

The interaction between Student Numbers and the Quality of Teachers – Review and Current situation

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Key words: Student Numbers, Quality

SUMMARY

In Austria, technical studies in general and surveying in particular suffer from low student numbers. Although recently the number of students increased, the low number of students will lead to problems in the long run because the curriculum may not be cost effective for the universities. Another effect of the low student numbers is that less students graduate. The Vienna University of Technology has problems producing a sufficient number of surveying graduates to fulfil the demands of the job market. The low number of graduates also restricts the list of candidates for teaching positions. The best students usually enter the private sector because of better salaries. This has an impact on the quality of the teachers and in the long run on the quality of studies. One already identified solution for this concatenation of circumstances is to attract more people to study surveying and familiar studies.

This paper extends a survey by Gerhard Navratil presented at the FIG Workshop "Navigating the future of Surveying Education" in Vienna in 2009 [1]. It gives a brief review of the situation back in 2009 and compares these results with the current situation. Since 2005 most curricula in Austria follow the Bologna rules. This was a significant change in the Austrian education system. In 2009 some changes were evident but the short observation period made it difficult to assess the long –range effects on student numbers. These effects and their reasons can now be discussed in more detail.

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1. Introduction

Assessing and improving the quality of education is a problem worldwide. [2] The curriculum is often used to measure the quality of education. In many FIG Working weeks the curriculums of other countries have been explained to give a feedback. [3-6] However the discussion of educational quality should not be restricted to the development of curricula and how to assess ECTS points. The quality of education is also based on several other factors.

Some of them have already been defined as:

- monetary expenditure,
- quality of teachers, and
- number of students

Due to alternating impact of all these factors deficiencies in any of them can eliminate benefits from improved curricula. Although one of the most important fact, which has been already identified, when discussing about quality of teachers is the student numbers. The interaction between these two is most relevant for future discussions.

The paper is structured as: Section number 2 shows the impact of monetary expenditure. It points out how political decisions can have an impact on the curricula. Section number 3 shows the factors which have an influence on the quality and motivation from teachers. Section number 4 shows the impact of student numbers on the curricula and finally in section number 5 all these 3 factors will come together and the interaction between them will be described. It will be a summary and conclusion of all aspects described in this paper.

2. Monetary expenditure

In times of tight budgets due to political decisions and economic crisis monetary expenditure can have a big impact on quality of teachers and number of students.

In the last years salaries for persons starting a career as university teacher have been reduced by 37% by switching contracts for young teachers (PhD students) from full positions (40h/week) to part-time jobs (25h/week). The argument is that the 15 hours shall be used for the PhD. However, since the working profile of these young teachers did not change, it constitutes a reduction in salary. Also the resources available for new professorships are limited, e.g., personnel, laboratory equipment, or office space. Due to this reduction an employment as university teacher is not as attractive as some years ago. As a result, there are fewer applications from highly qualified national and international teachers for a job vacancy at universities in Austria. Due to this fewer applications the options are limited and this directly influence the attractiveness of the university and its international reputation.

If universities have to deal with tight budgets, the first things to be cancelled are expensive parts of the education, i.e., field trips. This will lead to a lack of practical experience for the students and also will take an impact on the quality of lectures. Also geodetic instruments—which are typically expensive—cannot be procured. So students are not able to experience the use of these new instruments and technologies. They can learn the theory but every surveyor knows that “there is no best theory until you can use it”. At Vienna University of Technology, the instruments are typically rented from companies during field trips so the students still have the chance to get in contact with them.

Due to the tight budget it is also hard to organize international events where the university can invite international experts. In times of the tight budget of universities and linked economic crisis it is hard to find sponsors and participants for such events. Another issue is how to guarantee the access to materials like books, papers, conference publications etc. Subscription to an important journal may cost €1000,- and more per year and there are typically 20 to 30 relevant journals for each curriculum. However, many new ideas emerge while reading texts or listening to presentations. If this access is limited it will also affect the quality of teachers.

