Carvalho (2018). The questionnaire consisted of a set of questions regarding four dimensions: Information Management; Communication and Interpersonal Relationships; Domain and Application of Information Technologies; Organization Management. We sent the survey by email to the target audience; it was available to complete in April and May 2018. Data analysis included calculating mean and standard deviation, as well as Shapiro Wilk normality tests, statistical tests for multiple comparisons, ANOVA, Kruskal Wallis test, Friedman test, Wilcoxon test, and Pearson's correlation.

Results – In relation to certain dimensions, one could think that age would be a determining factor, but this has not been proved. In fact, results showed that age is not a factor that influenced the importance attributed to different competences in the several dimensions. The respondents' academic degrees and areas of knowledge were linked to significant differences transversally. The Kruskal Wallis test indicated that students, teachers, and employers perceived the importance of Information and Communication Technologies (ICT) skills equally. As for the other competences, overall there were significant differences between students and employers, and there were significant differences between students and teachers regarding the perceived importance of organization management skills. There were also significant differences between teachers, students, and employers regarding the perceived importance of communication skills. We also found that responses within the teacher group had less dispersion of answers, therefore there was greater internal agreement. The opposite occurred in the employer group.

Conclusion – The differences detected in the perception of the different groups were minor. However, it is necessary to create initiatives for the alignment of the perceptions of students and employers, because if all groups have the same perception, they will develop and value the same skills, responding to the needs of the labor market, thus promoting the employability of LIST graduates. The inclusion of a curricular internship, even one of short duration, in the first year of the degree could also be a way of endeavoring to bring together the expectations of both groups. These suggestions are part of a proposal to change and update the study plan and enhance the performance of course management.

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Research Article

Perceptions of the Skills of Graduates in the Library and Information Science and Technology Degree of P. Porto, Portugal: A Statistical Data Analysis of the Alignment Between Students, Teachers, and Employers

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Abstract

Objective – The objective of this research was to identify the four professional competences of graduates in Library and Information Sciences and Technologies (LIST) considered most pertinent, from the points of view of students, teachers, and employers. We also sought to compare the perceptions of the different groups. The study was based on the premise that

alignment of these perceptions may enhance the employability of LIST graduates.

Methods – A questionnaire, used and validated by Arias-Coello et al. (2014), was further translated by Martins and Carvalho (2018). The questionnaire consisted of a set of questions regarding four dimensions: Information Management; Communication and Interpersonal Relationships; Domain and Application of Information Technologies; Organization Management. We sent the survey by email to the target audience; it was available to complete in April and May 2018. Data analysis included calculating mean and standard deviation, as well as Shapiro Wilk normality tests, statistical tests for multiple comparisons, ANOVA, Kruskal Wallis test, Friedman test, Wilcoxon test, and Pearson's correlation.

Results – In relation to certain dimensions, one could think that age would be a determining factor, but this has not been proved. In fact, results showed that age is not a factor that influenced the importance attributed to different competences in the several dimensions. The respondents' academic degrees and areas of knowledge were linked to significant differences transversally. The Kruskal Wallis test indicated that students, teachers, and employers perceived the importance of Information and Communication Technologies (ICT) skills equally. As for the other competences, overall there were significant differences between students and employers, and there were significant differences between students and teachers regarding the perceived importance of organization management skills. There were also significant differences between teachers, students, and employers regarding the perceived importance of communication skills. We also found that responses within the teacher group had less dispersion of answers, therefore there was greater internal agreement. The opposite occurred in the employer group.

Conclusion – The differences detected in the perception of the different groups were minor. However, it is necessary to create initiatives for the alignment of the perceptions of students and employers, because if all groups have the same perception, they will develop and value the same skills, responding to the needs of the labor market, thus promoting the employability of LIST graduates. The inclusion of a curricular internship, even one of short duration, in the first year of the degree could also be a way of endeavoring to bring together the expectations of both groups. These suggestions are part of a proposal to change and update the study plan and enhance the performance of course management.

Introduction

At the beginning of the 21st century, the Portuguese higher education system underwent major changes for compliance to the Bologna Declaration. As higher education lecturers, the authors experienced this change in the first person and, in addition to the change in form, the assumptions inherent to higher education have also changed. On the one hand, at the level of teaching, new methodologies, which should benefit from Information and Communication Technologies (ICT), were implemented, as well

as information literacy and active teaching strategies, such as the use of laboratories and tutoring. On the other hand, at the level of learning, students became responsible for their own learning, taking up a proactive posture and becoming aware that their learning does not end with the completion of the degree, but will take place throughout their life: Lifelong Learning. These changes, among other objectives, were intended to facilitate the employability and mobility of the youngest students (European Higher Education Area, n.d.).

Amaral (2005) believed that the change of paradigm that underlies the effective implementation of the principles contained in the Bologna Declaration presupposes an adaptation of the degrees to the new professional and social reality.

Information literacy is of vital importance in this context. The evolution of information science has led to a user-centered paradigm, as well as to the enhancement of the importance of information and of the social role of success in shaping a more democratic and inclusive society (Comissão Europeia, 2009). It is now certain that the work of the information professional must be based on the needs and interests of the users and, at the same time, must support their activity in the mediation of information, that is, in the construction and consolidation of mechanisms and instruments that allow users to appropriate the information they need, to stimulate and facilitate access to and use of information.

In the Library and Information Sciences and Technologies (LIST) degree, we believe that the training of professionals and the increase of their ICT skills is necessary in order to achieve the full valorization of information as a human and social phenomenon. That is why each year the LIST meetings (Encontros de CTDI) are organized. The LIST degree and the Master in Business Information are both degrees of ISCAP-P, Porto (Portugal) which have been structured as stipulated in the Euro-Referential I-D (2005). This is the document that, to this date, characterized the "Skills and Aptitudes of European Information-Documentation Professionals" (Volume I) and their "Qualification Levels of European Information-Documentation Professionals" (Volume II). As said in the document, it was intended for a number of categories of users (information-documentation professionals in progress, employers-recruiters, people wishing to be oriented to these activities, trainers) and implied various uses (writing a curriculum vitae, career

advancement, self-assessment, development of a training program). Their content presupposed a certain standardization of the profession which, despite the changes, continues to have to search and find information, describe, organize it, and make it accessible to those who need it.

