
AC 2012-4142: THE FIVE MAIN REASONS BEHIND STUDENT ENROLLMENT AND LATER DROP-OUT

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The five main reasons behind student enrollment and later drop-out

Abstract

In the last few years the number of applicants for technical studies has dropped, as have the knowledge levels they bring with them. The main challenge for our department with two intense engineering degree programs is to deal with this situation while satisfying the ever increasing requirements of industry and society.

Due to the regulations at our university, which include a numerus clausus, we are keen to have as many enrollees as possible. However, a larger number of applicants does not guarantee quality, although the probability of increased quality does rise.

In contrast to other universities, to become a student in the department of Automotive Engineering, enrollees must participate in an admission procedure consisting of three parts: formal application, written test and personal interview. For many young people this is the first time in their life in a competitive environment and some of them prefer to go to other universities without acceptance tests. The number of enrollees and the quality of knowledge they bring with them when they begin their studies, both correlate significantly to study success.

In our work we investigated the main reasons for enrollment and later non-persistence by processing application and survey data. We inquired as to how young people inform themselves before choosing the study program and what factors they consider as they come to a decision.

We proved a correlation between the admission procedure and the students' study success. One of the key questions was whether bad marks or other diverse factors were the main reasons for dropping-out from the degree program.

The outcome of our work is a hypothesis regarding the main reasons for enrollment and non-persistence. We hope that these results will be useful for other academic institutions.

Research questions and hypothesis

As is the case with most university departments that provide very technical study programs, we are faced with the problem of high drop-out rate. Furthermore, it is a well-known phenomenon that the non-persistence rate can vary appreciable from year to year even though the curriculum, the teaching staff, and the overall study conditions have remained unchanged.

We are also confronted with the fact that we invest more and more in individual supervision, social integration and special freshmen courses without significant sustainable improvement of the persistence rate.

We decided to investigate whether, if the level of knowledge students bring with them from secondary school really is sinking, how this influences academic success and may correlate with the drop-out rate.

We assume that there are not only independent factors which influence the (decision to) drop out, but furthermore there are very important correlations between them.

The identification and the understanding of these factors and the possible close connections between them is a primary objective in our aim to raise the persistence rate.

We hypothesize that drop-out happens because:

- some freshmen are inadequately prepared for the technical degree program : they lack basic knowledge, have no experience in systematic performance, have little or no perception of the challenges of engineering work, lack of life experience, etc.;
- some freshmen lack consistency, resilience and motivation;
- some freshmen cannot work in a team which is of vital importance if they are to persist in the kind of degree program we offer;

Our work aims to address following research questions:

Question	Motivation
How do applicants select the degree program?	Raising the marketing and information efficiency. We need the best applicants!
Who or what helped them to take the decision to apply?	Positive influence in the process of making decision to apply.
Do the high-school education and the pre-qualification significantly influence the persistence rate?	Adapting the marketing strategy, design of special freshmen courses.
Does the acceptance test ranking correlate with the academic success?	Raising the efficiency of countermeasures.
Do acceptance test parameters (partial results) correlate with the probability of drop-out?	Better positive selection, reformation of the acceptance test.

Hypothesis corroboration

In the past few years the ratio of the number of applicants to study places has leveled off to an average of 2.5:1 . However, we are convinced that it is not primarily the amount but the quality of freshmen that is of essential importance for raising the persistence rate. To select the best qualified applicants, we have designed a special acceptance procedure consisting of three parts, each part being attributed a certain percentage:

1. AP: application (25 percentage points)
2. WT: written test consisting of two sub-parts (RT1, RT2) (50 percentage points)
3. PI: personal interview with a commission of two lecturers from our department (25 percentage points)

The application comprising:

- high-school diploma/certificate for access to higher education
- motivation essay
- curriculum vitae
- certificates of advanced qualification
- certificates of professional experience

The head of department evaluates the application documents giving scores for following criteria:

- application form
- advanced qualification
- professional experience
- motivation essay

The high-school diploma/ certificate for access of higher education marks are included in the AP-score list automatically. Unfortunately, in our country there is no federal final exam for all high-school graduates and therefore the high-school final marks are not really comparable.

All applicants who have complete AP are admitted to the written test which comprises two parts: RT1 and RT2. RT1 focuses on the language skills and spatial sense, while RT2 focuses on logical thinking and technical understanding.

We conduct an interview (PI) with all applicants who have participated in the written test (WT), regardless of the pre-ranking. All enrollees are obliged to fill out a multiple-choice survey which records the information concerning the information sources governing their decision-making process prior to applying to study Automotive Engineering..

Figure 1 shows the survey results concerning the information sources in the years 2008-2010. We can see that there are no relevant differences. The mean values in Figure 2 point to the

conclusion that the most significant information source is the internet followed by word-of-mouth recommendation, open house events and educational fairs.

