



THE IMPACT OF THE UNIVERSITY EDUCATION FOR AN IT CAREER IN CLUJ-NAPOCA CITY

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Abstract: Cluj-Napoca city is considered a major IT hub in Romania, and the leading exporter of IT services. The purpose of this article is to analyze the impact of University education on the future careers of IT students in city of Cluj-Napoca, Romania. In order to achieve this, a survey was conducted among the University students in the IT field in Cluj-Napoca. The surveys contents four sections: Demographic items, Education and interests, University education and Work experience. It aims to outline the current strong points of the educational process as well as to identify existing issues and suggest potential improvements. In this article, it is presented the questionnaire for students and the interpretation of the respondents' data. We also make a comparative analysis between the students and graduates answers from an previous article.

Key words: University Education, IT University students, Cluj-Napoca, Romania

1. Introduction

According to the article [5] "Romania becoming Europe's fastest-growing outsourcing hub" in Computer Business Review "Romania has become a highly attractive sourcing destination for companies looking for business process outsourcing, offshore software engineering and contract manufacturing services, according to market reports". Article [6] "Romania among top 10 outsourcing locations globally" confirm in 2013 "Investor attention regarded Romania a perfect match for information technology outsourcing activities, software development and research programs, knowledge process outsourcing and business process outsourcing operations, as well as for shared service center capacity. The country in becoming leader in IT outsourcing, particularly for chip design, embedded software and information security." In Romania the city of Cluj-Napoca is considered a major IT hub in Romania, and the leading exporter of IT services. 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. 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 [2], Romania was included in the first group of countries "in which very few students are employed or unemployed".

Under these circumstances, improving the efficiency of University education is paramount. In article [4] we analyzed 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 IT

graduates in Cluj-Napoca city. The surveys contents four sections: Demographic items, Education and interests, University education and Work experience. At the same time the University IT students were surveyed to see how their University education has helped them and what improvements could be made to enhance the efficiency of the educational process. The idea 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 this article we present and discuss the survey for the students. We also make a comparative analysis between the students and graduates answers from the previous article [4].

2. The research description

The purpose of this study is to analyze the impact of University education on the future careers of IT students in city of Cluj-Napoca, Romania. In order to achieve this, a survey was conducted among the university students in the IT field in Cluj-Napoca. The research was conducted during December 2012 to February 2013.

2.1. Sample of respondents

The sample for the survey comprises 89 graduates. The gender distribution for graduates is slightly skewed (more males than females) and there are more Computer Science graduates than Technology graduates. According to [1] “In the broader field of science, mathematics and computing the share of women graduating from tertiary programs is equal to or slightly above 50 % in Italy, Portugal, and Romania”. So we can assert that the sample is representative.

2.2. Survey content

The survey contains 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 University students sample

3.1. Demographic items

The questionnaire was filled by 77 people, of which 57% male and the remaining 43% female. Respondents of age between 18-20 years are 43%, following by 21-23 years category with a percentage of 42%, 23-25 years category with a percentage of 13% and the age group over 25 years representing 1%.

3.2. Education and interests

Individuals who have graduated the Mathematics-Computer Science High-school specialization are in proportion of 83%, followed by Sciences specialization with a rate of 9%, Technical specialization 6%, Human specialization by 1%. Nobody graduated from vocational profile.

With regard to University's specialization followed, Computer-Science at Babeş-Bolyai University is the first with a rate of 74%, followed by Mathematics and Computer Science with a percentage of 12%, Computers 12%, Information Engineering and Information Technology, both with 1% .

Among the other University specializations that were followed or intended to be followed by respondents there are: Mathematics-Computer Science (52%), Information Engineering (16%), Economics (12%) or Theatre and Television, Law, European Science/Business, Theology each at a rate of 4%.

