



## THE TRANSITION FROM UNIVERSITY TO THE LABOUR MARKET FOR IT GRADUATES IN THE CITY OF CLUJ-NAPOCA

Ioana Magdaş, Alexandru Brad, Daniela Cristea, Otilia Alexandra Pop, Adina Radu, Nicoleta Sicoe

**Abstract:** The European Union is deeply concerned with how education responds to the needs of society. The purpose of this article is to analyze the transition from the University education to the labour market for the IT specialists in the city of Cluj-Napoca, Romania. In order to achieve this, a survey was conducted among the recent graduates in the IT field in Cluj-Napoca. The surveys contents four sections: Demographic items, Education and interests, University education and Work experience. We also were interested to identify a possible profile of the IT specialist. In this article, it is presented the survey and the interpretation of the respondents' data.

**Key words:** University Education, IT graduates, Cluj-Napoca, Romania

### 1. Introduction

The European Union is deeply concerned with how education responds to the needs of society. The Eurydice report: *Key Data on Education 2012* [1] establish that “Tertiary education graduates integrate into the job market two times more quickly than people with lower qualifications. On average, it takes 5 months for tertiary education graduates to enter the job market, as opposed to 9.8 months for people with lower attainment levels.” According to Eurostat [2] “there are significant structural differences among European countries in young people's participation in the labour market.” In this statistic, Romania was included in the first group of countries “in which very few students are employed or unemployed. For countries in this group, the overlap between the labour market and education is very small. This could be the case e.g. if the young complete their studies before looking for a first job, and there are only few part-time or summer jobs for students. Countries in this group are Belgium, Bulgaria, Croatia, Czech Republic, Hungary, Italy, Cyprus, Romania and Slovakia.” In Romania a particular situation is the job market in the field of IT. This labour market is growing and as a result, the demand for labor is high. According to Bureau of Labour Statistics, U.S. Department of labor [3] “Employment of software developers is projected to grow 30 percent from 2010 to 2020, much faster than the average for all occupations. Employment of applications developers is projected to grow 28 percent, and employment of systems developers is projected to grow 32 percent.” Consequently, the demand for skilled developers is currently at an historic high despite the ongoing hiring during the last decade. As a result, the number of students and graduates working in the IT field a student is growing. Cluj-Napoca city is the largest student base of Romania and it is considered a major IT hub in Romania, and the leading exporter of IT services.

Starting to these observations, we wanted to analyze the transition to the labour market of the IT students and graduates in Romania. In order to achieve this, a survey was conducted among current students and recent graduates in the IT field in Cluj-Napoca city. The surveys contents four sections: Demographic items, Education and interests, University education and Work experience. We also were interested to identify a possible profile of the IT specialist. Another aspect was to compare how students view the relation of their education to the labour market before and after they graduate and are enrolled in the workforce. In order to get a better understanding on how different people perceive their education and make use of it, the respondents were profiled with respect to their preferred learning method, interest in technology, working experience, and involvement in internships and student-exchange programs. These allows for a more fine-grained analysis of the situation.

## 2. The research description

The purpose of this study is to analyze the transition from the University education to the labour market for the IT specialists in the city of Cluj-Napoca, Romania. It aims to outline the current strong points of the educational process in an IT career, as well as to identify existing issues and suggest potential improvements. In order to achieve these two surveys were conducted among current students and recent graduates in the IT field in Cluj-Napoca, asking them about their opinions on University education and how it affects their current or future careers. The surveys were very similar because they have been designed to enable a comparative study of how students' opinions on the working environment change once they leave University. The research was conducted during December 2012 to February 2013.

In this article we will present and discuss the survey for the graduates.

### 2.1. Sample of respondents

The sample for the survey comprises 89 graduates. The gender distribution for graduates is slightly skewed (more females than males) and there are more Computer Science graduates than Technology graduates, but considering that the age distribution closely matches that of the target population, defined as "current students and recent graduates in the IT field in Cluj-Napoca", we can assert that the sample is representative.

### 2.2. Survey content

The survey contain 27 items which can be divided in four main sections:

1. *Demographic items*: the respondent's sex, age
2. *Education and interests*: High school graduated and University education, the way the respondents use technology, how they spend their free time, their interests in other subjects, their experience in working or studying abroad, and their involvement in internship programs during University
3. *Opinions about the University education* - the relevancy of subjects studied in University, the preferred learning method, opinions on what makes a good teacher in the IT field, on the usefulness of University, and which activities should be emphasized during University
4. *Work experience* - this is the most comprehensive section and it includes questions related to the respondents working experience, the difficulties they have encountered or think they will encounter at their first job, their salary expectations, or their current position

### 2.3. Procedure

The surveys were conducted through Google Forms, so all of them were delivered and completed online.

