

WHY STUDENTS FAIL TO GRADUATE ICT-RELATED CURRICULA AT UNIVERSITY LEVEL

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Abstract

In Estonia, information and communication technology (ICT) companies lack labour. To be more precise, more programmers, analysts, and project managers are needed. Government strategies stipulate effort to be invested in popularizing ICT-related careers and curricula among the youth. That effort has resulted in the increased number of students applying for ICT curricula at university level. However, almost 33% of them do not manage to graduate Bachelor's studies. Most of them drop out during the first year and first semester. In 2013, a study was launched to investigate the reasons which affect students to study ICT in Estonia. One part of the study focused on determining the reasons for students dropping out. The study was carried out among three main universities in Estonia that offer ICT-related curricula. That year 517 students altogether were accepted by the three universities. By the beginning of the school year 2014/2015, 25% of the students had dropped out from the University of Tartu. These are the highest drop-out rate curricula in the University of Tartu. In order to find out the reasons and analyse the possibilities for reducing drop-out rates, phone interviews were conducted with the drop-out students. The results showed that the reasons for dropping out were related to financial, work and personal issues. Some of the students were already working in the field of ICT and expected to gain more knowledge while continuing their everyday jobs. Some of them wanted to learn something else but were not accepted to their preferred curriculum and started to study ICT as it is promoted by the media. In this paper, all cases of drop-out students are presented and reasons categorized. This work could be used by universities to understand and prevent drop-out in the field of ICT.

Keywords: Drop-out, ICT studies, ICT curricula.

1 INTRODUCTION

This paper presents the results of a study that investigated reasons for dropping out from two information and communication technology (ICT) related curricula in the University of Tartu. High drop-out rate from IT curricula is a common problem all over the world [1]. Informatics curriculum is taught in the faculty of mathematics and informatics. Computer engineering, which is more focused on hardware, is taught in the faculty of natural sciences. It has been a national objective for Estonia to increase the number of students graduating ICT curricula in bachelor studies. Work towards achieving this goal has increased the number of students applying for ICT curricula, and universities have even increased the number of students that could be accepted. The problem of dropping out during the first year is thought to be the next concern towards the goal of achieving higher rate of ICT graduates. This study is one part of a larger project which was aimed to identify the reasons that make students prefer ICT-related careers and curricula after graduating secondary school. Students starting ICT studies in 2013 and 2014 in two biggest universities and one college in Estonia were asked to fill out questionnaires. The aim was to determine the factors that induce students' interest towards ICT and make students choose ICT curricula. There are not many studies that present interventions which make students choose ICT courses. Less of these studies provide control and test group design [2] [3]. The purpose was to measure if interventions in Estonia have had any effect based on students' opinions. By the beginning of the second year in the University of Tartu, 48 students were not studying. The next section describes research methods and data collection. The third section focuses on the results of phone interviews, and fourth section discusses actions that universities, educational institutions, and society in general could take to decrease dropping out.

2 METHODOLOGY

In year 2013, 1464 persons altogether applied for ICT-related curricula in the three higher education institutions (University of Tartu, Tallinn University of Technology, Estonian Information Technology College). 581 students altogether were accepted whereas the University of Tartu accepted 200

students. By the beginning of the second year of bachelor studies, an inquiry was made to students' information system to detect students not studying in either informatics or computer engineering curricula. The inquiry returned 51 students. Two of the students were excluded as the length of their studies was one day; however, the purpose of this study was to talk to students who had been studying in the university for at least two weeks. Another student out of 51 was excluded from the study because they continued studies in the same curriculum on the state budget. They were excluded from the university and restated because of inner regulations. Altogether, 48 students were suitable for the purposes of the study. These students were phoned and semi-structured interviews conducted with them. The interview included 11 questions. According to the first answer (current activity), persons were separated into three categories and a predefined set of questions was asked, see Table 1.

