World:
Education – II

With a Focus on University Education for Engineering

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2021/06/17

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1.

Introduction

In this entry, I aim to explore possible problems and solutions within the education system, with a focus on universities, and for engineering. I have, as of writing this, completed my second year of study of Civil Engineering at Imperial College London. Due to my experience, I believe that there are certain things that might benefit from being questioned, and in this entry I will explain why.

This entry is structured with three main sections:

- Initial Assumptions on What a University Education Is

- The Current State of University Education as I Have Experienced It and Possible Problems

- Final Remarks

2.

Initial Assumptions on What a University Education Is

This is probably the most important section, since all other sections will in some way use these initial assumptions as a measuring stick. Here I will begin by setting up some definitions on what an education is, as well as what it should be.

Firstly, it would be perfectly sensible to say that if one is educated, then they have taken part in activities that have allowed them to learn new skills. Secondly, it is rather important that those skills are learnt in such a way that they are not forgotten.

These two statements are with regard to what it means to be educated. Now, what are we to say about the nature of the skills themselves. It was in the times of the Roman Empire that the liberal arts, maths, and philosophy were taught, among other subjects. It is also the case that these subjects are taught in the same way today, with their theoretical bases and roughly similar methods of teaching. I say that the methods of teaching are roughly the same since at a foundational level, there is still an instructor, in a room of students, giving a lecture. However, at a higher level, the techniques have improved of course, yet I would say the foundation is the same. What is important to note here, is that the subjects that were initially taught in this typical method of "classroom teaching", were only those of a theoretical nature, such as philosophy in those times of the Roman Empire. Ever since, this method of the classroom has continued to be in use.

Thus, we can say that typical education, in its classroom setting, has always

been of concern to skills which hold a theoretical nature at their foundation. However, of course, we could say that all skills, at a foundational level, are theoretical, since they are all based on some level of thinking. And so, I think some elaboration is needed. When I say that some skills are theoretical, I mean that those skills acquired can, in their entirety, be practised within a typical classroom with pen and paper. This is, from now on, what I mean when I say something is theoretical. Thus, it can be the case that some subjects are entirely theoretical by this definition, such as mathematics, but also that some are only so at a lower level, like chemistry or computer science.

Finally, we can say that these skills which were learnt, were learnt so that they might be useful in the future, for the purpose of having a better life in general. This was definitely the case in the past.

Therefore, we can say that education is traditionally treated as being:

1. A process where skills are learnt, and in such a way that they are not forgotten. These skills are learnt so that the student might have a better future ahead of them. Furthermore, these skills are taught in a derivative of, or within, a classroom environment, whereby they are to be treated as fundamentally theoretical in nature.

This definition is quite sensible for describing how past and modern education, at all levels, is treated. However, I think that there is a serious rift between how modern higher education at university should be treated, and how it is being treated. The problem is mainly that the aim of higher education is different in the traditional and modern flavours, but this difference has big implications. I will now provide a definition of what I think modern higher education at university really is, and how it ought to be treated as being:

2. A process where skills are learnt, and in such a way that they are not forgotten. These skills are learnt so that the student might then be able to work within the career relevant to the course they take, after it is complete. Thus, these skills must be taught and learnt in a way that best enables them to be applicable within the work environment the student aims to enter.

In this second definition, there is a clearer emphasis on the fact that university is a bridge towards a career. In the past, it could be said that this was not so much the case at all unless that career in question was within academia itself. This second definition is what I think higher education actually is, and should be, in the context of a modern working society. It is also what I believe many students expect university to be. Students pay for university, and so they must expect to get a career out of it using the degree obtained. It is folly to simply say that students attend university to, vaguely and solely, obtain a better skillset for their future, as with the traditional definition. Of course this is true, but it is not specific enough, since it is specifically, and only, a career that could be worth the amount paid for a university education (which is £9,000 per year for a UK student and often four times more for an international student).

Thus, I will measure the current university education system against the second definition, which is the definition of what I see university education ought to be. Thus, in the next section I will explain why university education, as it stands today, only aims to fulfil the first definition, and so needs to be improved.