## 3. Data results for graduates sample

In this section we present results from the application of questionnaires to graduates. Results are presented with reference to the categories of items.

### 3.1. Demographic items

The survey was completed by 89 people, of which 57% female and the remaining 43% male. Respondents of age between 23-25 years are 81%, following by 25-30 years category with a percentage of 12%, under 21 years category with a percentage of 1% and the age group over 30 years representing 6%.

### 3.2. Education and interests

Individuals who have graduated Mathematics-Computer Science High-school specialization are in proportion of 88%, followed by Sciences profile with a rate of 6%, and Technical specialization, Human specialization by 4% and 2%. Nobody graduated from Vocational specialization.

With regard to University's specialization graduated, Computer Science at Babeş-Bolyai University is the first with a rate of 65%, followed by Computers at Technical University with 12%, Mathematics-Computer Science with a percentage of 6% , and others. (see Table 1.)

Table 1. The distribution of the respondents' University specialization graduated

University's specialization graduated	Percent
Computer Science	65%
Computers	12%
Mathematics- Computer Science	6%
Information Technology	4%
Information Engineering	3%
Automatic control	2%
Bussiness Informatics	1%
Other	6%

Among graduates, those who have followed or will follow other faculties chose the following: Mathematics and Computer Science 20 people represent 22%, Economics 5 persons represent 6%, Theology and Engineering by 3 people each represent 3%. 11 respondents that represent 12% stated that they study other domain, and the rest of 47 people that represent 54% don't followed another faculty.

Referring to education, 70% graduated License, 27% Masters, and 3% have not completed their studies. This shows that the IT graduates do not put much emphasis on getting Postgraduate Study degrees.

As for leisure concerns are diverse and range in the following order: outing with friends (80%), watching movies, reading and listening to music (67%, 63% and 62%), sports, theater and Internet (46%, 43% and 42%), concerts, computer games and others (39%, 21% and 36%). (Figure 2.)

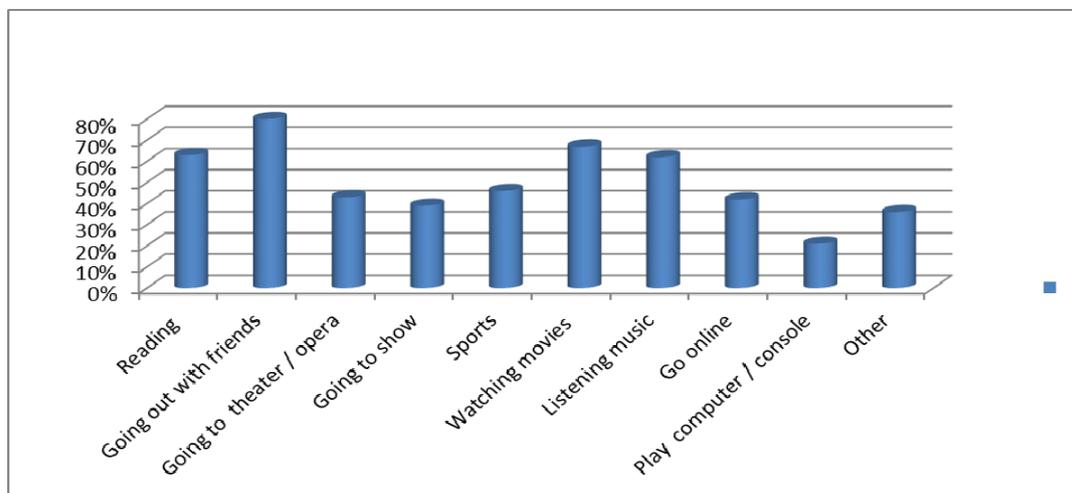


Figure 2. The respondents' leisure concerns

### 3.3. Opinions about the University Education

Among the areas studied in University, the most useful are: Programming Languages 81%, Databases 58% and with 43% Operating Systems and Networks respectively Engineering Software Systems (Figure 3).