As for the leisure activities, watching movies occupy a leading position for 62 people, followed by the pleasure of listening to music for 60 people and outing with friends for 59 people. Even if Cluj-Napoca is an important cultural center, students are less concerned with concerts, theater, opera. (Figure 1)

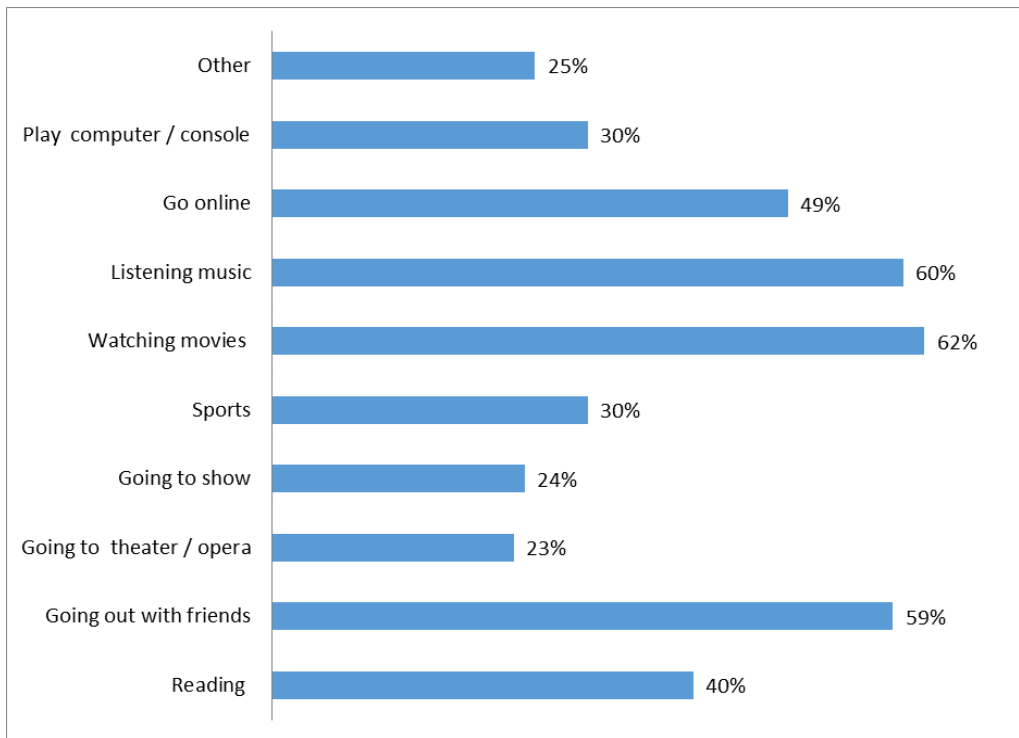


Figure 1. The respondents' leisure concerns

3.3. Opinions about the University Education

Among the areas studied in University, the most useful are: Programming Languages 88%, Databases 55% and with 47% Operating Systems and Networks (Figure 2).

From the point of view of the respondent, in the list of unnecessary disciplines Mathematics is the first with 54%. The other disciplines are at a long distance from that. (Figure 3)

Referring to learning method preferred, 34 people (44%) choose learn through practice, 17 (22%) through explanations of others, 13 people (17%) learn by talking to other people, and 13 people (17%) prefer to study alone. Teamwork is preferred by 65% of respondents, while individual work is preferred by 35%.

Among the activities that should be exploited more in within the faculty include internships (38%), the study of new technologies (27%), projects involving more teamwork (18%) and interdisciplinary courses (17%).

Other disciplines besides Computer Science specialization preferred by respondents are: Psychology (55%), Astronomy (35%), Physics (25%), Chemistry (17%).

In respondent's opinion, the most important characteristics of an IT teacher are: ability to interact / communicate with students (81%), the style of teaching (79%), level of knowledge in teaching(64%), experience in the IT field (61%), experience teaching (22%). Only 13% believe that a teacher should be authoritative.