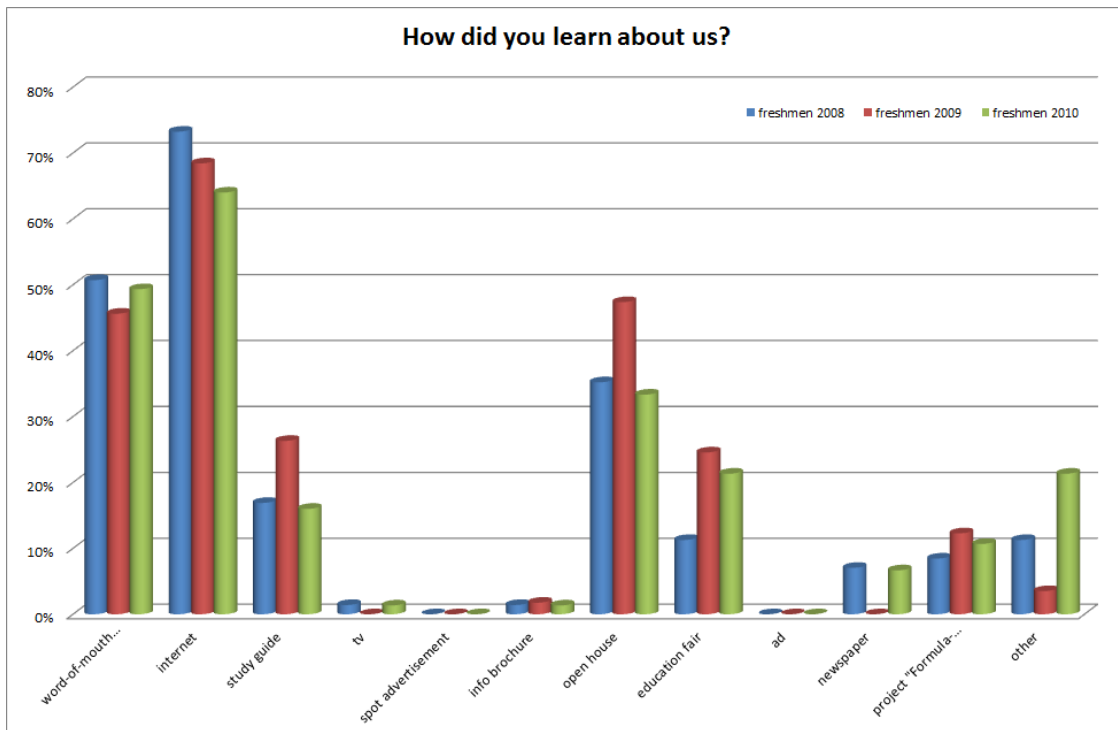


Figure 1: Survey results about study program marketing, freshmen 2008-2010 answers

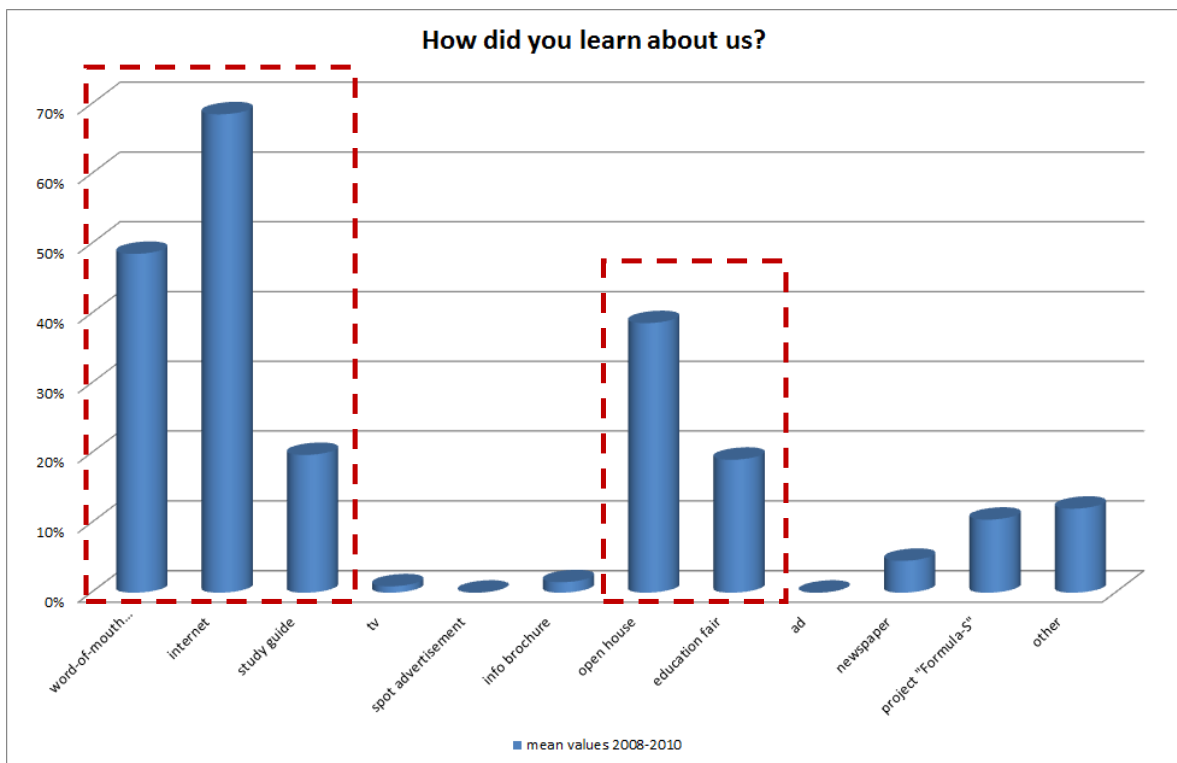


Figure 2: Survey results about study program marketing, freshmen 2008-2010 answers, mean values

Several previous investigations show that nowadays young people research study programs extensively but they select those that they apply for in different ways. Generally speaking, male applicants tend to be more subject focused whereas female applicants are much more interested in the continuation of the social contacts (friends, family) and often coordinate their study plans with them. Due to the extremely low number of female applicants in our department, however, we did not investigate the influence factors depending on gender.

