

Tuition fees and attractiveness of engineering education

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1 INTRODUCTION

Universities have a long history – often longer than many of today's nation states, and frequently with origins that can be traced to beginnings in religious foundations in the middle ages. The history of the collection of tuition fees in one form or another is just as long, having also been collected ever since then. Teaching in Bologna, independently from ecclesiastical schools is reputed to have started in 1088 with masters of grammar, rhetoric and logic beginning to apply themselves to law. At that time students paid the teacher as a gift rather than a salary, because science was considered a 'gift of God' and hence could not be bought or sold. However, the concept of the student paying for tuition was established – although it did not always work and the municipality had to intervene. Initially, many European universities were managed by the Roman Catholic Church and were mostly educating priests and from whom it did not have the motivation to collect fees – however there were exceptions, such as the University of Paris who collected a weekly fee from the students.

In later times many universities in Protestant countries were educating civil servants and officers. In these situations they did not want to collect fees, as it was considered that by doing so might exclude potentially good students, who might have come from poor backgrounds and this would have contributed to a lowering of the quality of graduates. However, the students had to cover their living costs - which made it more difficult for poorer people. Earlier European literature is littered with examples of poor students diligently labouring away in freezing garret rooms and eating poor quality food. Of course at that time many people made huge sacrifices to obtain an initial education and even today a similar situation exists in the third world countries. In some of these, while initial education might be tuition-free, such education still requires time, eating, materials and living space, all of which can be ill afforded in such societies. After the Second World War the standard of living across Europe has risen remarkably and free education had helped working class families to obtain access to higher education for their children.

Today there are a few countries where higher education degree programmes are free for everybody, regardless of origin. Examples of this are the Scandinavian countries including Finland. At the other European extreme is the UK, which charges a high level of fees for UK and other European nationals, albeit at a lower level than the full economic cost charged to students from beyond those areas. Tuition fees are widely charged elsewhere e.g. in Australia and China. The USA, presents an interesting example, with state and federal budgets and with fee levels at state institutions, set by whether a student is studying in a home state or elsewhere. At the same time there are many private institutions, often the most prestigious, with very high levels of fees.

In different countries students have different possibilities to pay their fees. Some might get vouchers from the state, be lent money from the bank or state perhaps at subsidised interest rates, obtain interest free loans or get grants from companies or from university foundations. Frequently, studies are financed by the student's own or hers/his parents money.

However even with such diverse practices, who should pay for university tuition? What is the effect of tuition fees on the attractiveness and effectiveness of engineering education? What role should fees play in the financing of universities? How do fees match with the principles of equal opportunities? How much do fees influence the motivation of studies, how are the study possibilities for European students affected by fees and how do fees affect the quality of teaching and learning. Does the charging of fees affect the internationalisation of universities? Are students selected by talent, money or nationality? And finally, what responsibilities the students might have after the graduation if they have not covered the cost of the tuition?

2 TUITION FEES IN FINLAND

2.1 Historic Background

In Finland, after several university mergers, there are now 14 Universities and 24 Universities of Applied Sciences. The number of Finnish universities was expanded greatly in the 1960s and 1970s, with the creation of seven new universities and even more in 1991 as the new trial of Universities of Applied Sciences started. Some years later all the colleges had changed their status to Universities of Applied Sciences (UAS) [1].

Education in Finland has always been considered as the 'right' of every person. Since 1898 everyone has had the right to attend elementary school and since 1921 everyone had to do so. In the beginning that school was for 4 years basic education, but from 1958 everyone had to go through at least 8 years education. To ensure children had the energy to study, the warm meals during the school days have had to be offered without cost to everyone for more than 50 years.

Higher education in Finland has traditionally been free for all students. That means the Universities have not been allowed by law to collect tuition fees from any of the students studying in degree programmes. This has been applied also to the programmes offered to special groups even outside European Union.

Additionally to the free studies, special support programmes for students who have advanced in a nominated phase is applied. That support covers main part of the cost of living, but still some income at least during the breaks is needed. The special support is available only to the Finnish students - and will be paid also to the Finnish students studying abroad.

2.2 Current situation

Finland is a part of European Union and wants to be international in its outlook. As the local language is mastered by only around 5 million people - and nowhere else other than in Finland - tuition offered in Finnish does not attract international students - on the other hand if tuition would not be mostly offered in Finnish the development of the language would suffer. Today Universities are offering bachelor programmes in Finnish (and Swedish) and only some of the Master's programs in English. Bachelor programmes in English are offered in the Universities of Applied Sciences - from where one can continue to masters' program only after 3 years work experience following graduation. Universities of Applied Sciences are not offering the OECD category 8 degrees (licentiate and PhD) at all.

