

# EUCIP in Italian Universities

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**Abstract.** EUCIP (European Certification of Informatics Professionals) is a pan-European qualification scheme for people entering the IT profession and for IT professionals wishing to assess their professional development. This paper presents the experiences of the Italian Universities in the framework of the EUCIP programme. We illustrate both the institutional perspective of the Universities and the personal perspective of a set of students who received the EUCIP *Core* level certification during their University studies. The results of our investigations have shown a good interest of the Universities towards the EUCIP programme. Students in general recognize the importance of this certification for their future professional career and show a good interest in improving their certified knowledge and competences.

## 1 Introduction

The fast technological innovation has increased the ICT skills gap at the European level [1]. Industries call for professionals capable of driving and managing innovation, by creating production processes based on new technologies and anticipating ICT trends. Such a situation requires more articulate educational and evaluation systems, based on technological competences, and on capabilities of using and developing technologies in multicultural, dynamic, unstable innovation contexts. The European Certification of Informatics Professionals (EUCIP) [2] is a programme defined by the Council of European Professional Informatics Societies (CEPIS) [3] for the verification and assessment of the ICT skills. Unlike the other certifications – such as the well known European Computer Driving License – EUCIP is conceived as a certification for ICT professionals. This target clearly

emerges from the structure of its *syllabus*, that is, the set of competences required to acquire the certification. In particular, as we will discuss in more details in Section 2, EUCIP defines two levels of competences, associated with two different certifications:

- EUCIP *Core*: a “cultural” level, aimed at providing all ICT professionals with a common terminology and a set of basic competences related to the implementation of ICT systems, including their planning, construction, and actual operation; and
- EUCIP *Elective*: an “operative” level, that identifies competence profiles related to some typical jobs offered by ICT industries.

The integrated and flexible view of EUCIP – that allows the evaluation of competences coming from a variety of different learning activities – has convinced the major Italian bodies involved in the EUCIP, namely, the Italian Society of ICT professionals (AICA), the Italian University consortium for ICT (CINI) and the operative section of the Conference of the Rectors of Italian Universities (Fondazione CRUI), to launch the EUCIP4U (EUCIP for University) project, with the objective of promoting the introduction of EUCIP *Core* level in academia. Some 40 Universities were involved in the project with a total of about 70 degrees of Computer Engineering and Science.

This paper is organized as follows. Section 2 describes the main features of EUCIP; Section 3 discusses the experiences of the Italian Universities in the framework of EUCIP. In particular, we will focus on the perspective of the Universities and on the perspective of a set of students who obtained the EUCIP *Core* certification during their University studies. Finally, the lessons learned from these experiences and some concluding remarks will be presented in Section 4.

## 2 Main characteristics of EUCIP

In advanced countries where technological innovation is a major social and industrial force, there is a clear evidence of the importance for people and industry to measure ICT competences and skills by means of certifications. “*Within the ICT industry, certifications are credentials that result from a voluntary evaluation process whereby an individual’s knowledge and/or skill in a particular subject area is verified against a set of predetermined skill standards by means of an objective assessment*” (CompTIA, 2004, pp. 18-19) [4].

EUCIP is an international certification scheme aimed at developing and keeping up-to-date the competences of ICT professionals. Its specific goals are to:

- define the minimal core of competences necessary to all ICT professionals;
- establish a network of educational services to promote the advancement of ICT competences;
- help to fill the skills gap in the field of ICT; and
- offer guidelines for lifelong learning and training of ICT competences.

The EUCIP programme [5] dates back to the year 2000. Today (December 2007) the

countries participating to the programme are: Croatia, Estonia, Greece, Ireland, Italy, Latvia, Norway, Poland, and Spain.

As already pointed out, the EUCIP programme includes two certification levels, namely, a EUCIP *Core* level and a EUCIP *Elective* level. The learning effort required to acquire these certifications is evaluated in 400 study hours for the EUCIP *Core* level and in 800 study hours for the EUCIP *Elective* level, including both the time spent for classes and the time spent for personal study. If we compare this effort with a University degree, the EUCIP effort is equivalent to 16 credits for the *Core* level and 32 credits for the *Elective* level. We remind that one credit corresponds to 25 study hours, and that one student-year is conventionally equivalent to 60 credits. Hence, by taking into account the effort measured in terms of credits, we can conclude that the two levels of EUCIP are equivalent to slightly less than one year of a University degree.