Figure 3 and Figure 4 display the factors that have highly predisposed our freshmen's choice of degree program.

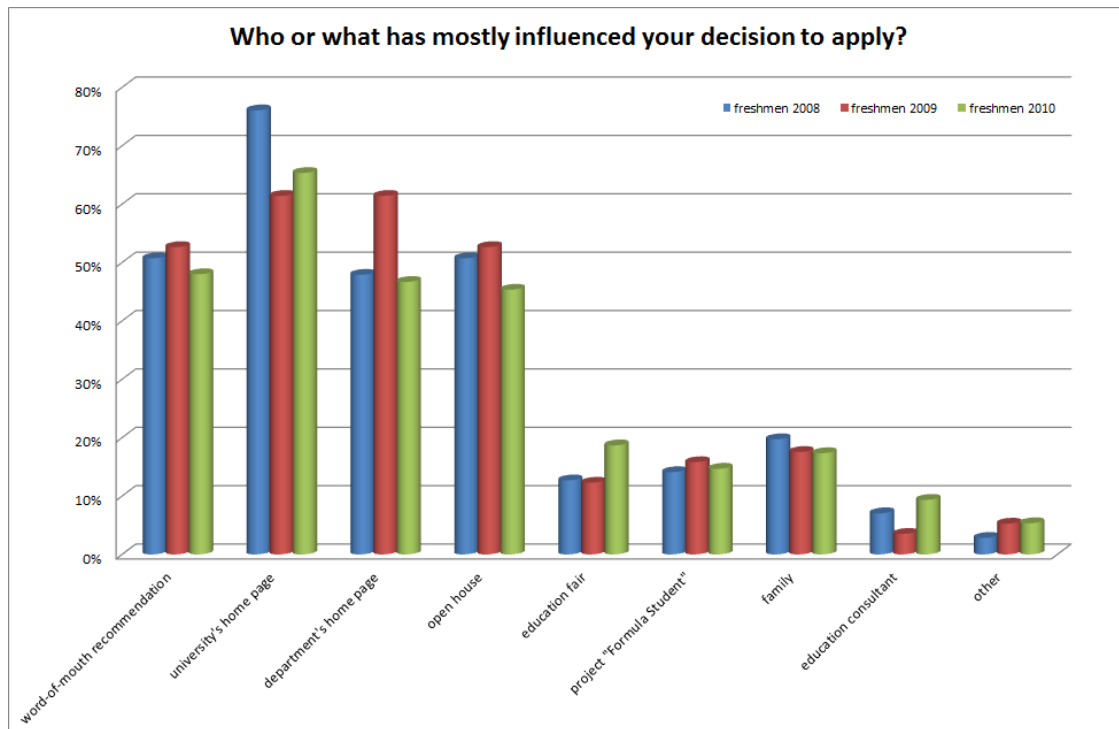


Figure 3: Factors that influenced the decision to apply, freshmen 2008-2010 answers

Here we can see again that the internet has the very high influence on the degree program choice. Word-of-mouth recommendation and open house come approximately joint second in the list of factors which have mostly influenced the final decision.

So we can summarize that on the one hand the internet, and on the other hand the personal contacts, the individual impression of the people working at the university, the infrastructure and the atmosphere play the main role in the process of collecting information and taking the final decision [2]. This fact seems to be very logical because young people are exposed to an extremely high amount of information nowadays but they are not experienced enough to know how to select, how to evaluate, how to take the best decision. Therefore, they use the very natural way of collecting information – the internet – and simultaneously look for face-to-face, trustworthy, personal advice.

It is interesting to note that neither the family nor the educational consultant at the home secondary school play a significant role in the decision-making-process even though the decision in itself could be regarded as a substantial ‘leap of faith’.