A typical way out of this problem is the acquisition of a project to bolster the budget. But however this also has some disadvantages. There is already a lot of work to do before the project is even starting and a lot of time and resources which are usually invested in normal university business. Teachers have to spend their time to overlook the implementation and progress of the project. Since administrative duties cannot be neglected, either teaching or independent scientific work will be affected. So therefore the solution for tight budgets will also affect the quality of education.

3. Quality of teachers

The quality of teaching is mostly influenced by two factors: the quality of the teachers (their education) and their motivation. Teachers who have to work on tight budgets all time will find it difficult to obtain material and equipment that can help the students during their studies. Enthusiasm of teachers can compensate for lacking budgets but this is not a sustainable model since the enthusiasm will trickle away. This is not only a problem for the teaching itself, it also reduces the reluctance to take offers from industry or other universities. Since these offers are typically made to the best researchers and teachers, this further reduces the quality of the education.

Prizes are usually awarded to counter the negative effects. Prizes for outstanding research are numerous, e.g., best paper awards at conferences, student awards for excellent master thesis, or even lifetime achievement awards. The Austrian Society for Surveying and Geoinformation (OVG), for example awards the Karl Kraus Grant for Young Scientists, the Karl Kraus Medal, and the Eduard Dolezal Award. These prizes shall keep the motivation of researchers. However, there is only a limited number of similar prizes for teaching quality. Within the surveying curriculum of the Vienna University of Technology, an Education Award is granted since 2008 for outstanding achievements in education.

A result of poor teaching is badly (or insufficiently) educated graduates. These graduates shall later fill vacant positions in the teaching team. This is an example of a catastrophic feedback loop. Without help from the outside it is difficult to stop this process.

4. Number of students

The number of students is a crucial factor to keep a certain level. Because smaller communities like surveyors have less influence in university politics and receive smaller shares of the budget than bigger one e.g. informatics or architecture. The relation we are talking about can be seen in the figure on the next page. As the number of approximate number of students who have start studying surveying was about 327. For comparison that number with the number of students who are starting studying Informatics is about 5105 and Architecture is about 4285. As you can see the number is quite small compared to other study subjects. So for keeping the studies of surveying alive at the Vienna University of Technology attracting new students and graduates is a key factor. The number of students of Surveying at Vienna University of Technology was increasing in the last 7 years. Reasons for that increasing number are: the change within the bologna process and that more pupils achieve the general qualification to enter university. Another factor is also that due to the European Union some students from abroad, especially Germany, are coming to Austria for studying. This shows in the fact that the number of new students is fluctuating quite a lot. This is partly due to varying success of advertisement but incoming ERASMUS students outweigh this. Figure 1 shows the numbers of starting students per year and below the number of students from these groups that are still studying in the 3rd semester. The numbers in the 3rd semester are much smoother than the starting numbers, an effect of eliminating ERASMUS students from the statistics.