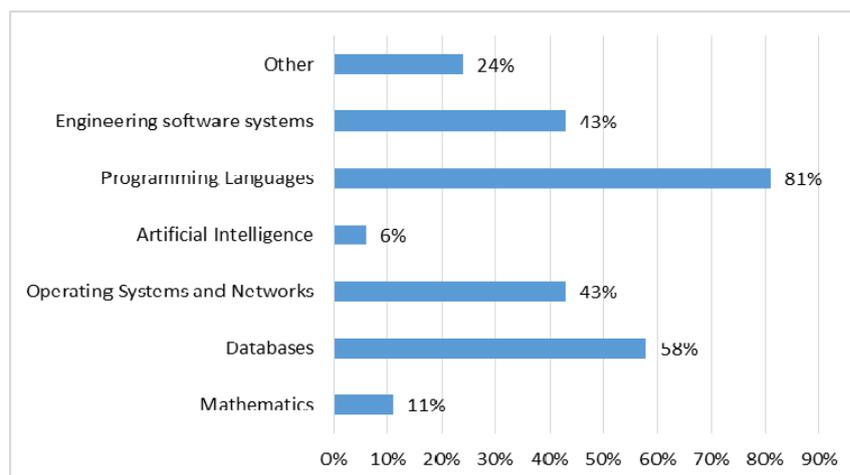


Figure 3. The respondents' answers about the areas studied in University considered useful

At the other pole the most irrelevant areas studied are considered Mathematics 24% and Artificial Intelligence 18%, but these percents are relatively low (Figure 4). That means that for more than 75% of graduates there are not unnecessary disciplines studied into the faculty.

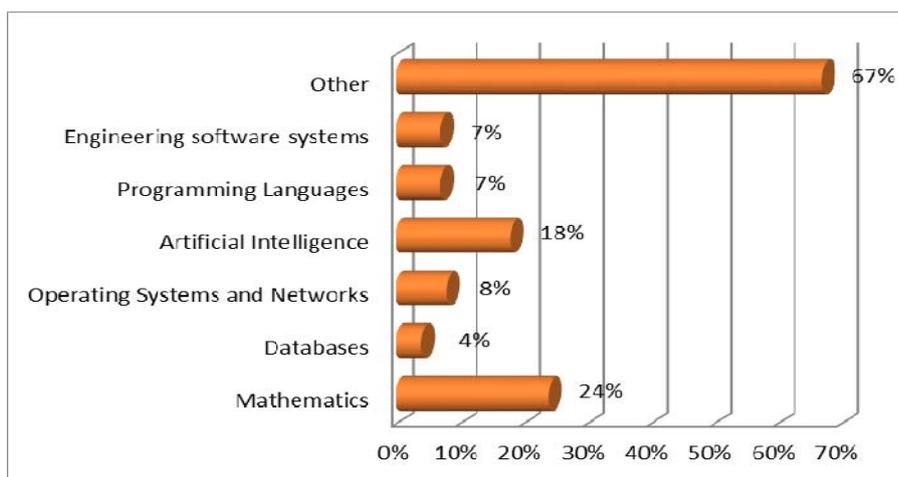


Figure 4. The respondents' answers about the areas studied in University considered unnecessary

About the ways of learning that are most effectively for them, 40% of respondents learn through practice, 28% of the explanations of others, 21% talking to other people, and 10% are informing themselves. Teamwork is preferred individual work, with a percentage of 65%.

Activities considered to be important and suitable to be used in the faculty are internships (44%), new technologies (35%), projects involving teamwork (15%) and transdisciplinary courses (7%).

Other favorite subjects, besides the Computer Science specialization are: Psychology, Astronomy and other disciplines belonging to the Human profile (51%, 33% and 34%), Physics, Chemistry, and Letters (21%, 11% and 11%).

Referring to IT teachers qualities, respondents believe that are important: the ability to interact with students (72%), teaching style (64%), experience in the IT field (59%), the level of knowledge (58%), teaching experience (17%) and level of authority (14%).

### 3.4. Work experience

Of the 89 people who completed the questionnaire, most work in Software Development - 63 people. Seven of the respondents working in Software Testing, six works in other domain, four of them are not

employed. In Web Design, Management Systems and K-12 Education System work every three respondents and in University Education do not work any of the respondents. (Figure 5.) We note the very low interest towards teaching career.

