

***From College-Professor to School-Teacher:  
A Small Step for Students, a Giant Leap for Teachers, or Vice Versa?***

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**Abstract**

The transition from being a high school pupil to becoming a college (or university) student might place high requirements in terms of in the learning abilities and maturity. For most people the role of the college professor might seem quite similar to that of the high school teacher. However, as students differ from pupils, in age, knowledge and emotional tools, the requirements for lecturers at colleges and universities are quite different from the ones needed to be a high school teacher. It is no wonder that most lecturers do not hold a teaching diploma while it is a must for high school teacher. Teaching teenagers contains many aspects of social and emotional learning and teaching abilities, while teaching college students usually requires academic knowledge in a field of interest and a basic ability of transferring it. In this work the researcher uses his own experience as a college and university lecturer for almost 20 years and as a relatively new high school teacher to compare the two teaching experiences. The work compares teaching electrical engineering undergraduate courses at college to teaching high school physics to 14-16 years old pupils. The research combines data of several years of college teaching in groups of 30-40 students per class and the data of 4 high-school classes, containing similar numbers. The purpose of the work is to compare academic teaching to high-school (pre-academic) teaching in terms of personal attention, teaching techniques, grading methods and more, to determine what tools are suitable for which population.

Keywords: Engineering Education, Physics Teaching, Long Life Learning, Social and Emotional Learning

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## **Introduction**

### **1. Why I Became a College Lecturer?**

In 1994 I began my MSc studies in Electrical Engineering and to obtain a scholarship I had to become an assistant lecturer. Almost immediately I fell in love with teaching and the no-barrier connection with my students. As I wished to continue teaching, I went on to do my PhD in Electrical Engineering, during which I had the chance to be the lecturer and not just the assistant in several courses. After finishing my PhD I had to choose between trying to get into the university and getting into an Engineering College. As the main difference was that in the university most of the work is in research and only a very small portion of time is dedicated to teaching and in the college, it was exactly the opposite I chose to become a faculty member in a respectable Engineering College. Since then, I served as head of the Electronics Department in two different colleges but still my biggest passion is teaching. The ability to transfer my knowledge to a new generation of students and at the same time learn from them and adjust the classes to real life matters.

### **2. Why I Became a Schoolteacher?**

During my research at the College, I went to several conferences on engineering education, and I came to understand that many of the advanced modern teaching methods in the academy were invented by schoolteachers, such as the flipped classroom (Bergman & Sams, 2012, Kerr, 2015). The next step was to go back to the university and study for a high-school teaching certificate in Physics hoping to learn some new methods of teaching such as productive failure (Kapur, 2008; Kapur, 2010; Safadi, 2022), Predict-Observe- Explain (POE) (Sajidan et al., 2014) or Toulmin's Argument Pattern (TAP) (Erduan, 2018). During my studies I became aware of the shortage in science teachers in high schools not only in my country but also in other countries due to the technological changes in recent years (Krumsvi et al., 2016). These changes affected the engineering education as well (Tsarapkina et al., 2001). So, with a sense of mission I decided to teach physics at a small but quality high school in my hometown. This is also a part of the LLL (Life-Long Learning) strategy that aims not only to connect the academic life the industrial life that follows but also to the school educational life that precedes (Hargreaves, 2004).

## **Classifying the Main Objectives for Teaching and Learning**

In this section we show the main topics in which we compared high school teaching to college teaching, mainly methods, how to address new material, how to grade students and pupils and how to receive feedback from them.

### **1. Teaching Methods and Approaches**

Both college and high school teaching were based until very recently on the principle that a lecturer (or teacher) stands before the class and unveils his knowledge to the listeners and viewers. this was the standard since the first industrial revolution. This has changed in recent years as knowledge became available in numerous channels and the role of the lecturer had to change. The importance of demonstrations and experimenting with the material taught has risen and thus the hours dedicated to lab work in colleges and high schools is increasing all the time. For example, In the technique of flipped classroom, the students (or pupils) are exposed to the theoretical background whether via textbooks or videos before the meeting in

class and the lecturer uses the time in class to practice the knowledge rather than to teach new material. This method is now very popular both in college teaching and at high schools. A second method of productive failure (and its' close relatives Predict-Observe-Explain and Toulmin's Argument Pattern) suggest that the lecturer starts by asking questions even before the students have basic knowledge on the subject at hand. Thus, by learning from the mistakes of ourselves and others we understand what we should or shouldn't do when solving a specific problem. A third approach is Problem Based Learning (PBL) (Santana & De Deus Lopes, 2024; Mills & Treagust, 2003), where students are faced with a problem, and they study the laws of physics not as a theoretical subject but rather as a tool to help them solve the problem. This tool is rarely used in class as pupils tend to think that what was right for a specific problem will be true for all problems and fail to see what can be generalized and what cannot. College students, however, are expected to have higher abilities in using specific problem to understand more general cases and for them many times the approach reaches a higher level of Project Based Learning (again PBL) that is not applicable for most high school pupils as their cognitive level is not advanced enough.