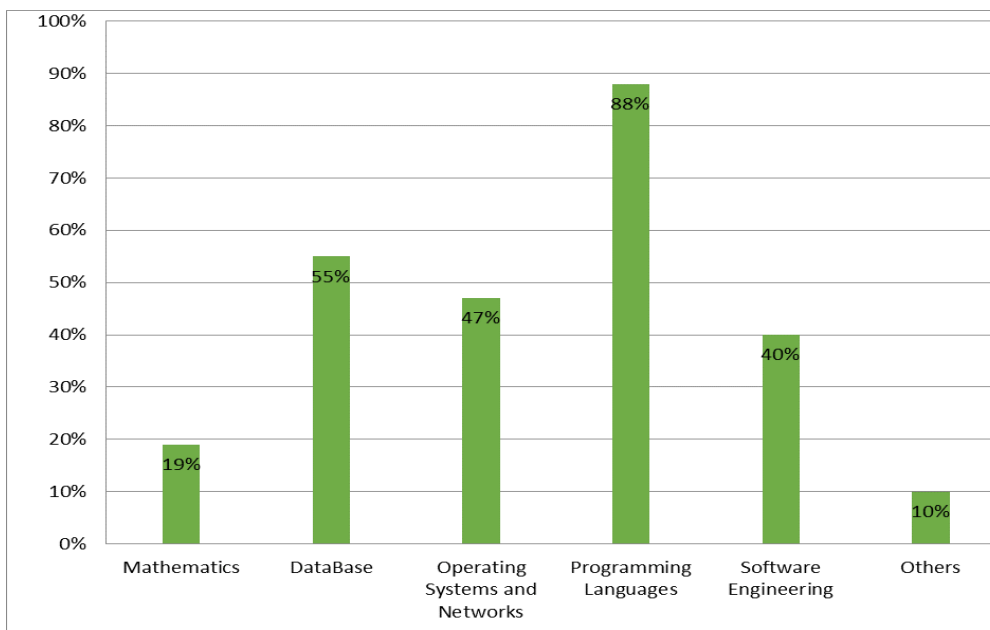


Figure 2. The respondents' answers about the areas studied in University considered useful

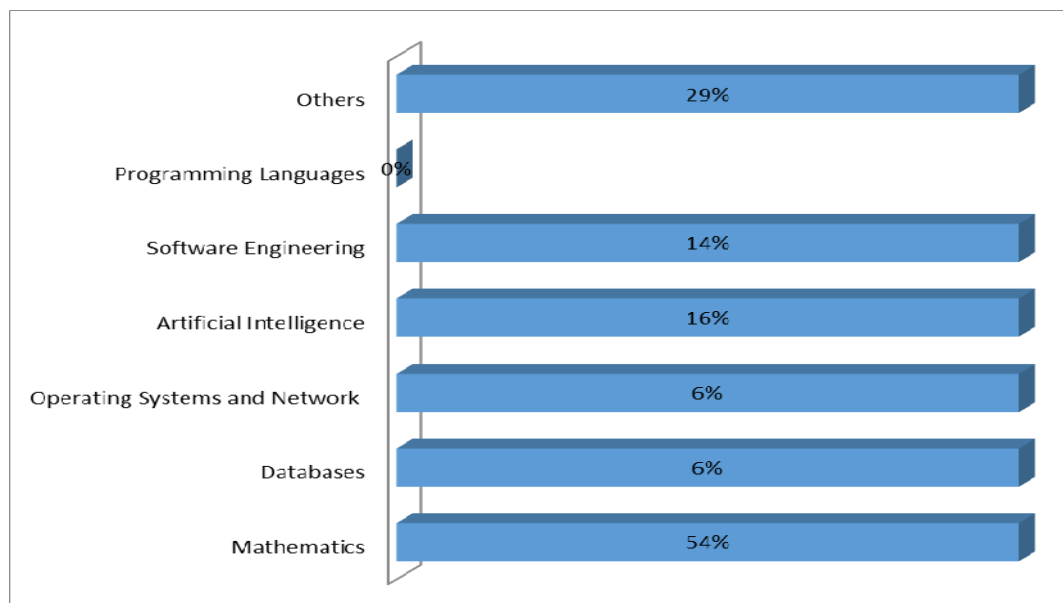


Figure 3. The respondents' answers about the areas studied in University considered unnecessary

3.4. Work experience

Of the 77 people surveyed, 26 (34%) are employed in IT, 27 (35%) are unemployed but want to employ before completing their studies in IT, and 21 (27%) want to employ in IT after graduation. Only 3 people, representing 1% are not interested to work in IT.