With this work we intend to assess the perceptions of three different groups (students, teachers, and employers) linked to LIST regarding information management, communication skills, information technologies and management. The study is based on the assumption that the alignment of these perceptions, although not always perfect, may, in our understanding, enhance the employability of LIST graduates. Conclusions will be drawn regarding the data collected, as well as their subsequent analysis.

This study originated from a Spanish study entitled "Professional Skills of Post-Graduates in the Master in Documentation, Libraries and Archives Management from the Perspective of Employers, Students and Teachers" published by Arias-Coello et al. (2014), in which the professional skills of the graduates of a master's degree in Documentation, Libraries and Archives were identified precisely considering three perspectives: student, teacher, and employer. In 2018, Martins and Carvalho presented a paper which, at the time, was based on a descriptive statistical analysis of the data collected. The data collection tool was translated and adapted by the authors to their national reality.

Literature Review

According to Ribeiro and Silva (2004), the Euro-Referential has a vision about the information and documentation professional and about his profession that "is defined by its fundamental mission of researching, treating, producing and disseminating information - incorporating added value - in order to meet the needs of information, expressed or not, by a target

audience, and propose information resources, usually consisting of 'documents' (texts, images, sounds)" (p. 4). Naturally, the constant mutability of the context and technologies requires a persistent adaptation of the professional and the profession itself. Also, according to the authors, the components of the information professional's performance are knowledge (know and know how to do) and skills (referred to as know-how to be).

Pinto and Ochôa (2006) stated that "The strategies to rethink the profession imply career enhancement, both by professionals and by employers" (p. 39). Lou and Pang (2003, as cited in Pinto & Ochôa, 2006) categorized these strategic initiatives in three areas: promotion of employability, improvement image with employers, and strengthening of external contacts. Effectively aligning perceptions of the information and documentation profession is essential for the success of the employability indicator.

For Ribeiro (2008), the traditional training (custodial, historicist, and patrimonialist) of information professionals centered their performance in the cultural world although, due to technological evolution, another technical approach anchored in the need to describe, organize, and make information available has emerged. It would have been, however, in the middle of the 20th century that a paradigm shift occurred, as a consequence of the explosion of scientific and technical information, together with the development of information technology and with the treatment and recovery of information. This new context converged to a new reality, with new demands, not only at the level of the profession, but also at the disciplinary level and in the training of professionals.

Indeed, throughout the years, programs and projects for the sensitization, training, and adaptation of professionals in this area have emerged, developed both by professional

associations and higher education entities. In particular, we wish to highlight changes in the academic training of information professionals in Portugal, where the main pioneers in 2001 were the Faculty of Arts and Humanities of the University of Porto (with a degree in Information Science, jointly taught with the Faculty of Engineering) and the School of Industrial Studies and Management of the Polytechnic Institute of Porto (with a LIST degree and the Master in Business Information, structured as stipulated in the Euro-Referential).

It should be noted that the Euro-Referential is the document that characterized the "Skills and aptitudes of European Information-Documentation Professionals" and the "Qualification Levels of European Information-Documentation Professionals. According to the Euro-Referential I-D (2005), "this Euro-Referential was carried out by professionals from a European perspective. The skills and aptitudes demonstrated in the different occupations of the information-documentation profession (archivist, librarian, documentalist, alert service, etc.) were identified and compared. This tool is intended for a number of categories of users (information-documentation professionals- in progress, employers-recruiters, people wishing to be oriented to these activities, trainers) and various uses (writing a curriculum vitae, career advancement, self-assessment and development of a training program)" (p. 11). These guidelines presupposed a certain standardization of the profession which, despite the changes, continues to have to research and find the information, treat it, and make it accessible to those who need it.

We are not aware of studies that have similar objectives to this in national territory. Some studies have been carried out, such as Pradhan (2015) and Kumar (2010), which show that employability of LIST graduates is around 100% and that communication skills as well as information and technology (IT) skills are of great importance regarding employability. The

importance of a hands-on practice is also present in these studies, alongside the need to develop adaptation skills to a constantly changing environment. Good communication skills, for example, conduct a negotiation that brings together multiple actors with antagonistic interests, taking into account the strategic interests of the company, problem-solving attitude, good knowledge of IT, presentation skills, and ability to provide services with motivation and commitment. These are some of the assets which the authors consider likely to increase the probabilities of employment.

This research was based on a 2014 study developed by Arias-Coello et al. entitled “Professional Skills of Post-Graduates in the Master in Documentation, Libraries and Archives Management from the Perspective of Employers, Students and Teachers,” and on a more recent study by Martins and Carvalho (2018), who developed a first analysis of the data collected.

We believe it is important to know the extent to which there is convergence in what concerns the immediate actors of higher education and the labor market, namely finalist students, teachers, and employers, in particular with regard to the perceptions about the relevant skills for professional practice. We also believe that this convergence will facilitate greater success in employability and that actions, at the level of the degree, can be conducted to refine these perceptions and obtain the desired convergence.

Aims

In this research, we assessed the perceptions of three different groups linked to a LIST degree (LISTs’ last year students, LIST teachers, and LIST graduates’ potential employers) regarding four dimensions. The study is based on the assumption that the alignment of these perceptions may enhance the employability of LIST graduates.

We based the study on the premise that identical expectations and perceptions of professional needs among the different actors in the training process in higher education and in the consequent entry into professional life are drivers of greater employability. The research questions that guided this work were: Are the perceptions of students, teachers and employers regarding different sets of skills all aligned? And if not, what can we do to promote that alignment and consequently foster employability?