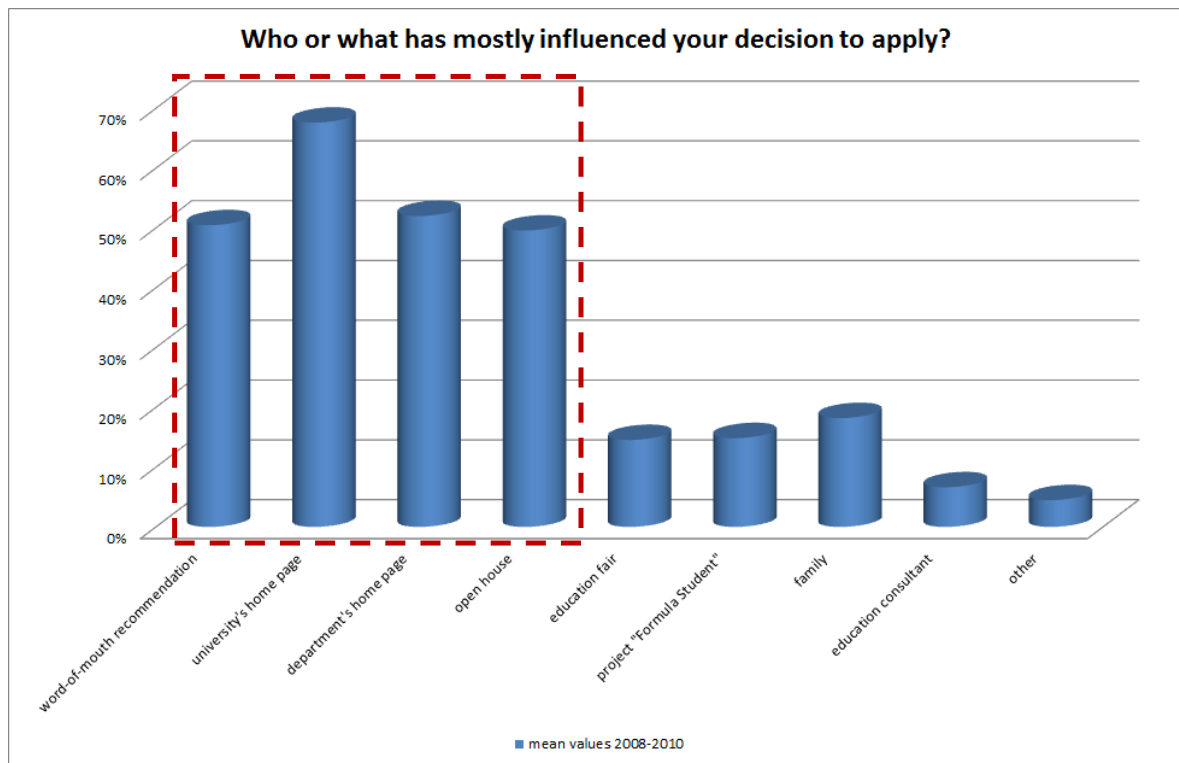


Figure 4: Factors that influenced the decision to apply, freshmen 2008-2010 answers, mean values

The freshmen group at our department is very inhomogeneous (see Figure 5). We have applicants with high-school diplomas from Federal Secondary Colleges of Engineering (FSCEng), High Schools (HS), Federal Secondary Colleges of Economics (FSCEco), and also applicants with a Certificate of Access to Higher Education (CAHE), and foreign certificates (FC).

Figure 5 also shows that in comparison to the other graduates, FSCEng graduates have the lowest drop-out rate. We assume that the technical background-knowledge has an important impact on the study success and the study motivation. We have proved this assumption in further investigations.

Figure 6 illustrates that, on average, enrollees with a technical background-knowledge gained in secondary school are far less likely to discontinue their studies than others.

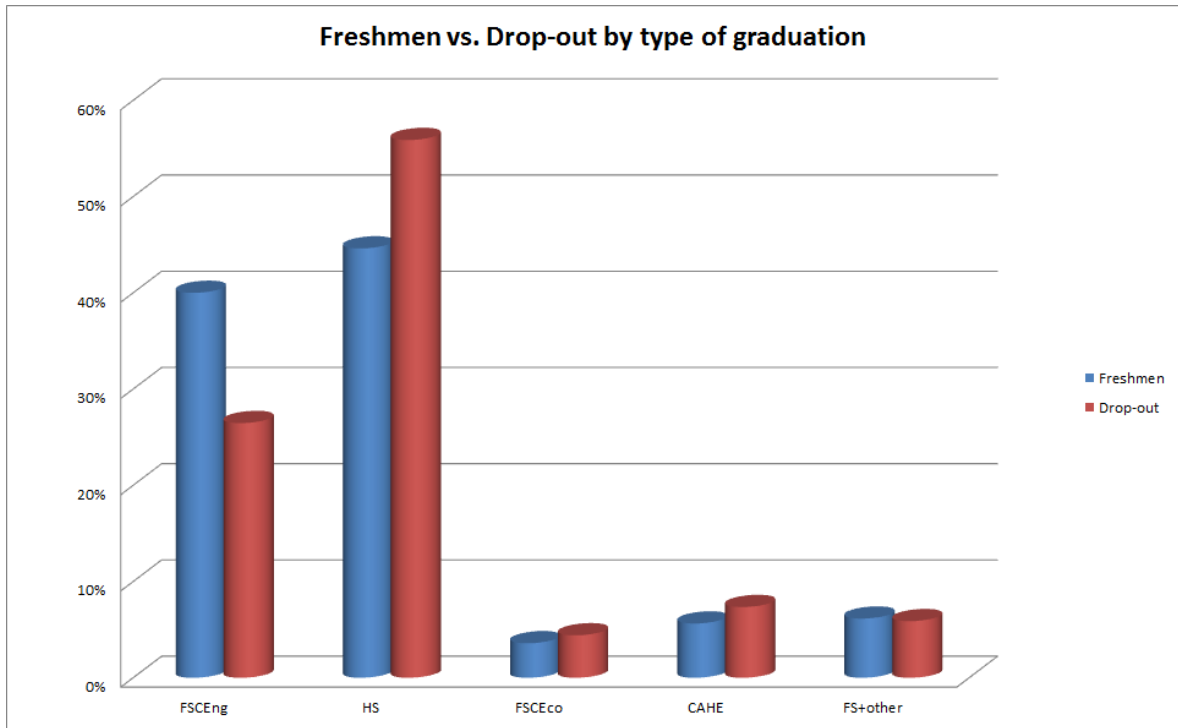


Figure 5: freshmen and drop-out by graduation: FSCEng: Federal Secondary College of Engineering; HS: High School; FSCEco: Federal Secondary College of Economics; CAHE: Certificate of Access to Higher Education; FC: Foreign certificate