In the Universities the students are mainly chosen directly into 5-year (3+2) masters programmes, although one can apply after a bachelor degree from elsewhere just study for the last 2 years, which are the master's programme. In the Universities of Applied Sciences the students are chosen to bachelor programs (in engineering 4 years).

For the time being, everyone accepted by the degree programme set entrance test and the criteria of the University can study without a limit for the degrees. Even if the maximum time of studying has passed, the student can apply for a new start. Also in some cases further studies in degree programmes are used without a personal aim of graduating, instead of continuing education. This happens as usually continuing education programme are charged to the student.

The aim of the free education has been to offer everybody the possibilities to develop their own skills, without being dependent on the welfare of their family or others. It has been thought that people repay

for the education they receive as subsequently they earn a higher income and thus pay significantly more taxes according to the strongly progressive taxation system of Finland.

2.3 Outlook

In the current situation the financing of universities is becoming increasingly difficult. A beneficial step has been taken recently with the financial grant provided from the Ministry of Education has become partly dependent on the quality outcomes of the institution, rather than just the number of students. The quality criteria are based on the feedback from students, speed of studying, graduating and employment after graduation etc. Additional financing should be collected from the cooperation with industry and projects financed from different sources, for instance EU funds. Also internationalisation, research and R&D work is a base for more funds from the ministry of education - but the question is, are those activities making more costs than giving benefits.

Now as the UAS's are offering bachelor programmes in English the question arises as to why students are choosing to study in Finland. Is it the standard of education - or just the fact that tuition is free? Also what is the benefit for Finnish institutions and society to have these international students.

In research orientated universities teaching in technology at bachelor level is mostly in Finnish (Swedish), but in Master's level programmes are offered mainly in English. This means the international and Finnish students are studying together. This mixture is advancing the aims of getting Finnish students to become more international, but hardly helps foreigners to learn Finnish. In the year 2012 there were 5568 technology students in masters level - out of those 1968 were foreigners [2].

In many cases the international students are staying in Finland just during the time of the studying - partly as they might have difficulties on getting visa to stay longer – they have to find a job pretty soon after graduation if they want to stay. And the foreign students have difficulties on finding employment, as most of them have not mastered the local language. Only very few employers, mostly the large international companies, are hiring people without even a basic understanding of Finnish. The international students have mostly taken only the elementary courses - and as Finnish is a very difficult language - that is just not enough.

Another aim is that the international students should make Finnish students more international - but even with that in the bachelor's programmes we have failed, as the international students are mostly staying in their own groups.

According to these experiences, the international students should be taken in much more serious programmes - making the learning of Finnish language compulsory, and supporting them to get the working opportunity after graduation - otherwise Finns just loose their talent to other countries after educating them – essentially for free!

Academic engineers and architects in Finland TEK published its educational policy strategy in the beginning of May 2014. In that strategy the aim is to give the universities the right to collect tuition fees on the condition that Finnish students would get the fees refund by the state [3].

3 TUITION FEES IN UK

3.1 Historic Background

First let us consider a brief history of the growth of university numbers in the UK. Prior to 1600 there were 7 universities in the UK, 2 in England, 1 in Ireland and 4 in Scotland. No more were established until the Nineteenth Century when the universities of Durham, London and Wales were formed. In the early years of the Twentieth Century 7 Civic Universities were formed, including Birmingham, Bristol, Leeds and Manchester. During the 1960s as a result of the Robbins report into Higher Education 8 new universities were created and 12 other existing institutions were granted degree-awarding status. At this time each institution had a limited number of students and the requirements for admission were usually an acceptable performance at the final school exams and frequently an on-campus interview. All full-time students would have their tuition fees paid by the state, often via the County in which they were domiciled, and would also be in receipt of a means-tested maintenance grant related to their parents' financial circumstances. Hence the costs to a student of attending a university would be

comparatively light. The 1960s also saw the pioneering establishment of the Open University system, which while not giving the same campus experience of the existing universities opened access to higher education to a wide range of people who for whatever reason might not have been able to attend universities in the 'normal way'. While the OU might be seen as an evolution from the correspondence courses then widely available its importance should not be underestimated. Degrees obtained via the OU were by no means a 'soft-option' and those students who graduated are to be respected, as they were probably juggling their study load with many other day-time commitments.

At the start of the 1960s probably only about 5% of the age cohort was attending universities and the costs to the state, either national or locally were at acceptable levels. At the same time many students were being educated at various technical colleges and polytechnics, which were under the governance of the local education authorities. Probably the most significant change occurred in 1992 under the premiership of John Major the Further and Higher Education Act was introduced, which brought these 34 polytechnics and 39 other institutions such as colleges of higher education into the same unified centrally funded structure and granted them degree awarding status in their own right. Whereas the 'older' universities embraced a mix of both research and teaching, with a predominantly 'academic orientation, these 'new' universities were predominantly teaching establishments.