Methods

Regarding the methodology, we applied the same questionnaire used in and validated by the study of Arias-Coello et al. (2014), and formatted it in Google Forms. The questionnaire consisted of 4 dimensions, subdivided into 29 factors, which resulted in 29 questions. The four dimensions were:

1. Information Management;
2. Communication and Interpersonal Relationships;
3. Domain and Application of Information Technologies;
4. Organization Management.

The response scale comprised values between 1 and 10 to rate the perceived importance of each skill, with 10 being the highest value of importance (most important) and 1 the lowest value (least important). The questionnaire was made available electronically via email to the three groups: a) the finalist students (N=28); b) the teachers of the degree (N=12) and c) the employers (here represented by the institutions of traineeship) (N=84), which were first contacted by telephone. The groups a) and b) were previously contacted in person in order to raise awareness for the completion of the questionnaire that was subsequently sent by email. The group c) was contacted by telephone. During the period of the data collection, from April to May of 2018, weekly reminders were

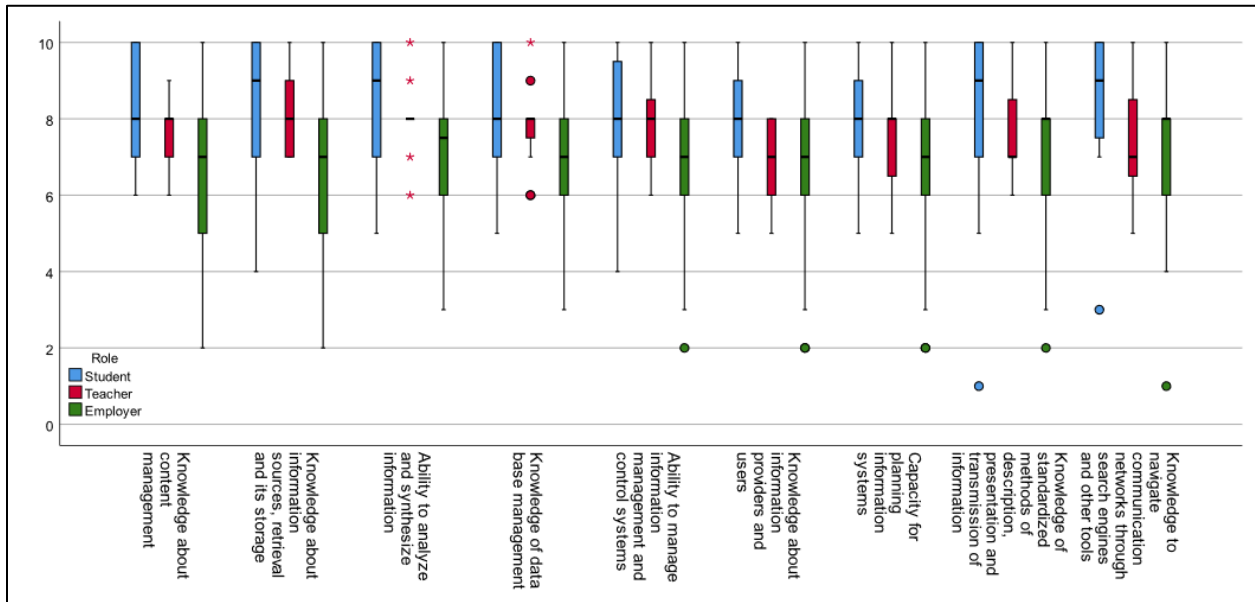


Figure 1
Boxplot of the importance of information management skills for students, teachers, and employers.

made by phone and by email. The response rate of potential employers was below expected, only 26% (22 entities), the response rate of the students and teachers was close to 100%, respectively 82% (23 last year students) and 92% (11 teachers).

The data collected was later exported. IBM SPSS was the software used for data analysis, alongside descriptive statistics—namely mean and standard deviation—as well as Shapiro Wilk normality tests, statistical tests for comparisons such as ANOVA, Kruskal Wallis, Wilcoxon and Friedman tests, and Pearson's correlation. The results obtained are described in the next section.

Results

The analysis of individual competences within each dimension, separated by the respondents' role (Student / Teacher / Employer) in relation to the degree, and taking into account the importance of Information Management skills for the three groups of subjects, revealed that, on

average for students, the most important competence was “Knowledge to navigate communication networks through search engines and other tools” (For details on the descriptive statistics, see Appendices A, B, C, and D). The second most important was “Ability to analyze and synthesize information”, whilst the third most important was “Knowledge about information sources, retrieval and its storage.”

Figure 1 shows a box around the quartiles, the median in the center of the box, and the minimum and maximum values assigned by students, teachers and employers to each aspect evaluated in this study. The stars and circles represent outliers.

Regarding the teachers, this group appeared, as a whole, as the group with the least dispersion in the answers and presented the two most important answer options: “Knowledge about information sources, retrieval and its storage” and “Ability to analyze and synthesize information”, followed by a parameter which

also included two answers, namely “Ability to manage information management and control systems” and “Knowledge in database management.” The third most important were “Knowledge about content management” and “Knowledge of standardized methods of description, presentation and transmission of information.”

In regard to employers, this group presented, in general, a greater dispersion in the respondents' answers. “Knowledge in database management” proved to be the first most important answer, followed by “Ability to analyze and synthesize information”, whereas “Knowledge to navigate communication networks through search engines and other tools” was the third most important.

Developing a similar analysis, yet considering the importance of Communication skills for students, teachers and employers, Figure 2 evinces that, for students, the first most important competence is the “Ability to work as a team,” the second most important is the

“Ability to train, coordinate and direct teams,” and the third most important is the “Ability to communicate orally and in writing in their native language.”

Regarding the teachers, similarly to what happened with the previous item, this group was also the one with the lowest dispersion of responses. The first most important option was “Ability to communicate orally and in writing in their native language,” followed by “Ability to speak and write in English,” while in the third most important this group presented two tied options: “Ability to work as a team” and “Ability to socialize with classmates and superiors.”