## 2.1 EUCIP *Core*

The EUCIP *Core* certification defines the minimum set of competences of an ICT professional. These competences are structured in 18 modules organized in three different knowledge areas: *Plan*, *Build*, *Operate*. The *Plan* knowledge area includes seven modules dealing with the economic and managerial planning and use of an IT system in a business environment. The *Build* knowledge area includes four modules concerning how the software architecture of an IT system is designed, implemented, and deployed. The *Operate* knowledge area includes seven modules on how an IT system is operated, namely installed, supervised and maintained.

The exam for obtaining the EUCIP *Core* level certification is based on online tests consisting of multiple choice questions drawn from a *Question and Test Base*, namely, 40 questions for the *Build* and *Operate* areas each and 45 questions for the *Plan* area. The time allotted for each test is 90 minutes. At least 60% of correct answers for each area are required to pass the corresponding test.

## 2.2 EUCIP *Elective*

While the EUCIP *Core* level requires a broad knowledge of basic topics in the ICT field, the EUCIP *Elective* level defines specialized competences of an ICT professional in terms of educational modules and practical experiences. The current EUCIP *Elective* certification (version 2.4, February 2007) includes 21 profiles, corresponding to the 21 main professional roles required by the ICT industry. Thus, each profile is defined by a list of learning modules and practical skills with their associated proficiency levels.

The examination process for a EUCIP *Elective* level certification is based on two steps consisting of the presentation of a *portfolio* of competences and related certificates and of an oral exam that assesses the candidate's knowledge and skills.

The EUCIP *Core* level certification is a pre-requisite for the EUCIP *Elective* certification.

### 3 EUCIP in the Universities

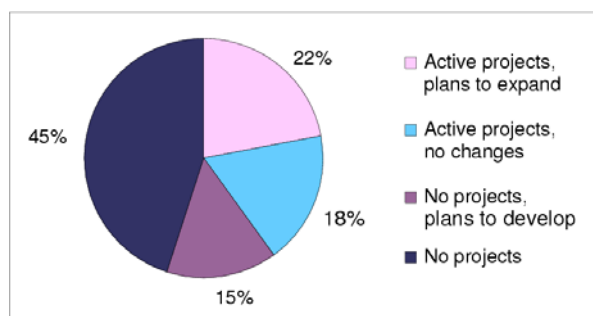
The Italian Society of ICT professionals, AICA, has been active for a long time in promoting the ICT culture in Italy, with particular emphasis to schools and Universities. Since 1997, it has been addressing the issues of ICT certifications. To analyze the introduction and the impact of certification programmes in academia, in the year 2001 AICA founded, in cooperation with CINI and Fondazione CRUI, the “Observatory of the ICT certifications in Italian Universities” [6] whose main goal is to collect and spread experiences and good practices of the Universities in the framework of informatics certifications [7, 8].

In this section, we summarize the results and the trends of the EUCIP projects in the period 2004-2006. We will present both the institutional perspective of the Universities and the personal perspective of the end users, that is, the students who obtained the EUCIP *Core* level certification during their University studies.

#### 3.1 University perspective

The Observatory monitored the diffusion of the EUCIP *Core* level certification since 2004. In 2004, only five out the 51 Universities that participated to our investigation offered this kind of projects. The results in the following years were definitely more promising: EUCIP projects were available at 23 out of 63 Universities in the year 2005 and at 26 out of 65 Universities in the year 2006. This trend denotes a tight correlation with the launch of the EUCIP4U project.

