Chapter 5
Strategies to Reduce Attrition among First Year Computer Science Students

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ABSTRACT

The observed trend to lose from one-third to half of students in the first year of computing studies at the University of Latvia served as the motivation to explore the causes of dropout and to find methods, how to determine potential dropouts in advance. The study investigates students enrolled in the year 2013 using integrated data from surveys, management information system and e-learning environment. Several factors that could affect attrition were studied: admission score, compensative course in high school mathematics, intermediate grades for core courses, prior knowledge in programming. The research revealed that the trend of non-beginning studies might indicate the wrong choice of the study field and possible lack of understanding of what is programming by enrolled students. An action plan is proposed to reduce dropout, which is based on the activities already conducted at the Faculty of Computing and is supplemented by one of the existing programming aptitude tests.

INTRODUCTION

A considerable number of students annually abandon their studies, especially in the first study year. This is not a new problem in the higher education and is observed in many countries and universities. However, this problem remains up to date when a new generation of students, the Digital Natives, is entering the universities. The term of Digital Natives introduced Prensky (2001a, 2001b) to describe students that are grown up in digital environment, which has changed the way, how these students are thinking. What are the causes of dropout in the era of the Digital Natives?

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In recent years, the observed practically stable trend to lose from one-third to half of students in the first year of computing studies at the University of Latvia served as a motivation to explore, whether the world, indeed, has not found a method, how to determine such applicants that have no chance to overcome the first study year in advance.

On the one hand, the dropout students and the teaching staff have wasted their resources. On the other hand, the Ministry of Science and Education and experts that are evaluating the study programs frequently associate the high dropout rate with a low effectiveness of the implementation of the study program (another matter – whether this assumption is reasonable) and ask what is done to reduce the attrition.

In spite of the fact that the attrition rate is often associated with the quality of education, the attrition causes found by the researchers show that there are many issues not directly linked with the education quality offered by the university. The causes are different and the recommended actions that should be undertaken to improve the situation depend on the causes of attrition. So, research regarding the causes of attrition and recommendations how to overcome the exposed problems is always timely and worthwhile for universities.

The Faculty of Computing at the University of Latvia offers first level higher education Professional study program and Bachelor`s study program. The both undergraduate programs have experienced a competition among applicants in recent years and 90% of all applicants have indicated one of those programs as their 1st priority. This approves that motivated and relatively good students have been selected to start studies. Nevertheless, a substantial number of students annually leave the studies, and mostly this takes place in the first study year. During the first study semester in average 30% of all new students abandon their studies, but after the first study year the number of dropouts is growing close to 50%.

These troubling figures and comparison with similar study programs in other countries encourages to investigate the causes of attrition. A research was conducted with a purpose to analyze the first year students enrolled in 2013 into the computer science undergraduate programs at the University of Latvia in order to evaluate, what are the characteristics of "dropping out" students, what are the mutual influence of these characteristics, as well as to create a model to make it possible to identify students, who are potentially at risk.

Several factors that could affect attrition were studied: high school grades (admission score), compensative course in high school mathematics, intermediate grades for core courses at university level, and freshmen students' prior knowledge of programming. Data used in our study come from multiple data sources. Admissions data are obtained from the management information systems of the University of Latvia. To analyze the students' study process, data about intermediate grades (tests, homework, practical tasks and other grades) for several courses were used. Also data from two surveys were also employed in the study.

However, the results of the study indicate that none of the studied factors is determinant to identify those students, who are going to abandon their studies, with great precision. The majority of the observed students drop out in the 1st semester of the 1st year, and the dropout consists mostly of those, who do not really begin studies. Therefore, one of the main conclusions is such that the planned activities of informing about the contents of the program should be carried out, and the prospective students should be offered a possibility to evaluate their potential to study the computer science. Universities should create a strategic action plan to reduce dropout, but the university strategy should not lower the quality of studies or admission requirements. It is necessary to carry out adapted activities for early "dropouts", late "dropouts", and for potential students, to reduce the attrition of students, for whom the program was not such as they were expecting.

In relation to this issue, several ideas were studied, for example, how to find out that the