In regard to employers, this group was the one with the greatest dispersion in responses. The most important answer was shown to be the “Ability to socialize with classmates and superiors,” followed by the “Ability to work as a team,” leaving the “Ability to relate to users” for third.

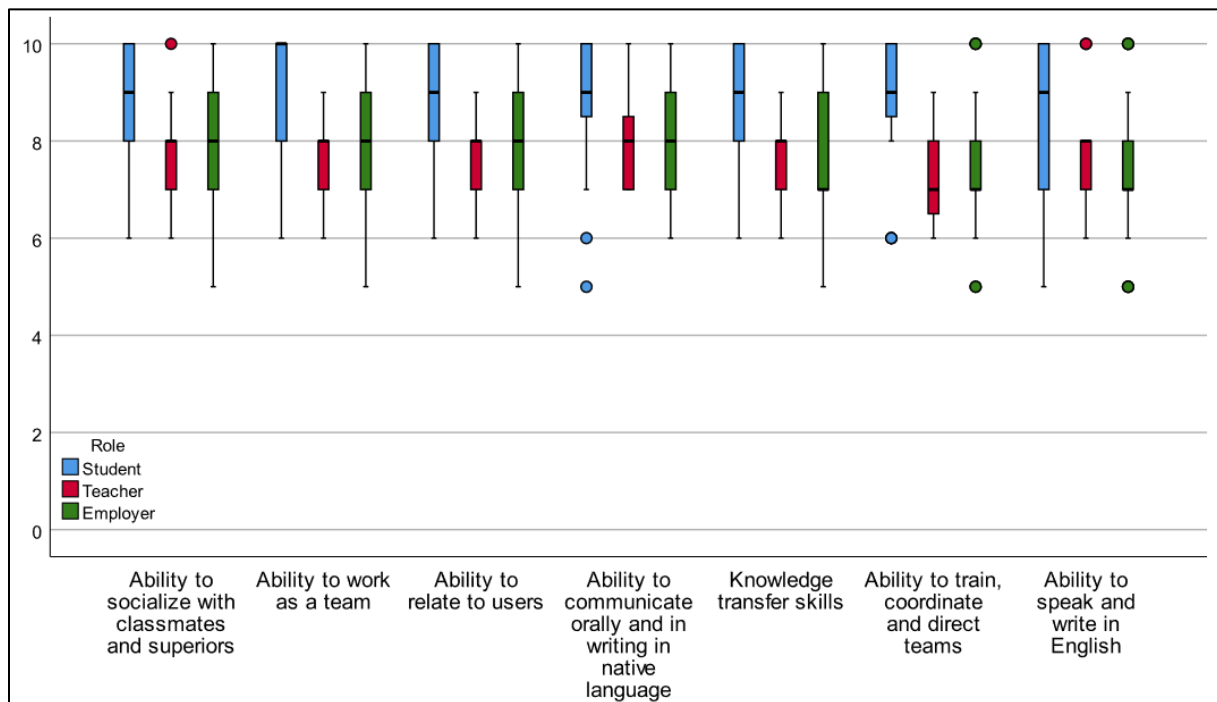


Figure 2
Boxplot of the importance of communication skills for students, teachers, and employers.

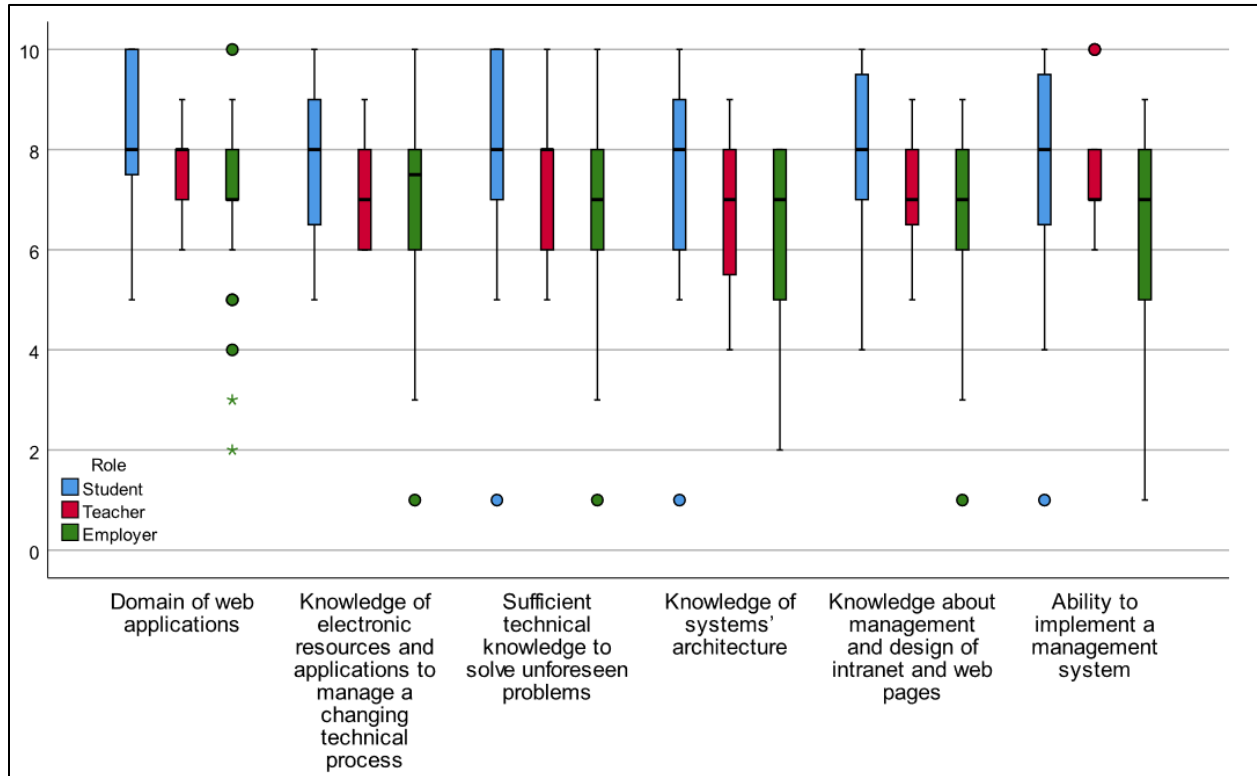


Figure 3

Boxplot of the importance of skills in information technology for students, teachers, and employers.