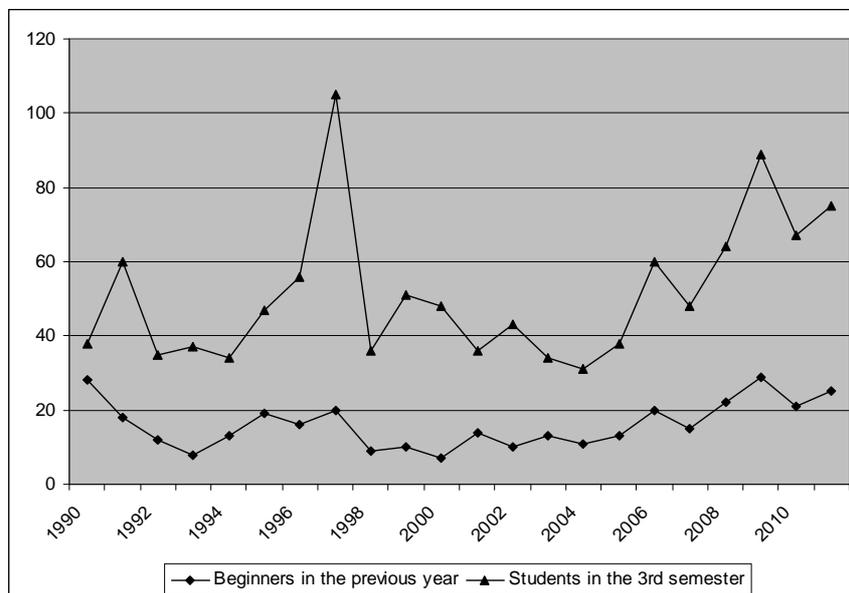


Figure 1: Comparison of student numbers in the 1st and 3rd semester. The numbers of the 1st semester are shifted by a year to make the numbers comparable.

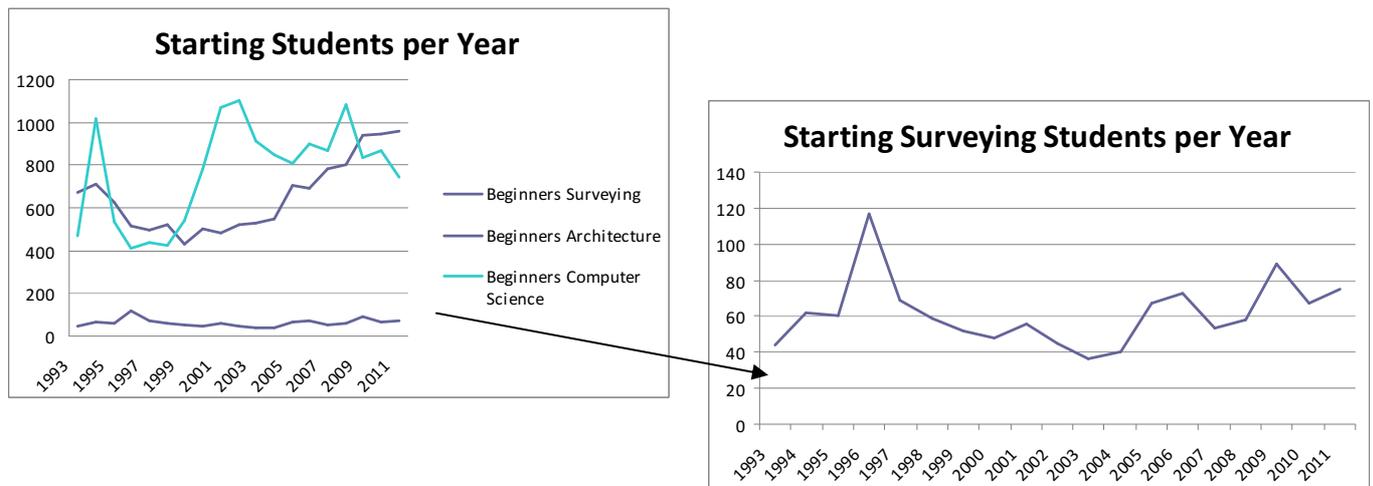


Figure 2: Comparison and Detail Number of Surveying Students

As seen on the graph there was a peak in 1996. This peak originates from the end of the old curriculum in 1996. A large number of students wanted to avoid complications with the change of curriculum and this resulted in also a high number of graduations (as shown in Figure 3). Then the number of students is decreasing until 2005 where the Bologna process was starting and the Bachelor - Master system was introduced at Vienna University of Technology. As seen in Figure 3, the numbers of graduates is also increasing in the last years and as the graph is showing there is this peak in 1997.