Regarding desired employment after graduation, Software development is in first place with a percentage of 60%, followed by Web Design (17%), Software Testing (17%), Management

Information Systems (1%). Only 4% want to be engaged in the Educational System of which 3% want to follow an University career, while only 1% in K-12 Education. (Figure 4)

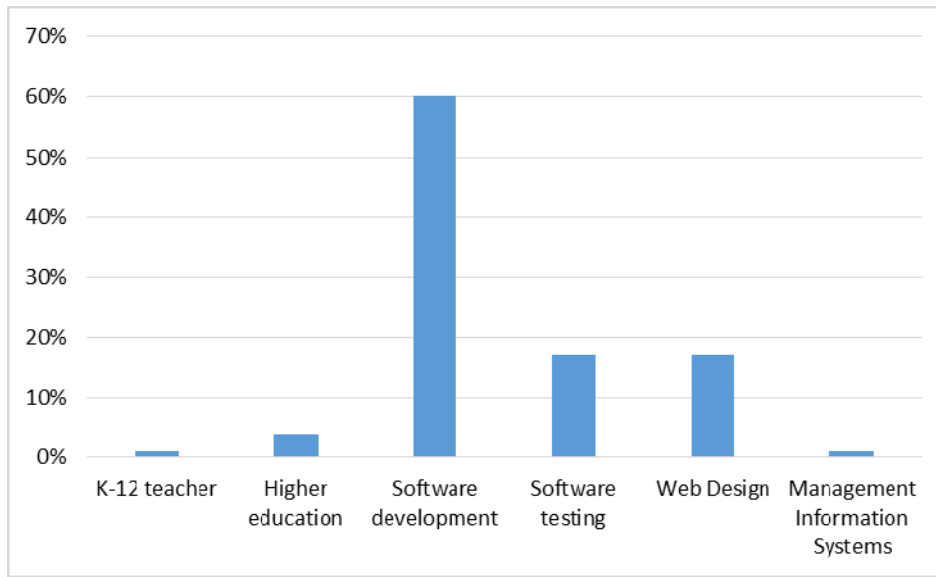


Figure 4. The distribution of the respondents' desired employment domains

Only 4 students representing 5% of respondents participated in exchanges in universities / companies from outside the country.

Of the respondents, 37 people (48%) want to work abroad within five years, 17 people (22%) want to work permanently abroad, and 23 people (30%) don't want to work at all abroad.

Majority of the respondents, 49 students, don't participate in any internship. Among those 11 spent between one and three months in internship, 9 students from two weeks to a month, 7 students participated over three months and 1 person under two weeks. (Figure 5)

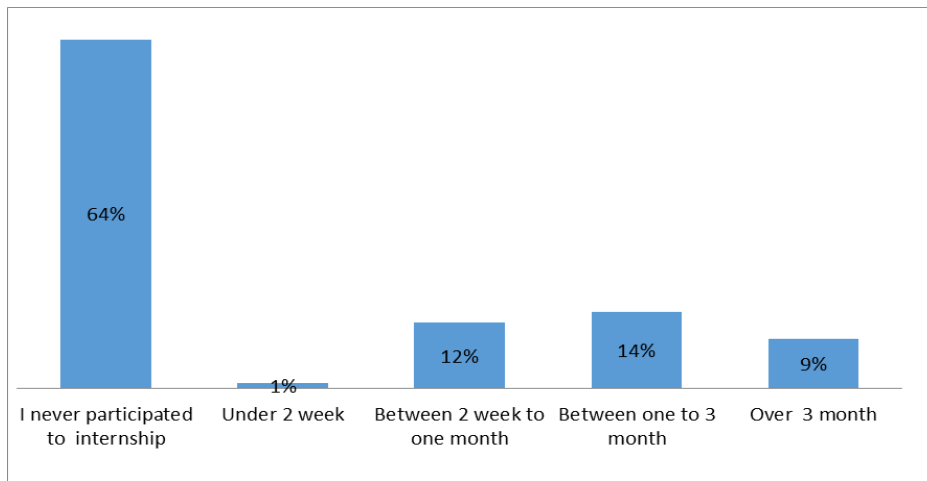


Figure 5. The distribution of how long time the respondents spent in internships

Of those who participated in an internship 18% have accepted a position at the company where they did internship, 10% of them did not receive an offer of engagement from the company, and 12% were not interested to work in the company.