If we take into account the importance of skills in information technology for students, teachers and employers (Figure 3 and Appendix C), we can say that, regarding the average, for students the first most important option was the “Domain of web applications,” while the second most important was the “Knowledge of electronic resources and applications to manage a changing technical process.” As for the third most important, two options arose: “Sufficient technical knowledge to solve unforeseen problems” and “Knowledge about management and design of intranet and web pages.”

Throughout this analysis, for teachers (this group had less dispersion in their answers) the most important option was the “Ability to implement a management system,” the second most important was the “Domain of web applications,” and the third most important was “Sufficient technical knowledge to solve unforeseen problems” (see Figure 3).

With regard to employers, overall, the dispersion of responses by this group was the highest. The first most important option was the “Domain of web applications,” the second most important was “Knowledge of electronic resources and applications to manage a changing technical process,” and the third most important was “Sufficient technical knowledge to solve unforeseen problems.”

Finally, regarding the importance of the Organizational Management skills (Figure 4 and Appendix D), in tune with the previous analysis, for students, the first most important was the “Ability to manage projects,” the second most important was “Problem solving ability,” and the third most important was the “Ability to analyze and organize statistical data.” As for teachers, and in agreement with what happened in the other dimensions, this was the group that presented least dispersion in the answers. The first most important proved to be “Problem

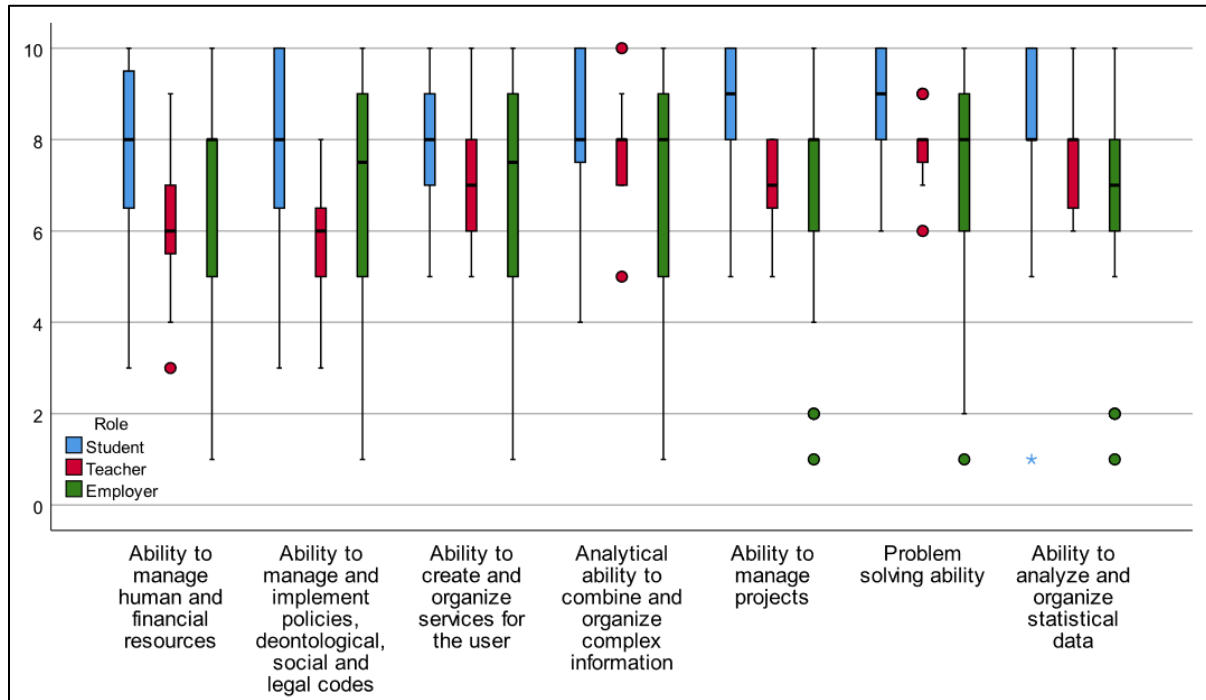


Figure 4
Boxplot of the importance of organizational management skills for students, teachers, and employers.

solving ability,” followed by “Analytical ability to combine and organize complex information,” while the third most important remained the “Ability to analyze and organize statistical data.” With regard to employers, also in line with what happened in the other dimensions, they were the ones who presented the greatest dispersion in the answers given. For them, the first most important was “Problem solving ability,” the second most important was the “Analytical ability to combine and organize complex information,” and the third most important was the “Ability to manage projects.”

For each individual who answered the questionnaire, we calculated the average of the scores attributed in the questions for each of the four dimensions, as well as the global average of the scores attributed in all questions. We analyzed these five quantitative variables using inferential statistical tests. Shapiro Wilk Normality Tests were performed for the four dimensions and for the global average (see

Appendix E), considering the three groups surveyed. With a significance level of 5%, the Shapiro Wilk normality tests revealed that only the variable of the average importance of Information Management skills, spread by the three roles in relation to the degree, could be considered normally distributed, while the other variables could not be considered normally distributed.

Thus, to determine whether students, teachers and employers assigned equal average importance to the skills listed, the ANOVA test was used for the first variable and the Kruskal-Wallis non-parametric test for the others.