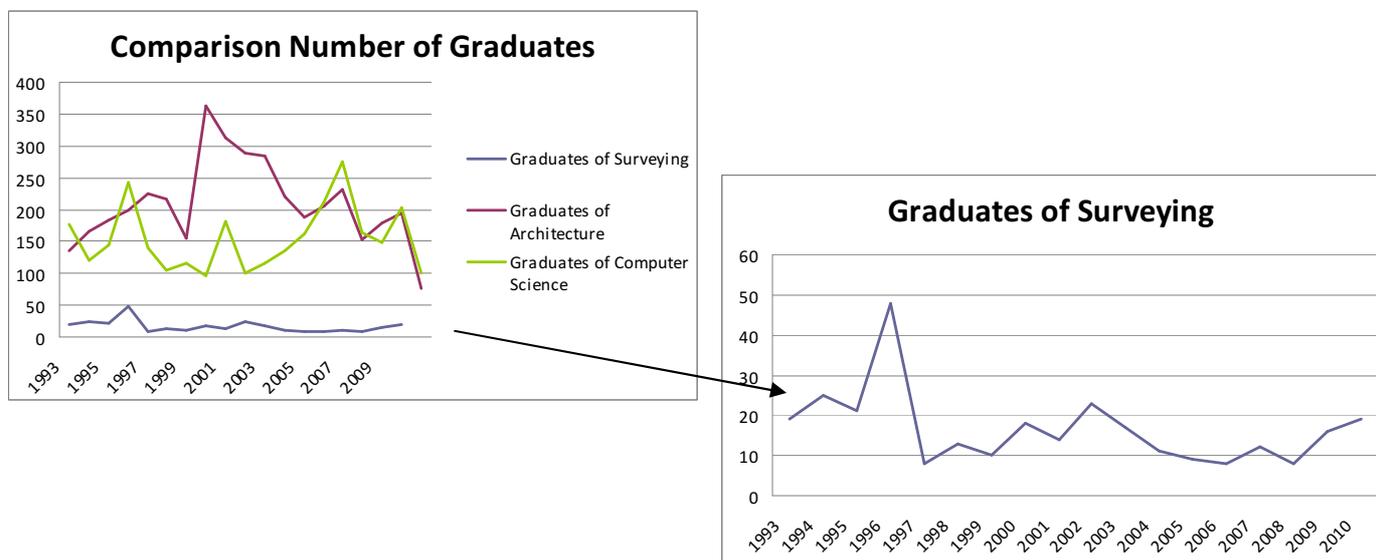


Figure 3: Comparison and Detail Number of Graduates in Surveying

But still in comparison to other studies offered at the Vienna University of Technology the numbers are quite small and the percentage of surveying students is approximately 1,3%. Due to this big difference leaders of curricula with a large number of students have a bigger impact in organizational decisions. The relative number of surveying students increased from 1993 (1,32% of the students in Vienna) to 2011 (1,35%). This indicates that there is a positive trend but the relative importance is still at an unsatisfactory level.

The number of graduates in surveying is still, in spite of increasing beginner's number, too small to cover the demand in university sector for research and also in the private sector. In some years many private small surveying companies will be closed because they cannot find somebody who is taking the company over. Also in the research sector at universities it's sometimes hard to fulfill the job offers due to a short of graduates.

Since 2008 we are asking the beginners of the Surveying Studies at Vienna University of Technology to take part in a questionnaire. So we have done it now for 4 years and in this subsection we want to present and discuss some outcomes of this questionnaire. The questionnaire was developed by ARGEOS which is a student association of Surveying for Austria, Germany and Switzerland. Unfortunately the questionnaire changed in 2011 so some questions haven't been surveyed longer. But the questionnaire can be seen as a base to start discussions and leads to understanding beginners and students of Surveying.

The association for beginners to the job as a surveyor hasn't really changed in the last 3 years. The job as a surveyor is mostly seen as a job in the field and office with a lot of job opportunities. Surveyors have to be multifunctional and Team players. Another important factor for beginners is that the job as Surveyor in Austria seems to be a secure one. This has been more relevant in the year 2009 than in the year before and after.