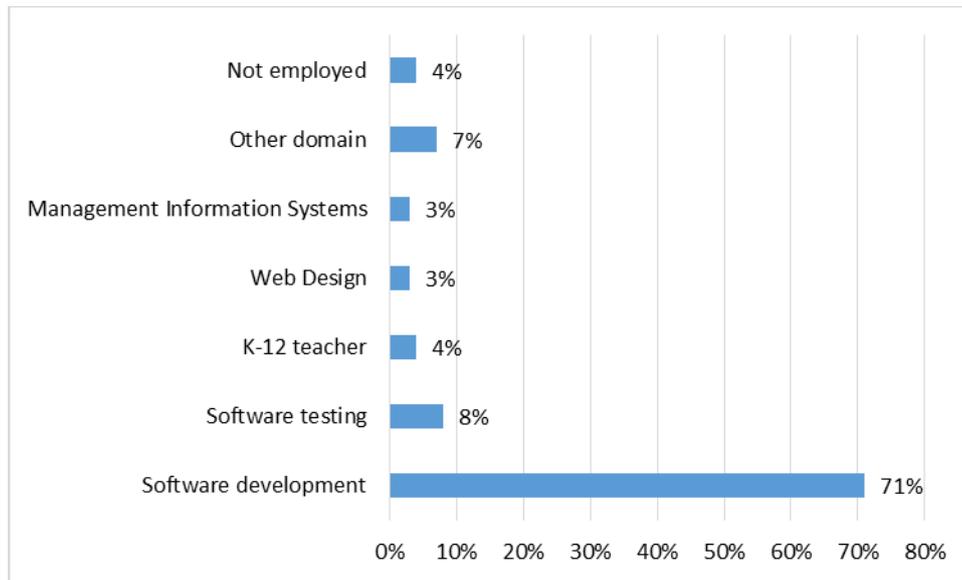


Figure 5. The distribution of the respondents' employment domains

71 of the respondents (80%) haven't worked or studied abroad in IT, 11% did so for a period shorter than one year and only 11% worked or studied abroad in the IT area for over a year.

38 of the respondents (43%) do not consider working abroad in the future, 37 (42%) is going to work only temporarily (for a maximum period of 5 years outside the country) and 14 of those who completed the questionnaire (16%) is going to do that forever.

36 of respondents (40%) have never participated in an internship, 22 (25%) were in the internship for a period of time between two weeks and one month, 14 of them (16%) spent more than 3 months internship, 12 (13%) were in internship in a time of between one and three months while 5 of those who answered this question (6%) are as interns but for a short period of time (less than two weeks).

Of those who participated in internships, 19 people (21%) were employed at the company where they were in internship, other 19 (21%) have not been offered their to work at that company and 18 people (20%) were refused an offer to work at the company you were internship.

For the majority (60% - 53 of the respondents) the most important factor in choosing a job is the opportunity for professional development. The staff and remuneration are considered to be the most important factors by 11 of the respondents (12%). Other important factors are: technologies and methodologies used, the flexibility of program, team etc. (Figure 6.)

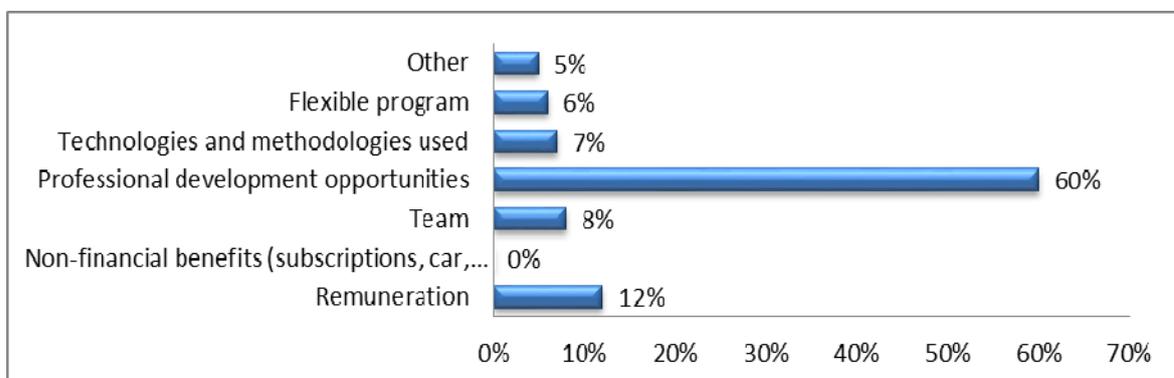


Figure 6. The respondents' most important factors in choosing a job

Of those who completed the questionnaire, 46 (52%) answered that lasted or have approximated that will last less than a month to find a job, 39 (43%) between 1 and 6 months and only 4 of them (5%) answered that lasted or that will last more than one year.

