Dropout of first year undergraduate students: A case study of engineering students

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ABSTRACT

The phenomenon of drop out studies appears in the current Romanian context as an acute problem of the national education system. In the present research we will try to identify how factors such as the average obtained in the baccalaureate exam, the place of provenance and the number of credits obtained at the end of the first year of study influence the abandonment. Using a bivariate analysis method, we followed the correlation between the variables "number of students expelled after the first year of study" in the case of students enrolled in the first year of study and having obtained a "grade less than or equal to 7 in the baccalaureate exam" and, respectively the correlation between the variable "number of students expelled after the first year of study" and the origin from urban or rural areas. As can be seen from the data collected, an obvious need to investigate the expectation of students at high risk of drop out - as regards the teacher-student relationship - can be presumed: what are the most effective ways of transmitting knowledge and what communication is acceptable by college students.

Keywords: drop out, engineering students, retention rate, school drop-outs, academic performance

Dropout at higher education level

The term “dropout” is commonly used to describe the situation of students who enroll at a certain institution of education and leave without obtaining a diploma or passing their final examinations. According to statistics, the retention rate in Romania at higher education level is approximately 77% (Report on the state of higher education in Romania, 2015). The dropout situation in Romania is similar to that found at the global level, with the highest rates of dropout being incurred immediately after the first year (Tinto, 1975).

Factors that influence dropout

The factors that influence dropout can be divided set in two categories: personal and institutional. Most sociological theories that address the complex problem of school drop-outs begin with an analysis of these factors (Rumberger, 2001). Among the personal factors identified in the scientific literature, the most frequently encountered are weak educational results, socio-economic status (the representatives of the lower social classes have a higher risk of dropout than those in the middle and upper classes), children from single-parent families, and ethnic minorities. When gender is taken
into account, males have a higher risk of dropping out, especially if they have a job while being in school (McNeal, 1995). Personal factors analyzed especially in the early research on school dropout, more recently the analysis of this phenomenon, also take into account the external factors, especially the specifics and policies addressed by educational institutions. The reason why early research on dropout focused on personal factors is that these studies were mostly conducted by psychologists. Thus, the lack of school commitment and departure were regarded as personal failures, both educational and adaptive (Tinto, 2006).

Since the 1970’s, attention has shifted towards the examination of external social factors, especially educational institutions. Sociological analyses on school dropout have provided a broader and more accurate explanation. Among the first sociologists to tackle the subject were William Spady (1970, 1971) and Vincent Tinto (1975), who in his seminal work “Leaving College” conducted a longitudinal analysis of the relationship between the social and academic environment and the decision of students to continue or drop out of university. The central element of this paper is the use of the concept of integration (both social and academic) and the analysis of student interaction with colleagues, teachers and employees of the educational institution, especially in the first year of study, during which most cases of dropout are registered.

Identifying the factors that have the highest relevance in school dropout represents the first step in studying the sociological issue. Rumberger in "Why Students Drop Out of School and What Can Be Done" (2001) identified the most important predictors used by researchers: he noticed that there are two conceptual models in studying the phenomenon, namely one in which individual factors prevail, and one in which emphasis is placed on the contextual factors such as the type of the educational institution, family, community, colleagues and friends. The identification of these factors has been done, in most cases, through multivariate statistical analyzes revealing the greater importance of these variables compared to others in order to obtain a strong causal relationship between factor and dropout.

**Individual perspective**

A type of analysis starts from the learner's personal attributes, such as his values, attitudes or behavior within the educational institution, and how they can influence the decision to leave school. In order to be able to work more easily with these variables, a concept has been built to include them all called "educational engagement".

In most studies, educational engagement has two main components: academic engagement and social engagement. Both dimensions of this concept can influence the decision to drop out of school: students can withdraw from the system if they have low academic engagement (if they do not fulfill their educational tasks) or if they have a low social engagement (they fail to integrate in the school community or have poor relationships with teachers or colleagues).