Table 1. Set of questions asked from interviewees depending on their current activity

Questions	Studying something else	Some other reason	Working
Why did the student come to study IT?	X	X	X
When did the student start work?			X
Why did the student start work?			X
Has the workload increased?			X
How long did the student try working while studying?			X
Was the university useful – how?	X	X	X
Why would a Bachelor's degree in IT be useful?	X	X	X
What should the university do differently so the person would still be studying that speciality today?	X	X	X
On which condition is the person willing to continue studying IT?	X	X	X

35 (72%) students were reached, others did not answer their phone, or the phone was switched off. These students were attempted to reach three times at a different time during the day. All the phone calls were recorded except in two cases where students did not give their permission for doing so. The average length of one interview was five minutes and thirty four seconds. Recordings were made to skip typing while talking to interviewees and to concentrate more on the questions and answers. In cases where interviewees did not allow to record, answers were written down immediately after the phone call. In other cases, recordings were re-listened to and answers written in a table. This step was followed by categorizing the answers. Categories were then tested by two coders and their answers were compared with the reliability calculator for two coders. If Cohen's Kappa resulted to be over 0.8, the categories clear enough. Cohen's Kappa does not only compare number of similar answers between two coders but also takes into account chance of classification [4]. With some questions, coders got too many differences in answers, when Cohen's Kappa resulted under 0.8. Those categories were overviewed and reformatted until answers according to the new categories resulted at an acceptable level by Cohen's Kappa. The resulting nominal data was used to find any strong correlations between answers and cluster analysis was carried out to find groups of students that are similar by pattern.

3 RESULTS & DISCUSSION

In the nominal data, no strong correlations that are statistically significant $p < 0.05$ [5] appeared. Next, the answers to more interesting question with graphs representing the results are provided. Taking into account that 35 students were questioned, the results are still given in percentages. The average age of students while dropping out was 21 years and four of the dropout students out of 48 were girls. This confirms that girls are more persistent and do not drop out as often as male students [6]. Age on the other hand is significantly different from what Xenos et al. found in their drop-out study [6]. The first question in the interview aimed to find out the current everyday activity of the person, see Fig 1.

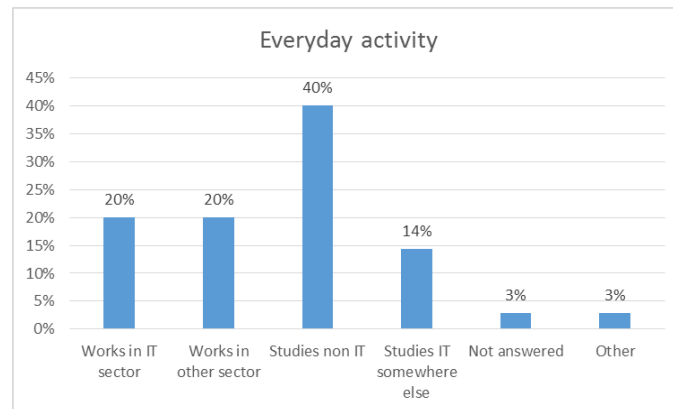


Fig. 1 Results of current activity

The biggest proportion of students (40 %) studied something else than IT-related. An equal part of students (20 %) are working either in IT or some other sector. 14 % of students have not left IT studies, however, they did not continue these in the University of Tartu. The answers for the first question should be discussed together with answers to the third question, see Fig 2. Answers to this question fit into six categories. 31 % of the students found that IT was not the right choice by personal point of view, or they went to study their first choice immediately they were accepted there. These two groups are under one category because IT being a second choice means that person might not be sure about an IT-related career. This is confirmed by statements of students who claimed that „they just wanted to try IT studies“. 17 % of the answers showed that the way of studying in a university does not comply with students' expectations or they did not get any new knowledge. These persons were mostly working before and had been educating themselves. They were also the persons who answered that they did not have time to work and study at the same time. There were 1.2 reasons per person given for quitting the studies.