52 of the respondents (58%) are in their first job, 20 (22%) have already changed jobs, 15 of them (17%) changed by more than 3 jobs and only two (2%) of respondents had no job so far.

The longest period of employment in the IT field is between 1-3 years for 55 of the respondents, 11 worked in IT between six months and one year, and 11 had no place IT work to date, seven of the respondents worked in this field over three years and five of them were employed in the IT field for a period shorter than six months. (Figure 7.)

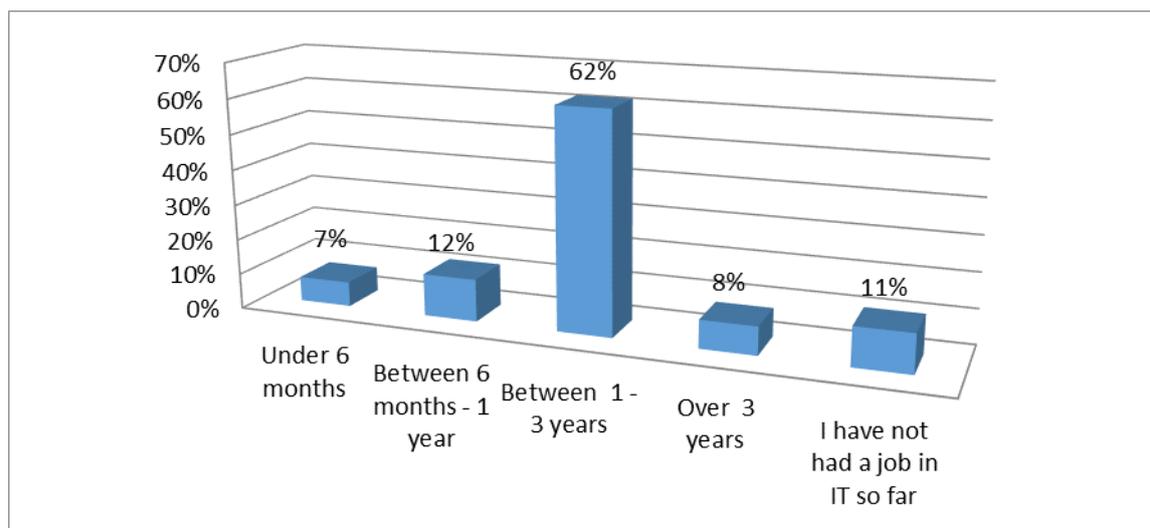


Figure 7. The respondents' longest period of employment in the IT field

Of those who responded, 53 (60%) anticipated or already earn between 400 and 800 € after one year of experience, 19 (21%) of them believe they will win or wins already over 800 €, 13 (15%) say that do not know how they earn while four of the respondents (4%) earn or expect to be earning less than 400 €.

Lack of experience is considered to be the biggest problem is likely to face employment by 41 of the respondents (46%), 33 of them (37%) believe that technical interview might be the biggest problem in this case 10 of the respondents (11%) see the interview of knowledge as a potential employment while only 5 respondents (6%) believe that CV and / or cover letter could be a problem.

51 of the respondents consider or think that expertise is a difficulty they will encounter the first work. 29 of those who responded believe they have experienced other problems, communication with project beneficiaries is considered a difficulty by 21 of the respondents, 13 of them find it difficult relationships with teamleader and 9 relationship with colleagues. (Figure 8)

36 of those who completed the questionnaire (40%) consider the knowledge and skills acquired in University were unnecessary at the first jobs, 21 of the respondents (24%) believe that they have used or will use very little, 20 of them (22%) consider them to be quite useful, nine of the respondents (10%) believe that they have used or will use a lot while three of them (3%) believe that they have been or will be at all useful. (Figure 9) These results show that the most graduates are not satisfied about the university educational offer. The graduates work experience show that the educational offer is not correlated with the requires of the labour market in the IT field.