By this time the increase in student numbers had raised the demands on the central exchequer for student support to unacceptable levels. A committee chaired by Sir Ron Dearing was asked to report on university funding with the aim also of helping to fund enrolment and promote more support for part-time students. One of the recommendations made was the introduction of tuition fees. This was enacted in 1998 at the level of £1,000pa per student.

In 2004 the annual fee level was raised to £3,000pa and again in 2010/11 to £3,290. There was yet another review of student fees under the chairmanship of Lord Brown and in 2012, which recommended an annual basic fee level of £6,000 for all institutions, with provision for this to be raised to £9,000 for institutions, which could demonstrate that they had established a scholarship scheme which would not prevent or inhibit students from financially disadvantaged backgrounds from following a university education. The £6k fee level was charged by 59 institutions and £9k by 64 institutions.

The introduction of fees and each following increase in charges was met with opposition, but none more so than the lift to £9,000, which was introduced by the current coalition of Conservative and Liberal Democrat parties and had not been agreed at the time of the negotiations to form the coalition. It's subsequent introduction cost the Liberal Democrats dearly in their loss of credibility with their own supporters.

Although students and their parents may think otherwise, even at a fee level of £9k p.a. this does not represent the full economic annual cost of educating a student in subjects such as sciences, engineering and medicine. It should also be recorded that these fees, although booked against the student's account, do not need to be paid during the time of study, but low cost loans are arranged via a specific organisation and the requirement to repay is only triggered when the subsequent salary of the student in employment exceeds a specific level. The ethics of this entire approach might be open to question, in that it is an official endorsement of situation which encourages an individual to take-on the responsibility for debt, analogous to 'living beyond ones means'.

Partly because English is a major international language and partly because of the international reputation of some of the prestigious academic institutions, the UK has always been an attractive study venue for overseas students, both from within EU and beyond. Full cost fees for non-European students have applied for very many years, but EU students are treated in the same way as domestic students, not as they would be in their home countries, unfortunately such students do not have access to the same loan structure as UK students. Clearly at one level there are moral arguments both for and against such a position.

It should be recognised that the introduction of fees paid by students, either directly or indirectly can and does introduce changes into the teaching dynamic. The concept of the student as customer model has its limitations as it might have the effect of encouraging academic staff to raise their attention to achieving increased standards in the quality of teaching, and student feedback. At the same time it can create a student mind-set that they are purchasing a qualification or passport to employment rather than a development and training of their critical faculties in a specific field of competence.

3.2 Current situation

With the economic downturn which has occurred in recent years, there is an oversupply of graduates with degrees, some of questionable value, and an inevitable increase in graduate unemployment. In its turn this increases the proportion of graduates failing to pay back student loans. Not only that but this increase is at such a rate that the UK Treasury is approaching the point at which it will get zero financial reward from the government's policy of tripling tuition fees. Forecasts suggest that write-off costs are reaching 45% of the £10bn student loans made annually, thus effectively nullifying the saving to the public expenses made by the introduction of the new fee system over and above the £3,000 level. Fewer graduates will earn sufficient to payback their loans during their working lives. On current forecasts, by 2042 approximately £90bn out of an overall £200bn in student loans will remain unpaid. Reflecting on such statistics might lead to serious questions about this method of funding universities!

3.3 Outlook

In recent years there has been a tendency for universities to be seen as businesses, and as such they are very large ones, and for vice chancellors as CEOs. Pay structures also have reflected the unsatisfactory and unhealthy trends of industry and society at large where the ratio of the salaries of the highest and lowest paid quartiles of the salary distribution have been progressively diverging. Unfortunately in the conventional use of the words, academic institutions are not companies and students are not customers and the concepts of bankruptcy and takeovers should not be viewed in the same light as would be used in business.

However, over the years there has been a constant mixing of the correct realisation that in order to prosper in an evolving and modern world there is a need for a workforce that is better educated and has greater flexibility and that it is the university system that is best placed to deliver this. The policy of expanding higher education, of trying to couple this directly to national economic development can be misguided. That a better educated and more flexible workforce is essential for effective economic development in a modern world can be considered as a given, but the corollary that this implies a greater number of university students is up for debate. If the percentage of an age cohort attending university increases from 5% to 45% it does not imply that the 45% can study at the same level as the 5% could.

4 INFORMATION FROM ELSEWHERE

In this section we introduce some information from different countries about the tuition fees for their own citizens, fees for students from European countries, students from elsewhere and for relevant other groups. Additionally the differences of financing the studies will be discussed. The history of Scandinavian universities started at 1455 when the Uppsala University was established. Finland got its first University as the Academy of Turku was established 1640.