Studies on educational engagement have highlighted the fact that educational background (especially prior educational results) and professional aspirations strongly influence one’s degree of commitment. The strong relationship identified between engagement and dropout has led to the construction of theoretical models in which the two concepts are studied together, dropout being described as the final outcome of a long and dynamic process of declining commitment (Newmann, 1992; Wehlage et al. 1989, Finn, 1989).

**Institutional perspective**

Even though most of the studies on dropout revealed that the main causes for this outcome are personal, there is research that has shown that external factors can influence the decision to leave the school. Empirical research has identified the main institutional factors that can influence dropout decisions such as family, educational institution, community, and group of friends or colleagues.
Family

Family background is considered to be one of the most important predictors of school success. Research by Coleman (1966) and Jencks (1972) have proven the importance of the family of origin in tracing the children's trajectory, particularly its socio-economic status and the educational level of the parents. However, more recent research has shown that the causal relationship between family background and school results is mediated by the type of educational institution. Thus, children from families with a higher socio-economic status will be enrolled in elitist schools where drop-out rates are low, while lower-class children will head to lower education institutions (Bryk & Thum, 1989; Ekstrom et al., 1986; McNeal, 1999; Rumberger, 1983; Rumberger, 1995; Rumberger & Larson, 1998; Pong & Ju, 2000).

According to the human capital theory, parents decide the extent to which they engage in the educational activities of children according to the goals they set for them. This parental involvement influences how children perceive the educational process; how they value education; and the aspirations they set. The financial capital invested in the education process also has an important role in achieving higher school results. Choosing the schools, post-school programs or summer schools represent an extra cost that only children from upper social classes can afford.

Coleman (1988) considers that only financial capital is not enough to explain the causal relationship of family background and school results. He considers that social capital also has a great importance (like the relationships that parents have with their children, other families and school staff) and children’s school outcomes. A close relationship between parents and children, emotional support, encouraging them to make their own decisions, and monitoring school activities leads to better results, a high degree of commitment and a reduction in the risk of dropout (Astone & McLanahan, 1991; Rumberger et al., 1990; Rumberger, 1995).

The type of educational institution

The school climate can have a decisive influence on the results students obtain and even their decision to drop out. One of the biggest problems from a methodological point of view is the identification of the factors that are specific to the educational institution and how they influence the results obtained by the students, and especially their separation from other external factors. Rumberger (2001) identified four characteristics of educational institutions that have been shown to have a causal link with educational performance and dropout rates of students.

Data analysis

Dropout at the end of the first year of study of students enrolled at the University of Oradea in 2015. In this paper, we utilize data from across the University of Oradea’s faculties regarding students enrolled in the academic year 2015-2016 and their situation at the end of their first year of study. The Faculty of Economic Sciences was excluded from this analysis due to lack of data.

Table 1. Students enrolled at the University of Oradea in 2015

| Faculty                              | Total number of students enrolled in the academic year 2015-2016, first year - undergraduate programs | Number of students who obtained a grade lower or equal to 7 on the Baccalaureate exam | Number of students who come from rural areas | Number of students expelled after the first year of study | Total number of students who accumulated ≤ 40 credits, after the first year of studies (2015 - 2016) (including those expelled) |
|--------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Faculty of Arts                      | 80                                                                                                   | 32                                                                              | 22                                        | 11                                                     | 24                                                                                                                             |
| Faculty of Constructions and Architecture | 100                                                               | 37                                                                              | 7                                         | 20                                                     | 29                                                                                                                             |
| Faculty of Law                       | 167                                                                                                  | 30                                                                              | 53                                        | 40                                                     | 56                                                                                                                             |
| Faculty of Geography, Tourism and Sports | 231                                                               | 77                                                                              | 80                                        | 25                                                     | 41                                                                                                                             |
Bivariate analysis

The data analysis demonstrates a strong correlation between the "number of students expelled after the first year of study" and "grade less than or equal to 7 in the baccalaureate exam". Therefore, we can say that students who have obtained poor school results at the end of high school studies have a high dropout risk.