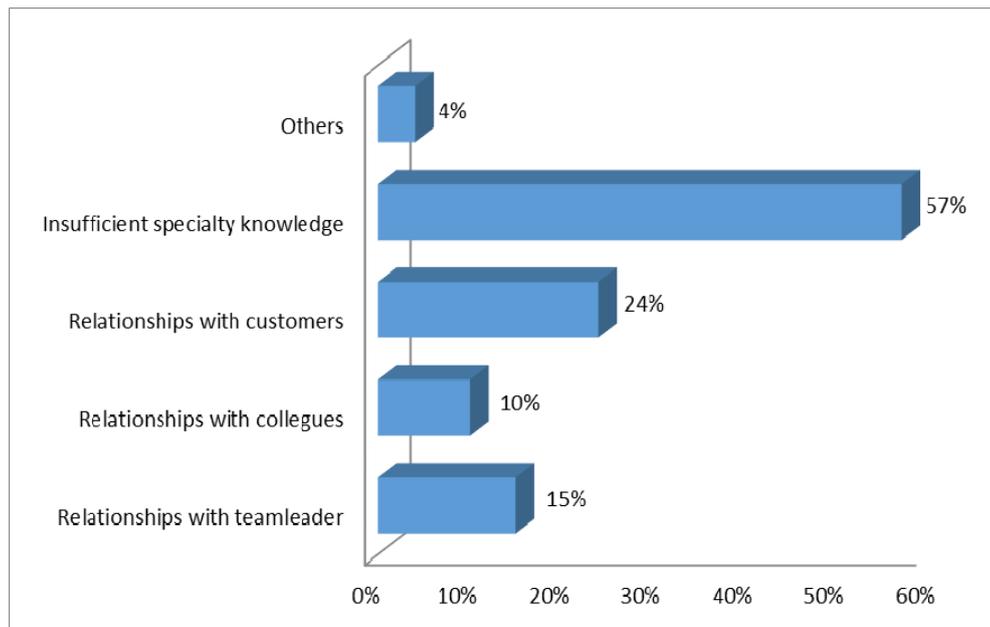


Figure 8. The difficulties of respondents at their first work

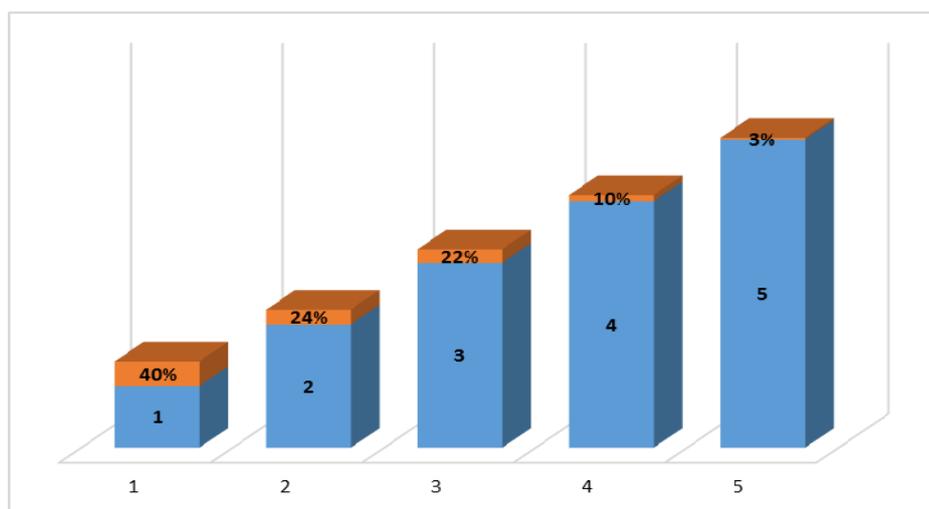


Figure 9. The respondents' impressions about the importance of knowledge acquired in University for the first job

#### 4. Discussions and conclusions

The survey was completed by 89 graduates of an IT University specialization, 99% of them with age less than 30 years. 89% of them work in the IT field, most of them being at the first or second job.

The gender distribution for graduates is slightly skewed (more females than males). This result is expected because at the IT faculties in Romania we find a women's presence approximately equal to that of boys. This situation contradicts the worldwide trend. According to Census Bureau (U.S. Department of Commerce Economics and Statistics Administration) [4] in 2011, women made up 27% of computer occupations, but the number has dropped since 1990 when it was 34%. According to [1] "In the broader field of science, mathematics and computing the share of women graduating from tertiary programmes is equal to or slightly above 50 % in Italy, Portugal, and Romania". We can explain a better representation of women in IT in Romania because the high-school curriculum for

Mathematics-Computer Science specialization includes elements of programming languages. So the girls who may otherwise be frightened of this specialization confidently choose a career in IT.