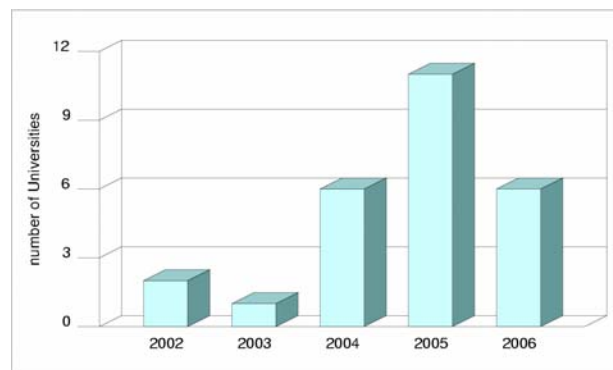
Among the Universities that offered the EUCIP in the year 2006, the vast majority, namely 17, is either large or very large. Concerning their geographic distribution, there is a slight prevalence of Universities located in Northern Italy (11), whereas there are nine Universities located in Southern Italy and six in the Central regions of Italy. Figure 1 shows the details of the choices made by the Universities with respect to EUCIP *Core* projects in the year 2006.



**Figure 1.** Diffusion of the EUCIP *Core* level projects in academia in the year 2006

We can notice that more than 50% of the Universities have demonstrated an interest to the EUCIP *Core* level certification. In particular, 22% of the Universities plan to expand their existing projects and 15% plan to develop new projects. Universities without EUCIP projects include the ones where no IT degrees (i.e., Computer Engineering and Computer Science) are offered to students, thus where EUCIP does not fit student interests (actually, scientific and technical faculties were present in only 75% of the Universities that participated to our investigation).

The distribution of the years of activation of the EUCIP projects, shown in Figure 2, outlines once more the strong impact of the EUCIP4U project. The majority of the Universities activated their projects in the years 2005 and 2006, and only nine Universities activated EUCIP projects earlier, that is, between 2002 and 2004. Note that, in 2004, CINI launched a pilot project that involved some Universities spread all over Italy, and some students of Computer Engineering and Science enrolled in the third and fourth year of their degree.

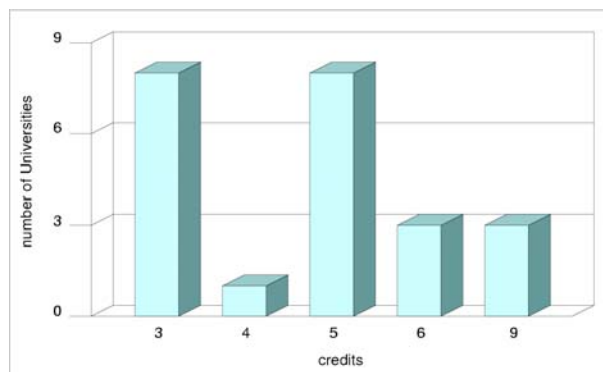


**Figure 2.** Distribution of the years of activation of EUCIP projects

The relevance of the EUCIP *Core* level certification in terms of number of credits earned by the students is shown in Figure 3. The most frequent values, that is, three and five, are in line with the recommendations of the two Italian groups of the University professors of Computer Engineering and Computer Science. The figure shows three Universities that associated nine credits with the EUCIP *Core* level certification: this choice was probably due to some local peculiarities.

The quantitative analysis of the EUCIP projects focused on the number of students involved in these projects and on the number of certifications awarded to the students. Despite the increasing interest shown by the Universities towards EUCIP, these numbers are not very encouraging. For example, in 2005, the Universities involved in their EUCIP projects 3,123 students in total and awarded 504 certifications. In the year 2006, we noticed a decrease of these numbers, namely, 1,808 students involved and 189 certifications awarded. A possible explanation of this trend relies on some peculiarities of the EUCIP4U project, which granted

students a free access to e-learning material and a discount on the Skills Card required for the online tests. These two aspects might have led students to enroll earlier in the EUCIP projects. However, Universities might have not given them sufficient incentives (for example, credits) for pursuing the corresponding certification.