At the beginning most of the students, nearly 70 %, who are starting the Bachelor want to continue with the Master. This number is changing and in the surveying curriculum at the Vienna University of Technology almost all bachelor students are continuing with their Master degree. Although at time of the questionnaire nearly the rest is thinking about stopping after finishing the Bachelor degree or don't know at this time. One of the reasons for the high number of students continuing their studies is the legal insecurity of the bachelor degree. For federal employment, the bachelor degree is not acknowledged as an academic degree (yet). Thus the pay would be significantly lower with a bachelor degree than it is with a master degree. This may change but currently it seems to have an impact on the students' decisions. Another problem is that working as a licensed surveyor currently requires a master degree.

Reasons why beginners have chosen the Study of Surveying was mostly because they were interested in the subject although nearly 83 % haven't served an internship within the surveying field before studying. Another factor for them is because they are thinking that after finishing they will have a lot of job opportunities within the surveying sector. And another surprising factor is that they appreciate that the number of students is quite small compared to other studies at Vienna University of Technology.

Most of the students are just coming from school or changed from another study. Just a few of them approximately 2 each year worked before as a surveyor in a private company. 34 % of them don't know in which field of surveying or in which company they want to work after finish studying. Although if the students have an idea where they want to work afterwards they prefer working in the private sector like a private company for surveying. Only some of them can imagine working in the research field e.g. for university.

Another relevant question was how they get informed about the study of surveying. Most of them got informed by the homepage of the Vienna University of Technology. There you can find an easy to read description about the subject, the job opportunities and the duration of the study. This result of the study was no surprise but it also gave feedback to other advertisements offered by the universities. For example in Austria there is an annual exhibition where pupils can get information on a wide variety of jobs and studies. The universities are also present by students at this exhibition and researchers explain to pupils, who are interested, the curriculum and chances in the job market. Because these pupils get informed by the students, who are mostly motivated and engaged, most of them are really starting to study. There is also another possibility for pupils to get in touch with students for example they can come to university at certain times and can just talk to the students to get some information. Also some of the students have been invited to their former schools to represent their studies and give the pupils, who mostly don't know what surveying is about, an idea about surveying. So the questionnaire confirmed that the channels to attract students are via internet appearance (like university homepages, YouTube, Facebook...) or via personal contact to pupils who are thinking about their future.

5. Interaction, Summary and Conclusion

The above sections described the individual components but as seen in the figure below they all belong together. The interaction between them is strong and changes in one of them affect the others. If the student number for example is decreasing the monetary expenditure is going to be affected and due to the tight budget then the quality of teachers is affected. In Austria a low number of students results in a low budget. For teachers it's not easy to deal with low budget because then the research and lectures will be affected. This leads in the long term to a lower quality of education.

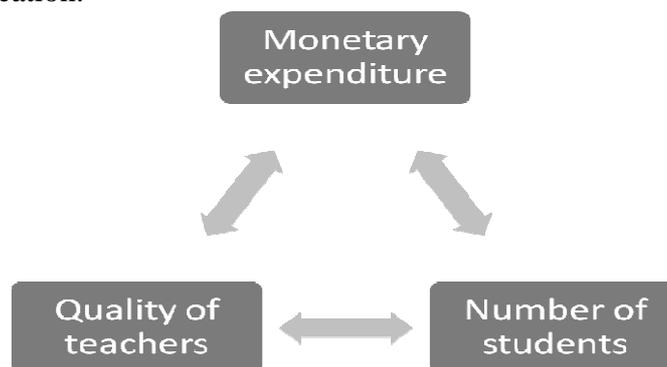


Figure 4: Interaction

A low number of students increase the monetary problems because every study at one

university wants to have more money and the budget is at best at a constant level. Thus everybody tries to argue that his study group is more important. This Argumentation is then mostly based on student and graduates number because they are easy to count. But another fact caused by such argumentation is that cooperation's between different studies are also suffering and these again alleviate the motivation of teachers and so the quality of teachers is suffering.

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BIOGRAPHICAL NOTES

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