| Faculty of Electrical Engineering and Information Technology | 326 | 93 | 48 | 41 | 59 |
|-------------------------------------------------------------|-----|----|----|----|----|
| Faculty of Energy Engineering and Industrial Management     | 103 | 51 | 32 | 23 | 33 |
| Faculty of Management and Technological Engineering         | 220 | 70 | 98 | 38 | 123|
| Faculty of History, International Relations, Political Sciences and Communication Sciences | 150 | 45 | 20 | 26 | 45 |
| Faculty of Letters                                          | 108 | 18 | 11 | 3  | 6  |
| Faculty of Medicine and Pharmacy                            | 561 | 163| 45 | 17 | 32 |
| Faculty of Environmental Protection                         | 411 | 147| 225| 61 | 70 |
| Faculty of Sciences                                         | 169 | 8  | 22 | 12 | 25 |
| Faculty of Social-Humanistic Sciences                       | 375 | 93 | 157| 42 | 74 |
| Faculty of Orthodox Theology                                | 41  | 12 | 14 | 2  | 4  |

Table 2. Correlations between number of students expelled and students who obtained a grade lower than 7

|                                             | Number of students who obtained a grade lower or equal to 7 on the Baccalaureate exam | Total number of students expelled after the first year of studies (2015 - 2016) |
|---------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Number of students who obtained a grade lower or equal to 7 on the Baccalaureate exam | Pearson Correlation                                                                   | .595*                                                                            |
|                                             | Sig. (2-tailed)                                                                        | .025                                                                            |
|                                             | N                                                                                      | 14                                                                              |
|                                             |                                                                                       | 14                                                                              |
| Total number of students expelled after the first year of studies (2015 - 2016)   | Pearson Correlation                                                                   | .595*                                                                            |
|                                             | Sig. (2-tailed)                                                                        | .025                                                                            |
|                                             | N                                                                                      | 14                                                                              |
|                                             |                                                                                       | 14                                                                              |

*. Correlation is significant at the 0.05 level (2-tailed).

We can see a much stronger correlation between the variables "Number of students from rural areas" and "Total number of students expelled after the first year of studies".
Table 3. Correlations between total number of expelled students and number of students from rural area

|                                | Total number of students expelled after the first year of studies (2015 - 2016) | Number of students from rural areas |
|--------------------------------|----------------------------------------------------------------------------------|-----------------------------------|
| Total number of students expelled after the first year of studies (2015 - 2016) | Pearson Correlation: 1, Sig. (2-tailed): .823** | N = 14, Sig. (2-tailed): .000 |
| Number of students from rural areas | Pearson Correlation: .823**, Sig. (2-tailed): .000 | N = 14, Sig. (2-tailed): .000 |

**. Correlation is significant at the 0.01 level (2-tailed).

In analyzing the results obtained by students after the first year of study, the Faculty of Management and Technological Engineering conspicuously bears an extraordinarily high percentage of students who earn less than 40 credits at the end of the first-year study. In this faculty, over 55% of students fail to get over 40 credits within their first year. Of the first 3 faculties in which encounter this problem, two have an engineering specialization.

Table 4. Percentage of students who accumulated ≤ 40 credits, after the first year of studies