In Figure 5, the average of the importance of skills in the four dimensions are compared regarding the three roles under analysis, and also the global average of all skills. Students and teachers seemed to assign more importance to Communication and Interpersonal skills and employers to Organizational Management skills.

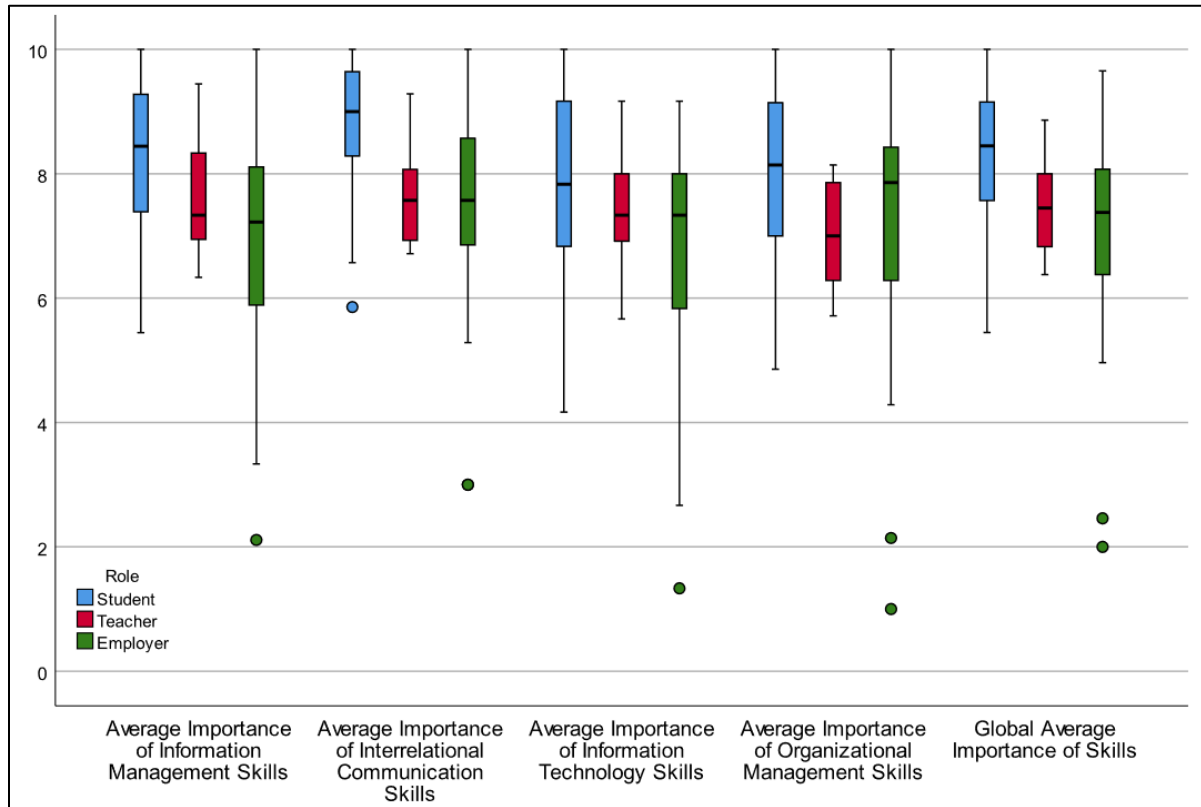


Figure 5

Boxplot of the average importance of skills in the four dimensions and the global average.

Throughout the ANOVA Test and the Kruskal Wallis Test (Tables 1 and 2), it was found that there were significant differences for students, teachers, and employers regarding the importance of skills in dimensions 1, 2, 4 and, globally, at the level of 5% of significance. The Kruskal Wallis test indicated that students, teachers, and employers perceived the importance of ICT skills equally.

Multiple comparisons with the Tukey HSD test (Table 3) resulted in significant differences, at the level of 5% of significance, between the average importance of Information Management skills for students and employers, but not between students and teachers, nor between teachers and employers.

The statistical tests carried out for multiple comparisons also indicated that there were no

differences between teachers and employers in the importance attributed to Communication and Interpersonal skills, but there were significant differences, at the level of 5%, between teachers and students and between students and employers.

Tukey HSD tests also indicated that there were no differences between teachers and employers or between students and employers in the importance attributed to the Organization Management skills, yet that there were significant differences, at the level of 5%, between teachers and students.

Statistical tests for multiple comparisons indicated that there were no differences between teachers and employers nor between teachers and students in the global average importance attributed to all skills under analysis, and that

Table 1

ANOVA Test to Determine Whether Students, Teachers, and Employers Assigned Equal Average Importance to Information Management Skills

Average Importance of Information Management Skills	Sum of Squares	df	Mean Squares	F	p-value
Between Groups	21.197	2	10.599	4.067	0.022
Within groups	148.530	57	2.606		
Total	169.728	59			

Table 2

Kruskal Wallis Tests to Determine Whether Students, Teachers, and Employers Assigned Equal Average Importance to Skills in Several Dimensions

	Average Importance of Communication and Interpersonal Skills	Average Importance of Information Technology Skills	Average importance of Organizational Management skills	Global Average Importance of Skills
Chi-Square	11.469	4.324	6.096	7.523
Df	2	2	2	2
p-value	0.003	0.115	0.047	0.023

Table 3

Tukey HSD Tests for Multiple Comparisons of the Importance of Skills Regarding the Different Roles

Skills	Roles	Test Statistic	Std. error	p-value
Average Importance of Information Management Skills	Employer – Teacher	-0.74786	0.58061	0.408
	Employer – Student	-1.31308	0.46208	0.017
	Teacher – Student	-0.56522	0.59176	0.608
Average Importance of Communication and Interpersonal Skills	Teacher - Employer	-0.202	6.203	0.974
	Teacher – Student	15.638	6.285	0.013
	Employer – Student	15.437	4.954	0.005
Average Importance of Organizational Management Skills	Teacher - Employer	-4.963	6.269	0.428
	Teacher – Student	14.310	6.389	0.025
	Employer – Student	9.347	4.989	0.061
Global Average Importance of Skills	Employer – Teacher	1.101	6.280	0.861
	Employer – Student	13.018	4.998	0.009
	Teacher – Student	11.917	6.401	0.063

there were only significant differences, at the level of 5%, between students and employers (Table 3).