We notice that only 4% of the respondents have chosen a teaching career. Low salary offered in the educational field and the increasing jobs offer in the IT field led to this situation. Committee on Science and Mathematics Teacher Preparation, Center for Education and the National Research Council in [5] give specific recommendations for Governments, for collaboration between Institutions of Higher Education and K-12 community, for the higher education, for the K-12 community and for the professional and disciplinary Organizations in order to improve teacher education in Science, Mathematics and Technology. According to the Eurydice report: *Key Data on Education 2012* [1] “Greater effort needed to attract more people to the teaching profession”.

Graduates at a rate of about 70% do not feel the need to continue studies in Master or PhD. The causes of this could be the subject of further study. Working or studying abroad is not taken in consideration for almost 50% of the respondents, meanwhile the other 42% of them are interested to work abroad for maximum 5 years. 11% of respondents worked or studied abroad for a period shorter than one year and only 11% worked or studied abroad in the IT area for over a year. The most important factor in choosing a job is the opportunity for professional development. The promotion of student and staff mobility has been given a new boost by the setting of a target for the EHEA countries: "In 2020, at least 20 % of those graduating in the European Higher Education Area should have had a study or training period abroad" (Leuven/Louvain-la-Neuve Communiqué 2009 [6]). From this point of view the situation is in trend with the proposed target.

As for leisure concerns 80% of the respondents prefer outing with friends, meanwhile 42% spent their time on Internet and only 21% prefer computer games. A half of the IT specialist prefer to learn through practice or informing themselves, and the other half prefer to learn communicating with others. Teamwork is preferred to individual work, with a percentage of 65%. More than 50% are interested in Psychology. The researchers Sapna Cheryan, Victoria C. Plaut, Caitlin Handronand and Lauren Hudson [7] asked nearly 300 students from Stanford University and the University of Washington to describe computer science students. Intelligent, technology-oriented, singularly focused on computers, socially awkward, interested in science fiction and video games and physically unattractive were among the most common responses. Our study showed that though more than 50% of IT professionals are eager communication within both the profession and leisure.

The most graduates are not satisfied about the university educational offer, even if more than 75% of graduates cannot identify unnecessary disciplines studied into faculty. The graduates work experience show that the educational offer is not correlated with the requires of the labour market in the IT field. This requires a more detailed analysis that we intend to do into a next study. However, we can identify at least two issues that generate this situation. First is that technology is advancing at a fast pace and curricula can not keep up with them. Second, the IT specialists working in narrow areas that require specific expertise and faculty can offer in the 3 years degree than general training. Usually the employers in the IT field offer specialized training for the employees. Around Europe “The development of quality assurance systems is an important lever for achieving the strategic objective of improved educational quality and efficiency, consequently, the quality of education is increasingly being evaluated across Europe” [1].

## **Annex: Questionnaire for graduates**

### **Demographic items**

1. Gender: Male, Female
2. Age: Under 21 years ; Between 22 - 25 years ; Over 30 years

### **Education and interests**

3. The high-school graduated: Mathematics- Computer Science; Science; Technical; Human; Vocational

4. The university specialization graduated: Computer Science; Mathematics- Computer Science; Mathematics; Information Engineering; Automatic control; Computers; Information Technology; Bussiness Informatics; Other
5. Other faculty graduated: please insert your answer
6. What is your highest diploma?: License; Master; Doctorate; I have not graduated
7. What do you like to do in free time?: please insert 3 answers

#### **Opinions about the University Education**

8. What studied domain in university will help you / do you think will help you at work?(choose maximum 3): Mathematics; Data Base; Operating systems and networks; Artificial Inteligence; Programming languages; Software Engineering; Others
9. What studied domain in university seems your unnecessary? (choose maximum 2): Mathematics; Data Base; Operating systems and networks; Artificial Inteligence; Programming languages; Software Engineering; Others
10. How do you learn easiest?: When somebody explain to me; Searching information; Speaking with others; Making exercises
11. Which of the following modes of operation can you attract more (think you better match to)? Team work; Individual work
12. In your opinion, which of the following activities should be done more than, beside the course / seminar / laboratory normal?: Transdisciplinary courses; New technologies; Internships; Projects involving more teamwork
13. What others discipline would you like to study?: Physics; Chemistry; Astronomy; Psychology; Letter; Other human disciplines
14. In your opinion, which of the following characteristics are most important for an IT teacher?: Teaching style; Ability to interact / communicate with students; The level of knowledge; Age; Experience in teaching; The authority; Practical experience in the field