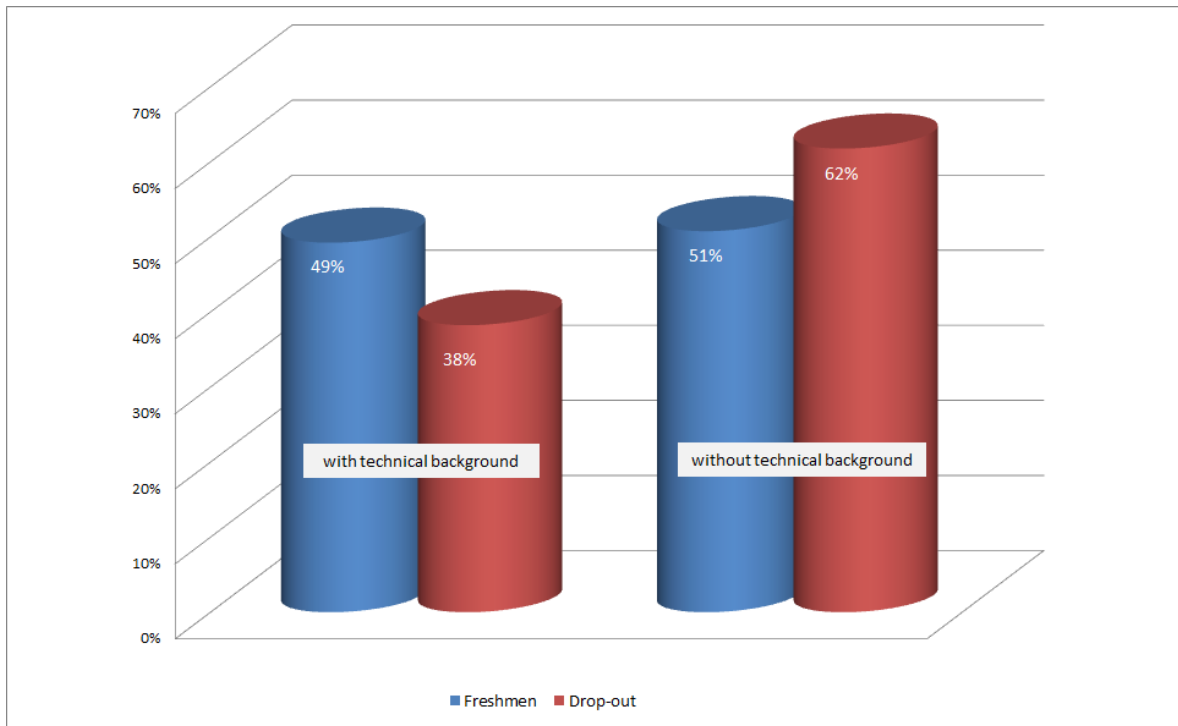


Figure 6: freshmen and drop-out by graduation, mean values

The dominant number of enrollees consists of FSCEng and HS graduates and therefore we investigated the correlation between ranking scores and drop-out rates in these two groups.