Most respondents considered that professional development opportunity is the most important factor in choosing a job (46 persons - 60%). Other important factors: flexible schedule and staff. Only 8% of students consider that remuneration is the most important factor. (Figure 6)

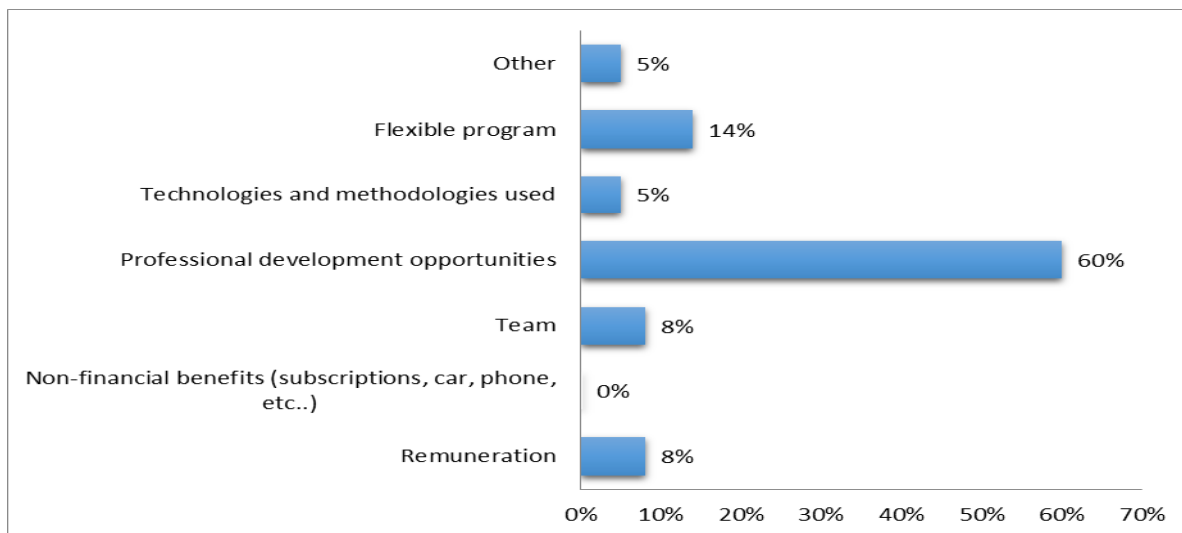


Figure 6. The respondents' most important factors in choosing a job

Of those who completed the questionnaire, 42% said it takes between one and six months to get an IT job. 35% said that finding a job period not exceeding one month, 4% deemed necessary between six months and a year to find one. Only 19% of people do not have a job and do not want to look for a job in the near future.

40% of respondents do not have a job so far, 34% are in their first job, 13% had two jobs so far and 13% have changed more than three jobs.

As for the longest period of employment in the IT field, only 1% of those surveyed had a position in a company over three years, between one and three years - 10% in six months – 1 year, 16% and between six months and one year - 17%.

53% of respondents felt that an employee after one year of experience in IT may have a salary between 400 and 800 Euro. Another 19% believe that the salary may exceed 800 Euro, while 8% think the amount is below 400 Euro.

Lack of experience is seen in 70% the biggest problem faced by a person in employment. technical interview, interview of knowledge and CV with 13%, 10%, and 6% are other impediments to finding a job.

The first difficulty the respondents consider they have at the first job is the insufficient specialty knowledge, 56%. Among the difficulties are relationship with project beneficiaries (16%), with team leader (14%) or colleagues (12%). Other 29% believe that other problems occur in the first job.

The opinions about how useful the University knowledge acquired are for the first job: 26 people given 1 point and believe that the knowledge are useless; 24 people given 2 points and believe that they are very little useful; 17 people that give 3 points believe that the knowledge gained are sufficiently useful; 7 people that give 4 points believe that this knowledge is very useful to work and 3 people that give 5 points believe that they are all useful. (Figure 7)