3.

The Current State of University Education as I Have Experienced It

Here I will give a description of how my civil engineering course has been so far with regard to key areas, along with those areas' possible problems. I will assume that I can extrapolate arguments in this section about my Civil Engineering course to other engineering courses at other universities, but less so for other courses.

3.1 Classrooms

During my time at university so far, all modules (specific subjects within the course, such as Fluid Dynamics and Concrete Design) have been centred around lectures in typical lecture halls, which can easily be equated to classrooms.

3.1.1 Possible Problems

The fact that my course on civil engineering is centred around lectures is by no means a bad thing. However, I believe that in order for lectures to be at the heart of my course in civil engineering, whilst being effectively so, two assumptions must be met:

1. Civil engineering must be, at least at its foundational level, theoretical in nature (remembering the definition of theoretical I gave in the previous section).

2. Practice within the classroom must be an adequate representation of what would be done within the real world work environment.

The evaluation of these assumptions rest on the further assumption that university education is as I described in my second definition ,in the previous section, of higher education.

I hope that it is clear to see that these assumptions above do not hold, if a good and effective education is aimed to be supplied by the university. Firstly, I think it could go without saying that civil engineering is not fundamentally theoretical in nature. This is not to say that there are no theoretical elements to civil engineering, as such a statement could not be further from the truth. Secondly, as civil engineers in the working world, it is clear that the civil engineering practised in the classroom is not a complete nor accurate representation of the civil engineering that will be practised after students graduate. Yet, my course on civil engineering is centred around lectures within classrooms. This, I believe, is a problem, if and only if, universities aim to give an education as I describe in my second definition, in the previous section.

3.2   Exams

Along side lectures, another common element found is the typical use of written exams.

3.2.1   Possible Problems

It is logical to ask first of all, what the purpose of written exams are, and in the context of a student's full education. It would help to use another common word for "exam", namely the word "test", in order to grasp the purpose of written exams. And so, although it may be clear to you already, put simply, an exam aims to test a student's knowledge. Now, assuming this deduction is accurate, I believe there is a serious problem with this purpose,

in the context of the student's wider education. The problem arises when we ask whether we should be testing students' knowledge, or be making sure that they retain the taught skills, with the capacity to put them into practice, as is surely the aim of their education. The concept of the written exam assumes that these two possible aims are one and the same. This is indeed mostly the case for subjects that are used theoretically (put into practice entirely with pen and paper). However, for fields such as civil engineering, these two aims are not one and the same. Furthermore, I see that the second aim takes priority over the first, since only testing the knowledge of a student does not allow one to see if they will make a good civil engineer. This is not least because in practice, civil engineering is not fundamentally theoretical, as pointed out in the previous subsection.

Even if exams genuinely aim to make sure that students retain taught skills, along with the capacity to put them into practice, they surely do so poorly, at least in my experience. One thing I have learnt from language learning is that situational context is usually key for storing and recalling information, since it is within certain situations that you would use certain things. The same applies with engineering, and with any other field I think. And so, a key weakness of exams is that they are not embedded within any real world context. Thus, for me at least, everything that I learn for the exam is rarely retained for more than the time in which I need to retain it. In other words, I easily forget the content after the exam takes place. I can say this even for exams that I took, as of writing this, but 15 days ago.

This was the case last year on my course too. I got good enough grades to pass into the second year, yet now vaguely remember any of the content in detail, besides that which I needed for the second year directly. My knowledge was undoubtedly tested, however for the sake of my wider education, I gained very little from those exams, since they do not guarantee the retaining of knowledge, nor do they allow me to gain experience in applying that knowledge in any real world context. Of course, if I needed to recollect some knowledge I had forgotten, I could do so with less hardship due to the exams, yet only in a purely theoretical context, which is still not good enough if I am to apply that knowledge as a form of skill in real world context. It could be said, that the bottom line is that I have been taught in my higher education thus far, to practise the skills I have learnt, only within exams or the classroom. And of course, the problem is clear when we consider that work in the real world is not just a collection of exams.