Regarding the analysis of the average competences in each dimension, aggregated for all roles, the reduced p-values obtained in the

Shapiro Wilk normality tests indicated that the aggregated variables did not have a normal distribution (Table 4), therefore non-parametric tests were used to analyze the aggregated variables.

Regarding the comparison of the aggregated average skills in the four dimensions, the Friedman test indicated that the four dimensions were not considered by the respondents to have equal importance ($\chi^2=19.183$, with 3 degrees of freedom produced a p -value <0.0005).

Wilcoxon's tests for multiple comparisons of the four dimensions (Table 5) indicated that, at the 5% level of significance, there were no significant differences between the average importance of skills in Organizational Management and in Information Management, nor between average importance of skills in Organizational Management and in Information Technology. There was statistical evidence to consider that there were differences when comparing the averages of the importance of skills in the remaining dimensions.

When separating by area of knowledge of the respondent, the only variable that the Shapiro Wilk Test considered normally distributed was the variable on the average importance of the skills in Information Management. For this variable, the ANOVA test was used, and, for the others, the Kruskal Wallis test.

In the analysis of significant differences in the average importance of skills separated by area of knowledge, the ANOVA test produced a p -value of 0.024, which indicated that there were significant differences in the importance of skills

in Information Management for the various areas of knowledge of the people who responded to the survey. The Kruskal Wallis test indicated that there were significant differences at the level of 5% for the various areas of knowledge regarding the importance of skills in Information Technologies (p -value=0.034), Organizational Management skills (p -value=0.005) and globally (p -value=0.021), but not in Communication and Interpersonal skills (p -value=0.055).

If we separate the groups by academic degree, the only variables that the Shapiro Wilk Test considered normally distributed were the variables on the average importance of the skills in Information Management and Organizational Management. The ANOVA test was used for these variables, and the Kruskal Wallis test for the others. These test results indicated that there were only significant differences in the importance of Communication and Interpersonal skills ($\chi^2=12.702$ and p -value=0.005) and globally ($\chi^2=9.109$ and p -value=0.028) for the various academic degrees.

Regarding age, Pearson's correlation test showed that there were no significant linear relationships between the respondent's age and the importance attributed to competences in any of the dimensions (all correlations were less than 0.134 in absolute value).

Table 4
Shapiro Wilk Test for the Importance of Skills in the Four Dimensions (Normality Tests)

	Shapiro-Wilk		
	Test Statistic	df	p-value
Average Importance of Information Management Skills	0.948	59	0.014
Average Importance of Communication and Interpersonal Skills	0.913	59	0.000
Average Importance of Information Technology Skills	0.937	59	0.004
Average Importance of Organizational Management Skills	0.921	59	0.001
Global Average Importance of Skills	0.919	59	0.001

Table 5
Wilcoxon Tests for Multiple Comparisons

			Test Statistics ^a Z	p-value
Average importance of Communication and Interpersonal skills	-	Average importance of Information Management skills	-3.032 ^b	0.002
Average importance of Information Technology skills	-	Average importance of Information Management skills	-2.326 ^c	0.020
Average importance of Organizational Management skills	-	Average importance of Information Management skills	-1.010 ^c	0.313
Average importance of Information Technology skills	-	Average importance of Communication and Interpersonal skills	-4.275 ^c	0.000
Average importance of Organizational Management skills	-	Average importance of Communication and Interpersonal skills	-3.775 ^c	0.000
Average importance of Organizational Management skills	-	Average importance of Information Technology skills	-1.102 ^b	0.270

^a Wilcoxon signed rank test

^b Based on negative ranks.

^c Based on positive ranks.

Discussion

As stated in the Introduction, the present study was based on the premise that identical expectations and perceptions of professional needs among the different actors in the training process in higher education and in the consequent entry into professional life are drivers of greater employability.

However, the desired alignment in relation to the perceptions of the different actors in the teaching and learning process did not exist in the way it was assumed to exist by the authors because the skills acquired by graduates will be able to, in theory, meet the needs of the labor market. Indeed, a notorious gap exists, above all, between the perceptions assumed by students and their future employers.

A research question that guided this work was: Are the perceptions of students, teachers and

employers, regarding different sets of skills, all aligned? As seen, they were not fully aligned. However, there was a group that was closer to the other groups: teachers. In fact, considering the several tests and data analysis, there were significant differences at the level of 5% of significance between the average importance of information management skills for students and employers, but not between students and teachers, nor between teachers and employers. They also showed that there were no differences between teachers and employers in the importance attributed to communication skills, but there were significant differences, at the level of 5%, between teachers and students and between students and employers. The statistical tests for multiple comparisons indicated that there were no differences between teachers and employers or between students and employers in the importance attributed to the Organizational Management skills, yet that there were significant differences, at the level of

5%, between teachers and students; and there were no differences between teachers and employers nor between teachers and students in the global average importance attributed to all skills, and that there were only significant differences, at the level of 5%, between students and employers. The reason could be the age difference and the incipient knowledge of professional practice by students.

In view of the data collected and their interpretation, it is necessary to put into practice some actions that promote maximum alignment, namely clarification actions targeted at students and degree candidates. In-office training sessions on the skills of information professionals and on ways they can work in an organization, addressing different dimensions and competences, would be a further action that could have a positive impact. The creation of a curricular unit in the first year aimed at bringing students closer to their employers also seems to be a viable way of promoting this connection.

The skills of an information professional are broad and diverse and can be used in business in order to promote its efficiency. This principle will be the guiding principle of the whole process.