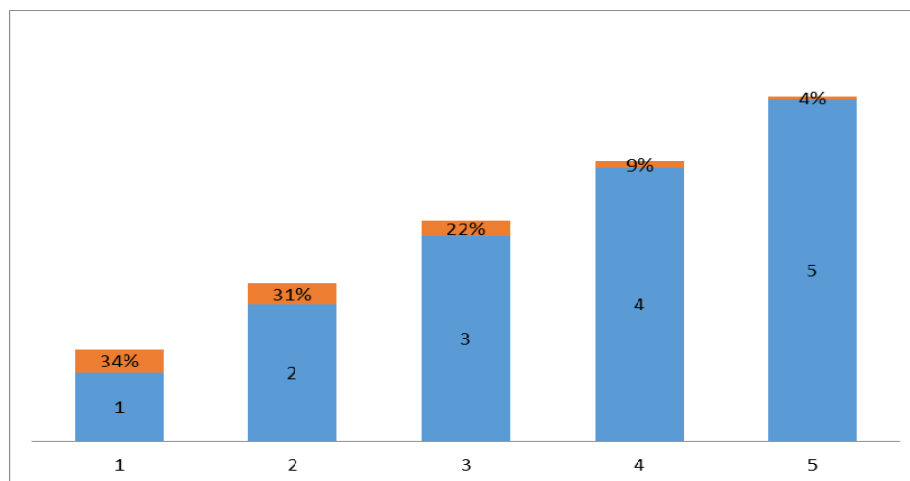


Figure 7. The respondents' impressions about the importance of knowledge acquired in University for the first job

4. Comparative analysis between the students and graduates' surveys answers

Analyzing the responses of graduates [4], respectively students to surveys we identified the following:

166 respondents, 89 graduates and 77 students respectively completed the surveys, the number of girls being approximately equal to that of boys. This fact was expected because according to [1] at the IT faculties in Romania we find a women's presence approximately equal to that of boys.

Over 80% of students / graduates are aged between 18-23 years and 22-25 years respectively.

Around 85% of respondents (both students and graduates) graduated the Mathematics- Computer Science High- school specialization.

Around 70% of respondents (both students and graduates) follow or graduated the Computer Science University specialization, while the other majors Mathematics and Computer Science, accumulating a percentage of 6-12%.

Areas considered useful by students and graduates alike are Programming Languages, Databases, Operating Systems and Networks, and Software Systems Engineering.

Other disciplines besides of Computer Science specialization preferred both as students and graduates include: Psychology, Astronomy, Physics, Chemistry. Of these, Psychology ranks first with approximately equal percentages: 55% for students and 51% for graduates.

Activities considered being the most important and suitable to be included in the university learning, both graduates and students chose internships and on the second position new technologies.

Teamwork is preferred to individual work by both categories of respondents.

About leisure, both students and graduates have chosen the leading places following: watching movies, going out with friends, listening to music and reading. The difference is the low interest of graduates of games, unlike students, and low interest of students to the theater in relation to graduates.

Regarding preferred learning mode, students and graduates of the same order determined modes of learning: through practice, through explanations of others, talking with others or informing it alone.

Most graduates already working in Software Development, while most students plan to do so. A teaching career in the secondary education was chosen only by 4% of graduates. In terms of student respondents 4% want to work into the Universities, while only 1% consider working in K-12 School Education.

The percentage of those who have worked or studied abroad (for graduates) or have participated in exchanges abroad (for students) is small: only 11% of graduates and 5% of students.

Percentage of students who are considering working abroad is definitely higher than that of graduates: 22% vs. 16% of respondents. Also the percentage of those who want to work temporarily abroad is higher for students than for graduates.

There is a higher rate of participation in internships of graduates than of the students, which could be explained by the fact that students who have not yet participated in an internship will have the opportunity to do before graduation. The 60% of graduates participated in internships.

Among those who participated in internships, to many of both the students and the graduates were offered employment at the end of the internship, which highlights increased demand for IT labor market.

Regarding expectations for employment it is observed that opportunities for personal development come first for both students and graduates. Remuneration, staff and especially schedule flexibility seem to not be a big concern as graduates.

Both students and graduates are aware of the conditions of the labor market so that the majority of respondents say that they have found or would be able to find a job in less than 6 months. Moreover, it seems that students are somewhat more pessimistic than necessary considering that a larger number of graduates believe that it takes less than a month to find your job.

The rate of change jobs is similar for graduates and students who have a job. It is observed that most of them are on the first job, but there are people who have changed more than three jobs, even among students. The results are as expected in a labor market as the IT in Cluj-Napoca.

Figures on the job long as expected given the average age of the respondents. Thus, most graduates have kept the same job for 1 to 3 years, while among students longest period of employment ranging from under 6 months to 3 years.

Regarding remuneration after one year of experience in IT, the percentages of graduates and student responses are approximately identical. The majority responded that the salary is between 400-800 euro (53 % students, 60 % graduates).