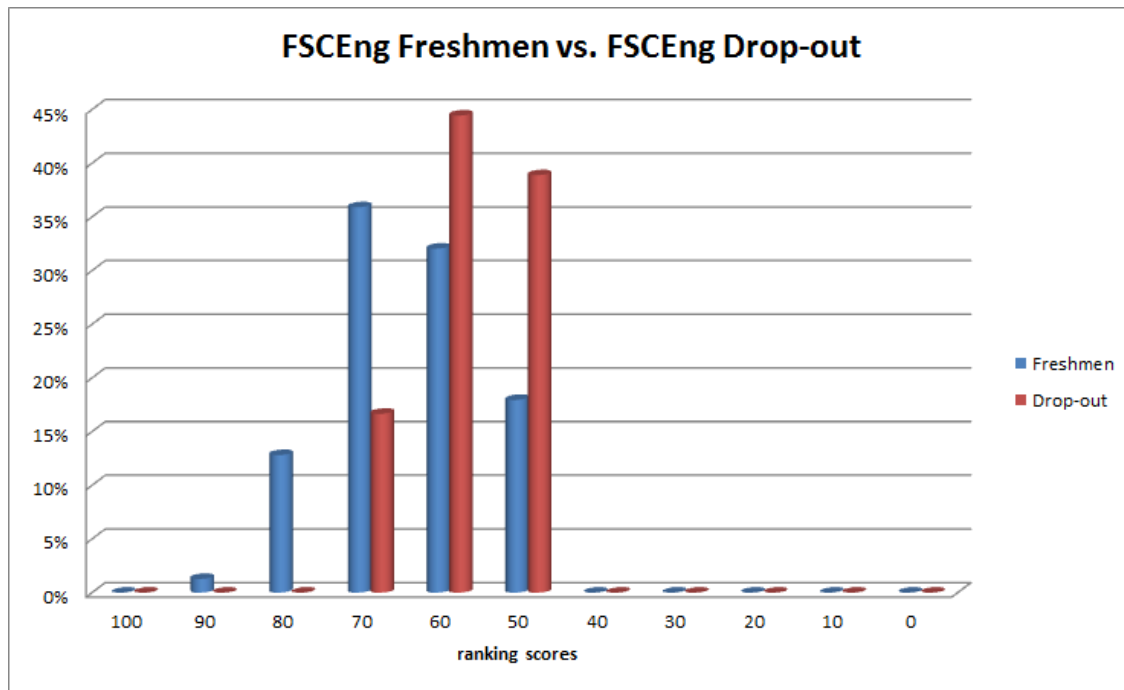


Figure 7: Federal Secondary Colleges of Engineering freshmen vs. Federal Secondary Colleges of Engineering drop-out, ranking scores, mean values

It is quite obvious that FSCEng graduates with high ranking scores – equal and greater than 70 – have a very low non-persistence rate. We feel confident that these young people persist not only because of better technical background-knowledge but they also have higher motivation. The FSCEng-students are more knowledgeable about the future professional life and its challenges, and their willingness for higher and continuous work-load is greater than those of the other students.

In the Federal Secondary Colleges of Engineering the pupils often have to work in teams and they have been already faced with engineering tasks. The automotive/technical terminology is well known and therefore they can better cope with the technical topics.

Figure 8 shows a completely different situation with regard to the students with a high-school background. The number of students who drop out with ranking scores higher than 70 is greater than the number of freshmen. That means that we lose enrollees with probably high intellectual and engineering potential. The reasons could be the high work-load or mismatch between expectations and reality.

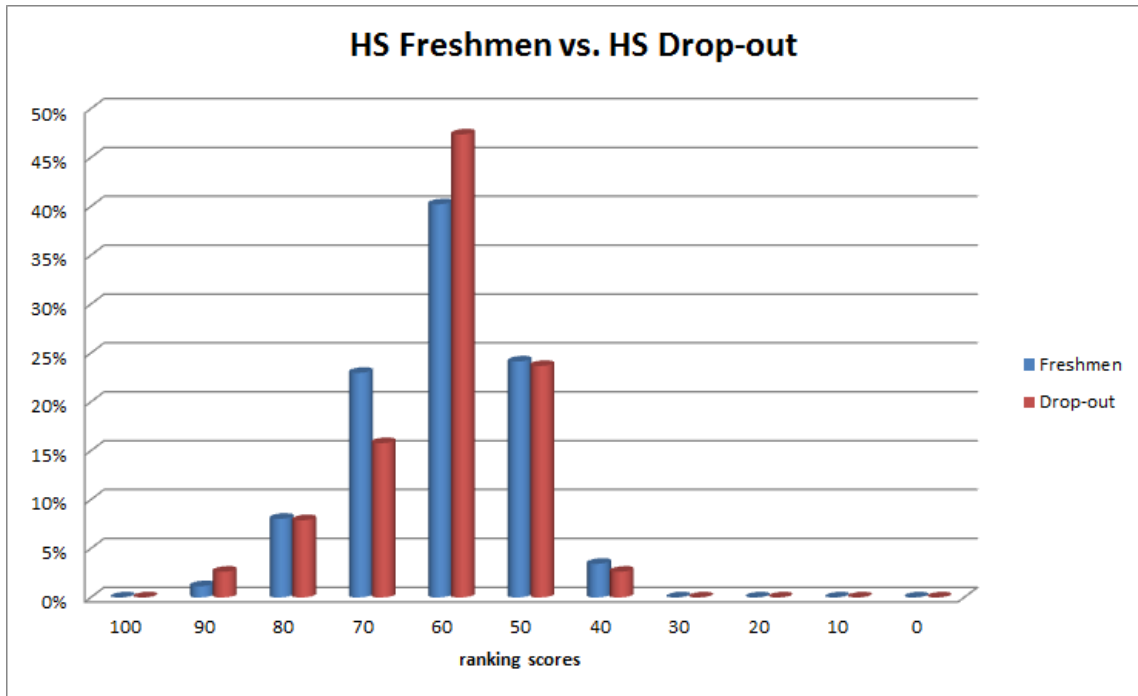


Figure 8: High-school freshmen vs. High-school drop-out, ranking scores, mean values

For better understanding the mechanism of persistence and drop-out, we have investigated some acceptance procedure criteria in detail. For these studies we selected those criteria in which the drop-out and persistence results essentially differ.