| Faculty                                                                 | Percentage of students who accumulated ≤ 40 credits, after the first year of studies (including those expelled) |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Faculty of Management and Technological Engineering                     | 55.91%                                                                                                      |
| Faculty of Law                                                          | 33.53%                                                                                                      |
| Faculty of Energy Engineering and Industrial Management                 | 32.04%                                                                                                      |
| Faculty of History, International Relations, Political Sciences and Communication Sciences | 30.00%                                                                                                      |
| Faculty of Arts                                                         | 30.00%                                                                                                      |
| Faculty of Constructions and Architecture                               | 29.00%                                                                                                      |
| Faculty of Social-Humanistic Sciences                                   | 19.73%                                                                                                      |
| Faculty of Electrical Engineering and Information Technology            | 18.10%                                                                                                      |
| Faculty of Geography, Tourism and Sports                                | 17.75%                                                                                                      |
| Faculty of Environmental Protection                                     | 17.03%                                                                                                      |
| Faculty of Sciences                                                     | 14.79%                                                                                                      |
| Faculty of Orthodox Theology                                            | 9.76%                                                                                                       |
| Faculty of Medicine and Pharmacy                                        | 5.70%                                                                                                       |
| Faculty of Letters                                                      | 5.56%                                                                                                       |
In the research “Talking about leaving: Why undergraduates leave the sciences” (Seymour & Hewitt, 1997) the authors explain the phenomenon of drop out in the case of students enrolled in scientific and engineering faculties: “The decision to leave an SME major was always the culmination of a dialogue with self and others over time, in which students were drawn back and forth between the options that seemed open to them. Typically, the process began with poor experiences in SME classes in their first year and, for some, the discovery of under-preparation. It was deepened by a series of academic crises and disappointments that provoked anger towards a particular faculty, advisors or teaching assistants. Students began to experience self-doubt and lowered confidence in their ability to do science. They became disillusioned with science and the science-based careers to which they had aspired, and questioned whether getting the degree would be worth the effort and distress involved. Only then did they begin to consider a switch to those non-SME classes where they had experienced better teaching and/or more satisfaction with their academic work” (Seymour & Hewitt, 1997, p. 393). In the case of the engineering faculties at the University of Oradea, the problem seems to be similar, particularly regarding the inadequate preparation of students for the academic rigors of the educational institution.

CONCLUSIONS

In order to reduce the dropout rate of students who achieved average or low school Baccalaureate exam results (grades less than 7), remedial courses and/or the creation of learning communities have proved to have a strong impact on student retention (Pascarella & Terenzini, 2005, p. 398). There is an evident need to investigate the expectations of high-risk students regarding teacher-student relationships. More precisely: what are the most effective ways of transmitting knowledge and what kind of communication is preferable for college students? We can start from the common observation that students perceive information as either dull or interesting by how they relate to the teacher’s persona. This way of reporting does not derive directly and causally from pedagogical methods and techniques: the use of modern technologies is not a guarantee of stimulating learning interests. The student-teacher relationship should be reconfigured in close connection with the changes of modern society. It is unlikely that the university environment can control the phenomenon without thinking about contextual academic strategies. It has become very clear that it is not enough for the university environment to offer high-quality courses and provide competency guarantees of the teaching staff. Several writers (Newmann et al., 1992; Wehlage et al., 1989, Finn, 1989) as cited in Rumberger (2001) argue that dropping out of school is “final stage in a dynamic and cumulative process of disengagement or withdrawal”. Given that the student-teacher relationship is invoked between other reasons for dropping out of school, the persons and organizations with which the student comes in contact throughout his university course play an important security role in retention.

In order to be able to train engineers that will meet the requirements of the market, it is important to use studies and analyzes in which the need for further collaboration with the industry were identified (Fagateanu et al., 2015; Draghici et al., 2015), in the IT sector and knowledge in the field of sustainability (Oprean et al., 2010; Prada & Bendea, 2013; Badulescu, Bungau & Badulescu, 2015). In order to meet these requirements and to make adequate training at the University of Oradea there were made important investments by attracting European funds (Vesselényi, Bungau & Husi, 2014). Another technique in improving the quality of education is by involving the engineering students simulated enterprises (Baban et al, 2013; Baban et al., 2013).

The process of integrating graduates into the Romanian labor market has encountered numerous blockages in recent times. From this, such generic motivations arise: "The worrying phenomenon of poor use or even unemployment, which is manifested among the graduates of higher education institutions in the country, is usually explained by the long-standing economic crisis that Romania has suffered during the 45 years of communist regime as well as in the 12 years of unsuccessful transition "(Frangopol, 2008). There remain a number of aspects of systemic policies at the main level: neither the education law nor related regulations express the direction of educational public policies very clearly. In examining the case of Romanian universities, it is necessary to consider the
impact of the educational financing system (per capita funding) and the tendency to educate graduates who decide to continue studies based on inconsistent academic reasons.

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