Conclusion

Skills currently required of the information professional are diverse and from different spheres. The Euro-Referential Information-Documentation, which framed and normalized the profession of information professionals in Europe, bears witness to this, including diversified competences, some transversal, and assuming different levels. The acquisition of these skills by students in the Information Science area will therefore be essential for entering the job market.

This work was based on the premise that the perception of the necessary competences for the

exercise of the information profession among the three groups involved in the teaching and learning process of the degree in LIST are properly aligned. However, the basic premise has not been proven. There was no total alignment and, overall, the largest differences existed between students and employers, which can be an obstacle to the employability of new graduates.

Based on this result, different actions, such as information actions for both groups, in-office training for the employers, and the inclusion of a curricular internship, even one of short duration, in the first year of the degree, are proposed in order to harmonize the perceptions of the groups and therefore clarify and promote the relevant competences for entering and working in the labor market.

The main limitation of this work was the low response rate obtained from potential employers. Another limitation was the fact that the implementation of some of these suggestions, in particular, of the internship in the first curricular year of the degree, require a lengthy process to obtain authorization from the national entity that accredits higher education degrees in Portugal.

As future work, it is suggested to repeat this study after implementing the actions identified as necessary, so as to identify the success of the proposed approach.

Author Contributions

Susana Martins: Conceptualization, Formal analysis, Writing – review & editing, Investigation, Methodology
Isabel Cristina Lopes: Formal analysis, Writing – review & editing, Investigation, Methodology, Validation
Milena Carvalho: Conceptualization, Formal analysis, Investigation, Methodology

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Appendix A

Mean and Standard Deviation Regarding the Importance of Information Management Skills for Students, Teachers, and Employers

	Role					
	Student		Teacher		Employer	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Knowledge about content management	8.30	1.460	7.73	.905	6.73	2.031
Knowledge about information sources, retrieval and its storage	8.35	1.668	8.00	1.095	6.85	2.130
Ability to analyze and synthesize information	8.43	1.502	8.00	1.000	7.12	1.840
Knowledge of data base management	8.09	1.756	7.82	1.168	7.15	1.891
Ability to manage information management and control systems	8.04	1.796	7.82	1.250	7.00	2.000
Knowledge about information providers and users	8.00	1.567	6.91	1.136	6.58	2.101
Capacity for planning information systems	8.09	1.411	7.45	1.440	6.81	2.191
Knowledge of standardized methods of description, presentation and transmission of information	8.09	2.151	7.73	1.191	7.00	1.980
Knowledge to navigate communication networks through search engines and other tools	8.70	1.743	7.55	1.635	7.04	1.990
Valid N	23		11		26	

Appendix B

Mean and Standard Deviation Regarding the Importance of Communication and Interpersonal Skills for Students, Teachers, and Employers

	Role					
	Student		Teacher		Employer	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Ability to socialize with classmates and superiors	8.83	1.193	7.73	1.191	7.79	1.668
Ability to work as a team	9.04	1.224	7.73	.905	7.83	1.606
Ability to relate to users	8.87	1.180	7.64	1.027	7.87	1.392
Ability to communicate orally and in writing in their native language	8.91	1.379	8.09	1.136	7.58	1.640
Knowledge transfer skills	8.70	1.222	7.45	.934	7.46	1.693
Ability to train, coordinate and direct teams	8.96	1.364	7.18	.982	7.52	1.470
Ability to speak and write in English	8.39	1.828	7.82	1.328	7.48	1.537
Valid N	23		11		21	

Appendix C

Mean and Standard Deviation Regarding the Importance of Skills in Information Technology for Students, Teachers, and Employers

	Role					
	Student		Teacher		Employer	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Domain of web applications	8.39	1.438	7.64	1.027	7.04	1.907
Knowledge of electronic resources and applications to manage a changing technical process	7.83	1.642	7.18	1.079	6.96	2.107
Sufficient technical knowledge to solve unforeseen problems	7.91	2.234	7.45	1.508	6.88	2.142
Knowledge of systems' architecture	7.52	2.064	6.82	1.722	6.42	1.880
Knowledge about management and design of intranet and web pages	7.91	1.832	7.27	1.272	6.54	1.816
Ability to implement a management system	7.70	2.439	7.73	1.272	6.46	2.064
Valid N (listwise)	23		11		26	

Appendix D

Mean and Standard Deviation Regarding the Importance of Organizational Management Skills for Students, Teachers and Employers

	Role					
	Student		Teacher		Employer	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Ability to manage human and financial resources	7.65	2.124	6.00	1.612	6.77	2.519
Ability to manage and implement policies, deontological, social and legal codes	7.57	2.212	5.73	1.421	6.73	2.539
Ability to create and organize services for the user	8.04	1.492	7.18	1.471	6.85	2.461
Analytical ability to combine and organize complex information	8.22	1.650	7.73	1.272	7.04	2.522
Ability to manage projects	8.61	1.530	7.00	1.000	6.96	2.441
Problem solving ability	8.57	1.409	7.82	.874	7.19	2.530
Ability to analyze and organize statistical data	8.26	2.050	7.64	1.433	6.81	2.367
Valid N	23			11	26	

Appendix E

Shapiro Wilk Test (Normality Test)

	Role	Shapiro-Wilk		
		Test Statistic	df	p-value
Average Importance of Information Management Skills	Student	0.931	23	0.115
	Teacher	0.945	11	0.575
	Employer	0.953	25	0.291
Average Importance of Communication and Interpersonal Skills	Student	0.857	23	0.004
	Teacher	0.934	11	0.455
	Employer	0.915	25	0.039
Average Importance of Information Technologies Skills	Student	0.947	23	0.249
	Teacher	0.966	11	0.838
	Employer	0.861	25	0.003
Average Importance of Organizational Management Skills	Student	0.936	23	0.149
	Teacher	0.900	11	0.183
	Employer	0.910	25	0.031
Global Average Importance of Skills	Student	0.941	23	0.186
	Teacher	0.954	11	0.691
	Employer	0.920	26	0.046