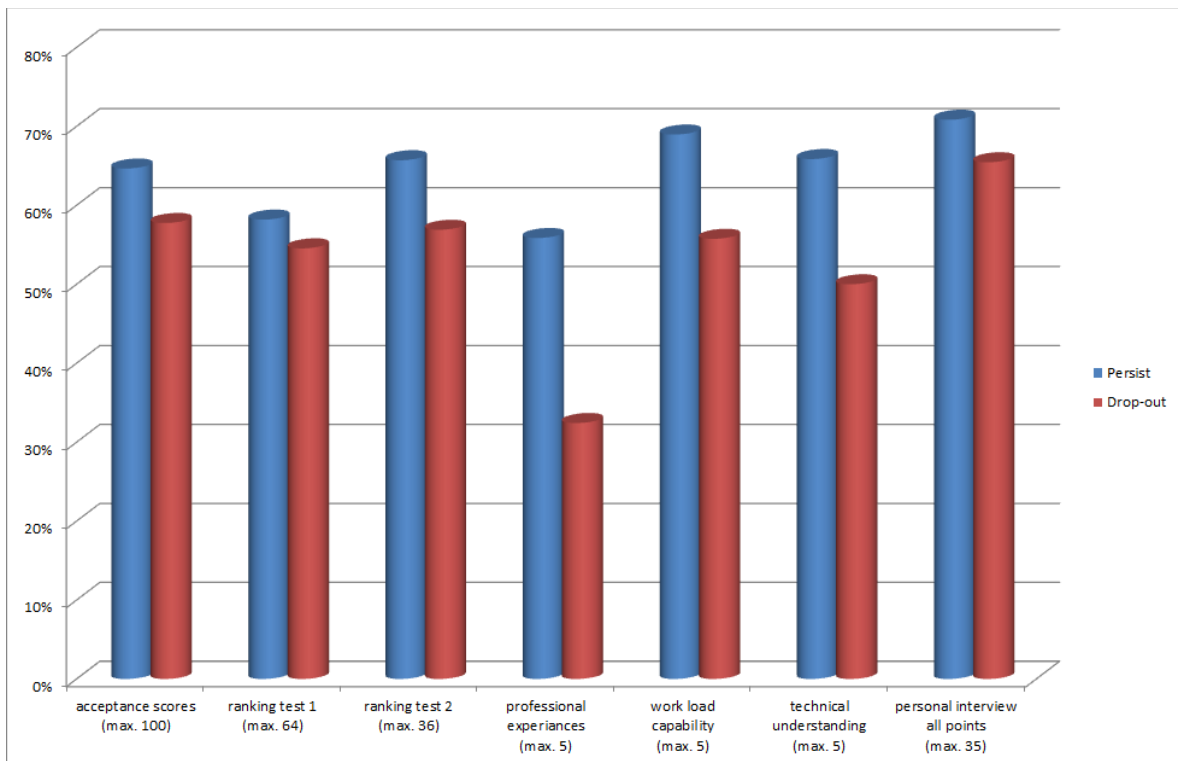


Figure 9: Drop-out vs. persisted students after the first 3 semesters

In Figure 9 we see that on average the students who left have worse acceptance procedure scores than their colleagues who persist. Greater differences can be noted in the categories:

- professional experience
- work load capability
- technical understanding

This awareness is very important because it shows that knowledge gaps could be closed with much effort and harder study. The main requirements for the academic success are personal characteristics like approach to work and dedication. These are qualifications the young engineers earn in the time before coming to us – in school and at home. Attempting to compensate for a lack of these characteristics is very difficult within the relatively short duration of the degree program. .