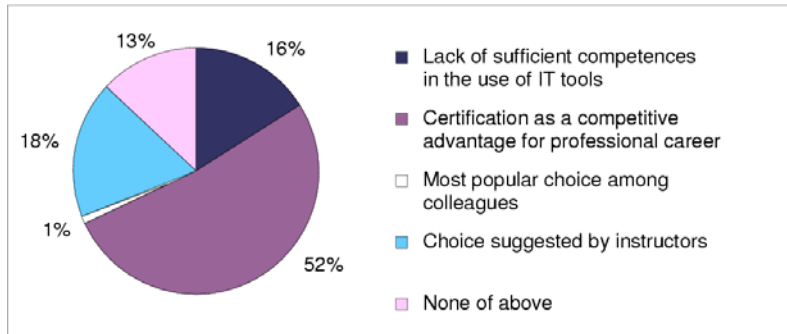
**Figure 3.** Maximum number of credits associated with the EUCIP *Core* level

It is important to outline that, because of the novelty for the academic world of certifications for IT professionals, such as the EUCIP *Core* level, their diffusion requires a strong evidence and recognition by industries which, in turn, require long and complex dissemination and penetration processes.

### 3.2 Student perspective

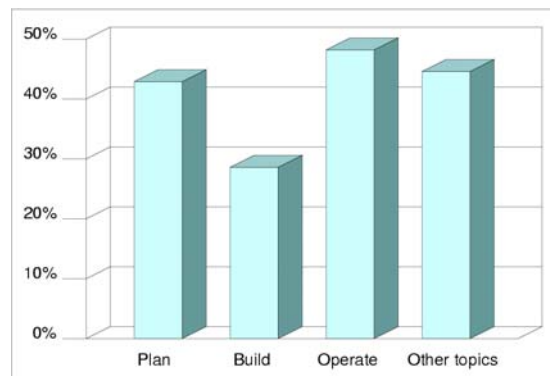
The investigation on the institutional aspects of the EUCIP projects has been integrated by telephone interviews of a set of students who obtained the EUCIP *Core* level certification in the years 2004, 2005 and 2006 during their University studies. These interviews were aimed at collecting the student perspective on EUCIP with respect to their degree of satisfaction, their choices and motivations.

The interviews involved in total 85 students enrolled at 20 different Universities. While the Universities were uniformly distributed all over Italy, the majority of the students (i.e., 70%) was enrolled at Universities in Northern Italy. Moreover, about two thirds of these students belonged to Computer Engineering, and about one third to Computer Science. The analysis of the motivations that led students to obtain the EUCIP *Core* level (see Figure 4) has shown a strong prevalence of professional motivations. Only 35 students had to perform a specific preparation before taking the exams required to obtain the EUCIP. For 50 students, the competences acquired during their University studies were enough. Even though the large majority of these students have Informatics as their major, it is interesting to point out a different behaviour between the students of Engineering and Science.



**Figure 4.** Motivations of the students to obtain the EUCIP *Core* level

Our investigation has shown that the majority of the students perceived the certification as either very useful or useful for their future professional career. Concerning the competences certified by EUCIP *Core* level, about two thirds of the students involved in the interviews expressed the need to improve them. This need was stronger among the students of Science (77%) than among the students of Engineering (61%). Figure 5 shows the choices of the students with respect to three EUCIP areas – *Plan*, *Build* and *Operate* – and to other topics not covered by these areas.



**Figure 5.** Topics to be improved after the acquisition of the EUCIP *Core* level

Each student was allowed multiple choices. It was surprisingly to discover that the most popular choice of the students, namely 48.2%, referred to the *Operate* area that covers topics related to operating systems and computer networks.

In summary, we can then conclude that students recognize the importance of the EUCIP *Core* level for their future professional career and show an interest in improving the knowledge and the competences certified by EUCIP. These results represent an important starting point for the design of new University programmes.

## 4 Concluding remarks

The results of the investigation of the EUCIP activities performed by Italian Universities have shown a good interest towards this type of certification. Many Universities offer EUCIP in their degrees. Moreover, the students who obtained a EUCIP *Core* level certification during their University studies are in general satisfied of their experience, and express a need to improve the certified competences.

Our investigation has also outlined the possibility of extending such a certification to a larger audience, that is, to students with major other than Informatics.

Moreover, the main feature of the EUCIP programme, that is, the integration between University studies and on-the-job experiences, makes it particularly suitable to become part of the University degrees. Hence, the experiences described in this paper could represent a good basis for the ongoing revision of University programmes in Italy. The integration of the EUCIP in Bachelor degrees in scientific and technical areas would definitely increase their attractiveness for the market.

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