#### **Work experience**

15. What is your domain of working?: K-12 Teacher; Higher education; Software development; Software testing; Web Design; Management Information Systems; Other
16. How long do you studied or worked abroad in IT?: Under 1 year; Over 1 year; Never
17. In the future you are going to work abroad?: Yes, but temporary(maximum 5 years); Yes, for ever; No
18. How long have you spent in internships?: I never participated to internship; Under 2 week; Between 2 week to one month; Between one to 3 month; Over 3 month
19. If you participated to the internship, choose the option that suits you the best: After every internship never I was asked to work at that company; I have proposed to work, but have not accepted; I have proposed to work and I have accepted
20. What is the most important factor in choosing a job?: Remuneration; Non-financial benefits (subscriptions, car, phone, etc.); Team; Professional development opportunities; Technologies and methodologies used; Flexible program; Other
21. How long you got a job from the moment you start looking? Or how long appreciated that you get the job you want if you look for?: Under one month, Between 1 - 6 months; Between 6 month - 1 year ; I'm not employed and I'm not going to search a job soon
22. How many jobs have you had so far?: It is the first job; It is the second job; I changed more than 3 jobs; I had no job so far

23. Which was the longest period of employment in the IT?: Under 6 months; Between 6 months - 1 year; Between 1 - 3 years; Over 3 years; I have not had a job in IT so far
24. How you expect to win / win monthly (net) after one year of experience in IT?: Under 400 €; Between 400-800 €; Over 800 €; I don't know
25. What do you think is the biggest problem that you faced / will you face in employment?: CV and / or cover letter; Interview of knowledge; Technical interview; Lack of experience
26. What do you think will be / were the difficulties when you started the first job?: Relationships with teamleader; Relationships with colleagues; Relationships with customers; Insufficient specialty knowledge; Others
27. How much knowledge and skills acquired in the university you were helpful / do you think will be helpful to first job? Select a number on a scale starting from 1 (not at all) to 5 (very much)

## References

- [1] Education, Audiovisual and Culture Executive Agency P9 Eurydice, *Key Data on Education in Europe 2012*, <http://eacea.ec.europa.eu/education/eurydice>
- [2] Eurostat, *Participation of young people in education and the labour market*  
[http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php?title=Participation\\_of\\_young\\_people\\_in\\_education\\_and\\_the\\_labour\\_market](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=Participation_of_young_people_in_education_and_the_labour_market)
- [3] Bureau of Labour Statistics, U.S. Department of labor, *Occupational Outlook Handbook, 2012-13 Edition*, Software Developers, <http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm>
- [4] Liana Christin Landivar, *Disparities in STEM Employment by Sex, Race, and Hispanic Origin*, U.S. Census Bureau, September 2013, <http://www.census.gov/prod/2013pubs/acs-24.pdf>
- [5] Committee on Science and Mathematics Teacher Preparation, Center for Education and National Research Council, *Educating teachers of Science, Mathematics, and Technology- New Practices for the New Millennium*, National Academy Press, Washington, DC, 2001
- [6] Communiqué of the Conference of European Ministers Responsible for Higher Education, Leuven and Louvain-la-Neuve, 28-29 April 2009 ,  
[http://www.ond.vlaanderen.be/hogeronderwijs/bologna/conference/documents/leuven\\_louvain-la-neuve\\_communique%C3%A9\\_april\\_2009.pdf](http://www.ond.vlaanderen.be/hogeronderwijs/bologna/conference/documents/leuven_louvain-la-neuve_communique%C3%A9_april_2009.pdf)
- [7] Sapna Cheryan, Victoria C. Plaut, Caitlin Handronand and Lauren Hudson, *The Stereotypical Computer Scientist: Gendered Media Representations as a Barrier to Inclusion for Women*, Sex Roles, July 2013, Volume 69, Issue 1-2, pp.58-71

## Authors

**Magdaş Ioana**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [magdas\\_ioana@yahoo.com](mailto:magdas_ioana@yahoo.com)

**Alexandru Brad**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [brad.alexandru@gmail.com](mailto:brad.alexandru@gmail.com)

**Daniela Cristea**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [daniellacristea@yahoo.com](mailto:daniellacristea@yahoo.com)

**Otilia Alexandra Pop**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [pop\\_otilia.alexandra@yahoo.com](mailto:pop_otilia.alexandra@yahoo.com)

**Adina Radu**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [raduadina89@yahoo.com](mailto:raduadina89@yahoo.com)

**Nicoleta Sicoe**, Babes-Bolyai University, Cluj-Napoca, Romania, e-mail: [andreea.sicoe89@yahoo.com](mailto:andreea.sicoe89@yahoo.com)