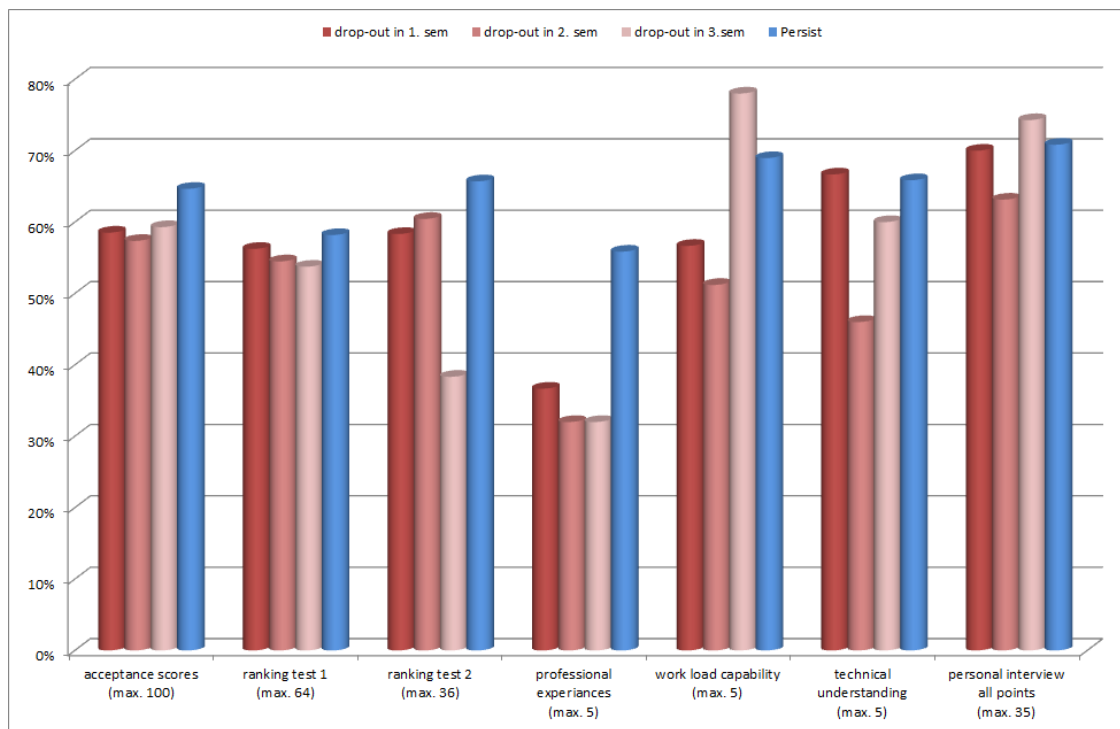


Figure 10: Drop-out vs. persisted students after the first 3 semesters in detail

Figure 10 shows the scores of drop-out and students who persist with their studies after the first 3 semesters in detail. We can see that the drop-out students in the third semester have the very low values in the categories: RT1, RT2, and PE (professional experience), which points to knowledge ‘gaps’. But they have very high values in the categories WL (work load) and PI (personal interview). This demonstrates that these students have a potential and they are ready to invest a lot of time and energy to persist. Unfortunately, these factors are not enough. We have looked at the study progress of our students in detail and can report that most of them have repeated the sophomore year successfully.

Measuring the academic success is the main question persisting – yes or not – but for the further professional carrier are the knowledge level and the professional skills of great importance not only for the young engineers. A good graduate image helps to acquire highly qualified applicants and strengthens the department’s position in academic and in industrial world.

Figure 11 displays the good correlation between the ranking scores and the study marks¹ of students who persist (mean values of approximately 180 graduates). It shows that a good input on average leads to a good output.

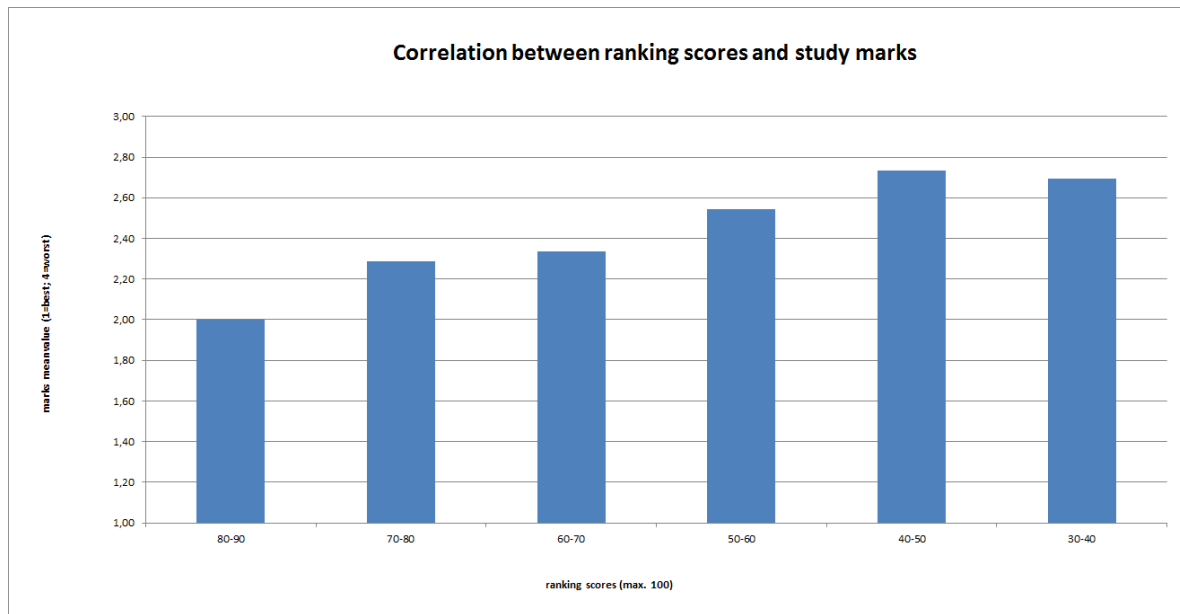


Figure 11: Correlation between ranking scores and study marks

Conclusions

Our investigations have shown that the main factors influencing student enrollment are:

- well prepared information and modern design of the university’s and department’s homepage
- word-of-mouth recommendations (mostly from our graduates)
- personal consultation or advice i.e. open house events or educational fairs.

To our great surprise neither the family nor the educational advisors play a significant role in the decision process.

We have proved that the knowledge gained in the secondary school and additional qualifications have an immense importance for a good ranking [1] and successful study.

¹ 1 = excellent; 2 = good; 3 = average; 4 = poor

The most important factors for the successful completion of academic studies are:

- technical understanding, having some affinity with engineering subjects and logical thinking, and understanding functional relations;
- work-load capability and motivation to achieve higher results, teamwork competence and dedication;
- professional experience, because it forms the character and helps students to understand the nature of engineering much better.

Based on this new awareness, we decided to implement some countermeasures in our bachelor curriculum to reduce the drop-out rate [3], specifically the introduction of new courses which aim to support our students in the very first semester of their studies by attempting to fill potential gaps in their knowledge and foster an affinity with engineering, such as:

- Written Communication
- Natural Sciences
- Selected Fundamentals in Mathematics
- Basics of Technology
- Introduction to CAD

Needless to say, it will take some time to gain enough statistical data to be able to measure the success of these curricular changes, but we are hopeful that they will make a significant contribution to the study success of our students.

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