Thus, I think that the students of such courses as mine are not as prepared

as they could be, if exams are to be kept at the heart of how they practise the skills they learn. I am very glad to say that there are practical elements to my course. However, in terms of what the university sees as being valuable indicators of my (and my classmates) aptitude, I would say that 80–90% of my course is based around written exams. I also think that this is the case for similar engineering courses too.

3.3 Careers

Within this aspect of my course lies, I think, the greatest inefficiency. There is no integration of my course of civil engineering with the outside working world by default, for students such as myself. However, it must be pointed out that there are resources available for students within the university careers scheme/department.

3.3.1 Possible Problems

By taking my second definition of what higher education should be, my course should then provide as good a bridge as possible to the working world. Yet, there is no form of hands-on work experience that is embedded into my course by default. This is also the case for every other course within all universities. There are practical projects within my course, and others I am sure, however they are not embedded in any form of work environment, and so cannot be classified as work experience.

If the role of university is to provide the skills for one to obtain a high skilled job, then it would make far more sense for there to be some kind of integrated work experience on real world projects (in a protected environment of course), at the very least as a way of testing aptitude, if not an advanced way of learning practical skills. There is a form of my course whereby a student could advance their degree to include an industrial placement for 1 year, and that I think is indeed a very good inclusion. However, it is not part of the degree by default, and so is naturally only available for those deemed most qualified upon selection, if the student wills to include such a placement in their degree. I understand that it may be costly for the university to organise industrial placements for all students, at least in engineering. If the cost would be deemed too great for universities, then this would only point to a

greater effort needed on the part of all hiring bodies and companies to secure the future workers in their industries. I understand that paid placements would be most likely too costly for even those companies, and so I deem it feasible, yet just as effective, to push for the inclusion of only unpaid work experience whereby students are simply given managed responsibility, and opportunity for gaining skills for the working world.

The bottom line here is that students go to university so that they can then get a good high skilled job at the end of it. And indeed, this is a primary assumption within my second definition for higher education. It is currently a simple fact that once one graduates, a job is not guaranteed, and neither was the university responsible for securing, at the very least, some work experience for its students. And so, here lies the problem. Here is the contradiction with regard to my second definition of higher education, since university currently only seems to function within its realm of academia.

It is another fact that all of the theoretical content that I learn on my course (comprising of around 80–90% of my course overall), can be learnt from books and the internet, although without the "university" experience. And so, this begs the question of what universities can offer students, that cannot be obtained elsewhere. This of course is the practical element, currently comprising of 10–20% of my course approximately, similar to other engineering courses I am sure. I think that the other unique element that could be offered is none other than the work experience programmes that I described earlier (given that they are embedded by default). This would secure links with companies, and directly contribute to graduate employability, satisfying, in part at least, the aims of what a higher education should be.

4.

Final Remarks

I want to say that I indeed do not have all the solutions, which is why only a few are proposed in this entry. However, a key part to solving the problem, is actually identifying the problem in the first place, which is what I hope I have done, at least in part.

Although this entry is a criticism of current university education for engineering, there are many good points with the university I attend, and the course I take. It wouldn't be right if I did not point out this fact. The current state of education is not bad at all, but this entry only wishes to point out that I think it could be better, even if the improvements that ought to be made aren't where this entry expects.

I hope in future entries to obtain more tangible solutions to the problems I have pointed out. Currently however, I can say that a solution to these problems would include putting more emphasis on the practical aspects of the working world, and of engineering, within the relevant courses, and do so by default. Another key to this possible solution is to adapt the idea of what a higher education is, possibly towards something close to my second definition given previously. If the working world in the past 2000 years has changed, it makes no sense to leave the fundamental assumptions of education throughout that time unchanged. Not least because education constitutes the initial step into the working world. And so, if education fails to provide the bridge into the working world, then we are left, quite simply, with a world that does not work.

Thank you for reading.

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