If we rank the problems faced by respondents in an IT employment, both graduates and students have put the resume, cover letter and interview knowledge on the last positions. The first concern is lack of experience (70 % - students , 46 % - graduates). That response is not surprising taking in consideration that 88 % graduates have / had a job while only 57% of students have / had a job in IT. Second place in both categories are technical interview (13 % - students, 37 % graduates)

For both students and graduates insufficient specialty knowledge is the main difficulty in the first job (56 % students, 57 % graduates). It is followed by relationships with clients, teamleaders and colleagues.

On the question of how useful are the knowledge and skills acquired in University at the first job, it is observed that students are slightly more pessimistic than graduates. We can see this from the fact that 31% of students vs. 40% of graduates believe that the knowledge are somewhat useful, and 34% of students vs. 24% graduates find that they are unnecessary. These results show that the most graduates are not satisfied about the university educational offer. This requires a more detailed analysis that we intend to do into a next study. As we observed in [4] 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].

5. Conclusions and further work

This survey was conducted with the purpose of analyzing the relation between IT students' University education and their future careers. The target population in this study can be described as current students and recent graduates in the IT field in Cluj-Napoca.

First of all, the study has confirmed that there is a great demand for skilled developers, since both students and graduates have stated the fact that they need less than six months (and in most cases even less than a month) to get a job. Furthermore, by comparing the responses we can conclude that students slightly underestimate both the ease of finding a job and average salary after one year.

The central aim of the study was to see whether the preparation IT students receive in University does indeed conform to the requirements of the labour market. The fact that a lot of students get a job before graduating strengthens the idea that there is a dire need for programmers, but unfortunately it also outlines the deficiencies of University education, since most students consider that getting a job would have a more positive impact on their career than concentrating on their formal education. The latter point is also emphasized by the fact that most students believe that their education is only slightly useful and consider that the main problems they will encounter on employment are related to their lack of knowledge and experience. However, graduates tend to value their education, which means that the situation is not so bad, but is necessary an improvement.

When asked about the nature of the educational process and potential improvements, both graduates and students talked about better communication between teachers and students and more emphasis on internships and new technologies. Also, they all consider Programming Languages, Software Engineering, Operating Systems, and Databases to be the most useful subjects taught in College. These aspects might be taken into account when redesigning the University Curriculum.

This pilot study was a brief enquiry into the gap between University education and the IT labour market and it opens up the door for further research. A more comprehensive study, having a larger sample and conducting a correlation analysis between the paths that people take in their careers, their individual profiles and their opinion on University education, could be conducted to better understand the issues at hand. Also, there could be more questions related to suggestions for improvement and even open discussions and debates so that the opinions of students can be properly mined and used to enhance the educational process.

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Annex: Questionnaire for students

Demographic items

1. Gender: Male, Female
2. Age: Between 18-20 years; Between 21 - 23 years ; Between 23 - 25 years; Over 25 years

Education and interests

3. The high-school graduated: Mathematics- Computer Science; Science; Technical; Human; Vocational
4. The University specialization you are enrolled in: Computer Science; Mathematics- Computer Science; Mathematics; Information Engineering; Automatic control; Computers; Information Technology; Business Informatics; Other
5. Other Faculty graduated: please insert your answer
6. What do you like to do in free time?: please insert 3 answers

Opinions about the University Education

7. 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 Intelligence; Programming languages; Software Engineering; Others
8. What studied domain in university seems your unnecessary? (choose maximum 2): Mathematics; Data Base; Operating systems and networks; Artificial Intelligence; Programming languages; Software Engineering; Others
9. How do you learn easiest?: When somebody explain to me; Searching information; Speaking with others; Making exercises
10. Which of the following modes of operation can you attract more (think you better match to)? Team work; Individual work
11. 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
12. What others discipline would you like to study?: Physics; Chemistry; Astronomy; Psychology; Letter; Other human disciplines
13. 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

14. Which from the following options are in your plans?: I work in IT; I'm not employed, but I want to employ in IT before to graduation; I'm not employed but I want to employ in IT after to graduation; I don't want to employ in IT
15. What is your domain of work or in which you intent to work?: K-12 Teacher; Higher education; Software development; Software testing; Web Design; Management Information Systems; Other
16. Have you participated to exchanges (eg Erasmus) in universities / companies from outside the country?: Yes; No
17. In the future are you 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 weeks; Between 2 weeks to one month; Between one to 3 month; Over 3 month
19. If you participated at 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 I 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)