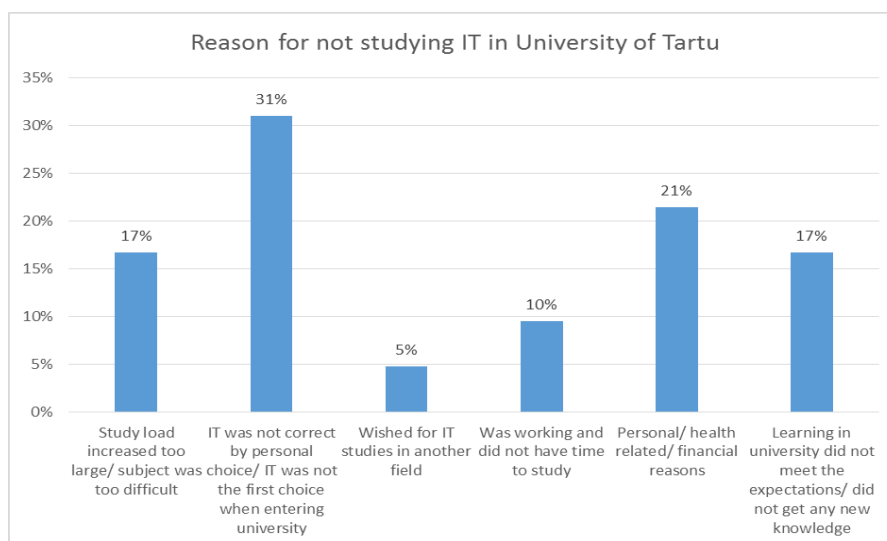


Fig 2. Reason for not studying IT in University of Tartu

Six students worked during the studies. Reasons for working were categorized as financial, experience, and other. Students studying informatics in the University of Tartu are receiving higher scholarship than in other curricula. This has been stated by the university and government to allow

students concentrate more on their studies since IT companies are missing workload and attract students to work. The results reflect that keeping students financially secure might not be the only necessary means to prevent the workload from increasing over studies. Students claimed to have some level of experience before graduating. The next questions were about students getting any new knowledge/skills from the university and whether they think having a Bachelor's degree in IT is valued among IT companies. 66 % of the drop-out students found that they got some new knowledge and skills from the university, 11 % said that they did not get new knowledge, others did not answer or could not say if their time in the university was efficient in terms of IT studies. People already working in IT companies had stronger opinion on IT studies in a university not being efficient. This might be connected to the fact that the first year in informatics and computer engineering curriculum is a base year which includes a substantial level of math and base level subjects. These might be considered too theoretical and lack practical examples as some students claimed. Working students' group answered similarly to the next question regarding the Bachelor's degree in IT. The results indicated that 27% of the students found Bachelor's degree not necessary in the IT sector, considering skills more important. 35 % of interviewees stated that Bachelor's degree in IT would be useful when looking for a job or making progress in career levels in IT companies. 11 % of the students answered that Master's degree in IT would be satisfying their expectations. Yet they did not find enough motivation to pursue that degree. It was also critical to find out what interviewees think about changing IT studies. The results of these answers fit into six categories and are presented in Fig 3.