4.1 Scandinavian Countries

The Scandinavian countries have in many ways been the role models of "equal opportunities". Democratic thinking has covered the most important areas of life: health-care and education, with the finances for these collected through taxation. This has led to free education that only recently has been raised as a key issue for discussions. In Sweden the universities are not collecting tuition fees from the citizens of the European Union, but since 2011 fees have been collected from students from outside EU. In the area of technology these fees have been around 15.000 euros per annum. Denmark has also started to collect fees from students outside EU/ETA area. Finland, Iceland and Norway are still offering the free education to everyone.

Additionally to the free education Scandinavian countries are offering different ways of other financial support for University students. This in practice gives students the possibility to study independently from the welfare support provided e.g. by their parents.

4.2 Other European Countries

Many of the European countries have started to collect tuition fees, which are varying in level from just a couple of euros to as high as 10.000 euros per year. By European Union agreements, all citizens of different EU countries should be treated in the same way by the educational institutions - but the social security systems and other benefits can be national. That means that although the cost of studying and living is according to the country where you study, the benefits are mainly according to one's home country. For example, in the Netherlands tuition fees are collected but local students have in certain circumstances the possibility to get the fees paid by the state [4]. That same situation seems to apply in some Baltic countries. The difference between the tuition fees in some countries applies to the language of the programmes – i.e. programmes in local language might be much cheaper than programmes in English. One more criteria for tuition fees and support systems is the age of the student - younger students are taken in as higher priority [5].

4.3 Other Continents

It seems that in all the other continents than Europe studying in well-respected institutions is more expensive and more depended on the funds available to the family of the student. On the other hand outside Europa the system for applying grants covering a major part of the studies are more available for students who have been able to show their potential.

In USA the fees can reach over the level of 30.000 euros per year, and in Canada to about half of that amount. In China fees seem to be dependent on the local living standard, the number of courses taken and the choice of teaching language. They start from almost nothing yet reach levels even up to 15.000 euros per year. In Japan the annual fees are varying around 3000 euros per year. In India, the public universities are charging almost nothing, average private universities around 1000 euros and the most expensive even up to 6500 euros each year. Australia appears to be the most expensive location to study. The price is dependent on the "course credit points" collected - having a price of about 500 euros each point. So a four-year engineering degree (192 points) in 2013 would have been about 85.000 euros. All the fees in this chapter have been covering just the tuition - additionally of there will be local living costs and materials etc that should be added.

5 DISCUSSION

The role, autonomy and financing of Universities in knowledge and science dependent societies needs a fundamental rethinking as the whole future of the globe is dependent on the decisions made in technology and share of wellbeing. How the Universities can take care of their part in this very serious situation, how the politics of student fees are affecting in this?

If the UK is to be regarded by the rest of Europe as a test bed for the charging of high student fees and Finland a test bed of remaining free studies for everyone, then on current results it seems clear that a detailed reconsideration would be sensible.

Unfortunately and regrettably it is highly unlikely that in any country the questions that should be widely discussed, debated and outcomes from which used as a basis for policy will ever happen. It does not fit to the aspirations of politicians or indeed many of the electorate! But issues that can't be avoided are:-

- Why does the state fund higher education, what does it hope will be the outcome?
- If that is the outcome, is a university education the optimum way to achieve it?
- Within a limited overall educational budget what should be the objectives of HE?
- How much of GDP should a state set aside to support HE

5.1 View from students

What kind of affects do the charging of tuition fees have - how much does this influence the selection of students? Will the talented poor youngsters stay away - or will the effectiveness of studying just

rise? Will they try to find a less expensive university elsewhere? Will the balance between the local students and students from other European countries - or from overseas change?

- What are the effects on students of charging fees, has it made them more diligent, more focussed or just more demanding?
- What is the impact on those thinking of applying for university places?
- Does this lead to elitist universities where the “not so talented but rich” students can study - or even almost buy degrees with less learning outcomes?

5.2 View from University

What are the effects on staff, will the fees increase their attentiveness and responsiveness to student needs, will it raise the importance of teaching?

What is the impact to the Universities total financing - are the tuition fees adding the money available or will the same amount of financing be cut out from other sources of financing?

Will the universities collect fees according to the cost of the education or according to the highest possible market price - what would be the price for an engineering course compared to medicine - or social sciences? Will that lead to cut in some faculties or will it create new ones?

6 SUMMARY AND ACKNOWLEDGMENTS

By posing these questions it will be clear that we are very sceptical of many of the policies that are currently pursued. We realise that, with so many vested interests, it will be difficult to undo that which has happened, however

- Overall to achieve a more educated society and economically productive society, funds are better spent at primary and secondary levels
- Many of the basic skills that society needs can be taught without the overheads of a university.
- The image in the minds of some people, that a university is a transition to adulthood, such as the gap year, is a luxury we cannot afford.
- Perhaps we need fewer universities, teaching to more demanding levels to the brightest students

We would encourage a wide debate that couples desired outcomes to the available funding.

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