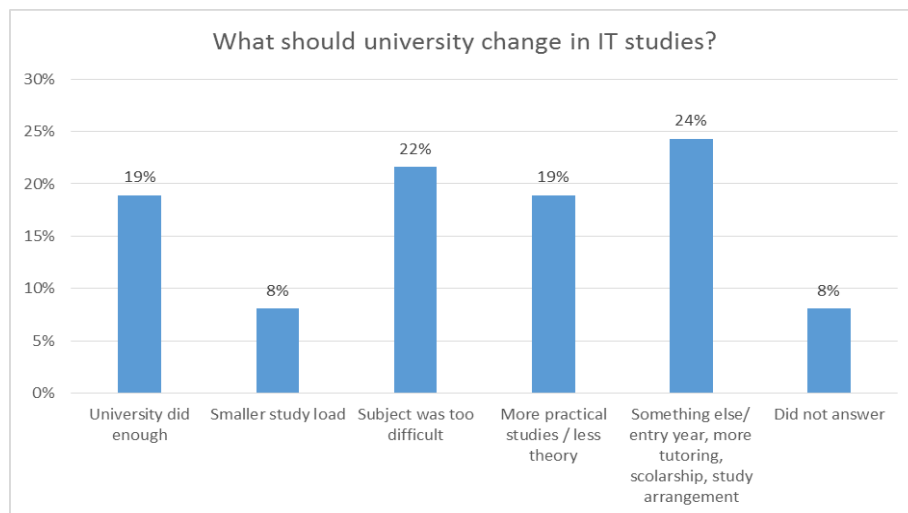


Fig 3. What should be changed in IT studies

19 % of the students said that help from the university in continuing their studies was enough and problems were more related to their personal choices. They were still asked if they thought there was something that would have made them continue their studies. Among the answers, very clear group of students indicated a math-related subject called discrete elements of math and programming to be too difficult. There were several opinions about math subjects, some groups found these to be necessary in the curriculum although they also said that the study load due to these subjects was too heavy. On the other hand, a group of students found the transition from secondary school level math to higher level math in the university too rapid. In the end, all the students were asked to give their opinion whether they would come back to study IT in the university or not. 43 % found their return very unlikely because of studying in another field or working full time. 14 % stated that they have plans to return to where they left off. The problem in the end is the same as the number of students graduating ICT studies is smaller than IT companies expectations. Among theories of this problem, the biggest part of dropouts consists of people who came to study IT to experience if this is something they could do. Reasons for studying IT in this group reflect all the categories, so it cannot be said that this particular group came to study IT for one similar reason. On the other hand, this does not rule out that general public attention of the society towards IT related careers and beliefs did not affect curriculum choices of this group. The same behaviour could characterize groups that are working in sectors other than IT. Reasons for coming to study IT also varied in this group, but one that was mentioned more often than other answers was that people belonging to this group came to study IT because they have interest towards IT, they like computers and programming. If efforts through the media and other channels are increasing general interest towards IT and the number of people wanting to learn IT at a higher level is increasing, but they are still lost when dropping out of the university, are these actions effective? There are other possible solutions that take the characteristics of persons more into account. Studying

IT in vocational schools could be seen as an alternative choice as curricula and formats of study are different and may fit some part of drop-out group. Besides that, there are several actions that universities could do to minimize dropping out such as altering the curriculum by reducing math and easier subjects which have already been experimented with positive results [7]. More people could move towards Bachelor's degree in IT with increased motivation in the second or third year of their studies. One of the interviewee's answer could be taken into consideration here, when stating that the university should not change anything, because the first year of studies is filtering out less motivated students that would drop out eventually. Although there may be some truth in this statement, however, the distinction between students starting their studies in IT could be more important. For instance, students already working in IT have more preknowledge and their curriculum could be different to meet their expectations.

4 CONCLUSIONS

There has been an increased level of work in Estonia to attract more students to choose ICT-related careers and curricula when entering universities. These efforts have been fruitful in terms of more graduates applying and being accepted by four main universities in Estonia offering ICT-curricula. One of these universities is the University of Tartu where in year 2013, 200 students were accepted to study ICT. By the end of first year in Bachelor's studies, 48 of them had dropped out. These students were phone-interviewed in year 2014 to study the reasons for dropping out and to suggest actions for decreasing the number students dropping out. Findings showed two main reasons for dropping out, namely, work related and personal issues. Students tend to choose IT courses in universities without preknowledge about the area. Perhaps this could lead to more thorough informatics courses and earlier acknowledgement. This way choices made by students might be more conscious. This work will be continued by gathering information from drop out students in the three universities in Estonia. Besides collecting information, this study provides concept and methods of retrieving and categorizing answers. Dropping out from ICT-related curricula is a problem that needs to be solved not only by the universities but by all stake holders that have invested in making IT more popular among youth.

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