## **2. Teaching New Material**

When teaching new material, the teacher must take into account the previous knowledge of the pupils and their expected abilities. Some teachers spend the first couple of lessons reminding the pupils of things they have already studied (and might have forgotten). In college teaching usually lecturers refer the students to specific sources and do not spend a lot of time or repetition. Most lecturers these days use presentations, videos, and simulations to pass the knowledge to the students while, according to my experience, high school teachers still prefer to use the whiteboard and as little technology as possible. The college lecturer today is more of a mentor and less of the teacher, as the students learn new material under his guidance. This is less suitable for many old schoolteachers and for most pupils that are not as independent as college students in performing tasks.

## **3. Grading**

In high school and in college the teacher can give as many home-assignment as he/she wants but in high school there're usually 2 exams during the semester, equally important while in college there's one final exam that has the largest impact on the final grade. In college the grades are set on a scale of 0 to 100 and if someone does not perform any task, he/she will receive a zero. However, school kids are a more delicate population and there's a fear of what a zero might do to the pupil's confidence, so the lowest grade given is a 40, which is a failure but still gives the pupil some hope (e.g., if the second grade is an almost good 70 the average is 55 which is usually a pass). The latter is part of the Social-Emotional-Learning (SEL) approach that tries to understand that children are children and thus must be handled more gently than adults. In college if the average grade is too high in the final exam, in many cases the lecturer has to explain what has happened to his/her superior (was the exam too easy. Did the students succeed in copying, etc.) but in high school if the average grade is too low in any of the exams the teacher has to explain what has happened to his/her superior.

## **4. Feedback**

In college teaching it is much easier to obtain feedback on the quality of teaching since there's a working feedback system and the students are adult enough to answer all the questions properly. It is much harder to apply this in high school since the pupils are all

teenagers and their ability to give reliable answers is limited. They are also afraid many times to speak their mind and even to participate in anonymous polls as they do not believe they are really anonymous. Therefore the teacher has fewer external tools to improve himself than the lecturer and he must rely on his intuition.

### Insights on Being a College Lecturer

Since I began teaching college students I taught many subjects in many fields, such as electronics, optics, communication systems, semiconductors, and software engineering. I taught in two universities and three colleges and taught in the classroom and from a far (during the Covid-19 plague). I've tried the classical teacher-stands-and-talks approach as well as flipped classroom and productive failure. From this experience I derive some of teaching in college advantages and disadvantages as shown in Table 1.

Table 1: Advantages and Disadvantages of College Teaching

| Topic            | Advantage                                                                        | Disadvantage                                                                       | Remarks                                                                           |
|------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Syllabus         | Can be changes to coordinate with other courses.                                 | Once it is published you can't change it.                                          | There's some control of the Council for Higher Education on the subjects.         |
| Teaching methods | Completely flexible, PBL, flipped classroom etc.                                 | Most of lecturers still write on WB.                                               | Students always expect more than they get.                                        |
| Grading          | Can give any grade and choose between evaluation methods.                        | If someone fails the final test, home assignments can't help them pass the course. | If grades are too high the teaching committee checks the exam.                    |
| Feedback         | Lecturers can see where they can improve their teaching and decide how to do so. | Personal opinions might corrupt results if overall number of students is small.    | There is a feed-back system that works the same in all universities and colleges. |
| Attendance       | Up to teacher to decide whether required or not.                                 | If there's extremely low attendance lecture must be recorded.                      | Labs require attendance but most other courses do not.                            |
| Flexibility      | Teachers can build their own course, within academic limits.                     | Method of evaluation can't be changed once posted.                                 | Within college definitions.                                                       |

### Insights on Being a Schoolteacher

I am new to school teaching. I mainly teach 10th grades ray optics and basic kinematics, but I also teach 9th grades in a special plan for pupils who excel in mathematics and want to start their kinematics in an early stage (other 9th grades just study basic energy calculations). From talking to other teachers and from my own short experience I may point out several advantages and disadvantages of teaching in high school as shown in Table 2.

Table 2: Advantages and Disadvantages of High School Teaching

| Topic            | Advantage                                                                    | Disadvantage                                                                                         | Remarks                                                               |
|------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Syllabus         | The emphasis on subjects is flexible.                                        | Very strict and the teacher has no say.                                                              | Ministry of Education defines the syllabus.                           |
| Teaching methods | Flexible, conventional, constructive failure, flipped classroom etc.         | Method can't be too advanced.                                                                        | Most pupils are unable to be completely independent.                  |
| Grading          | Home assignments can make for bad test results.                              | Can't give less than 40.                                                                             | If grades are too low the headmaster speaks with the teacher.         |
| Feedback         | Teachers can change the approach they use to fit the specific class.         | Pupils do not give formal feedback, making it hard to know what the majority of pupils want or need. | The feedback in high school is usually from above and not from below. |
| Attendance       | All pupils must attend.                                                      | Difficult to keep up if one misses class.                                                            | Studying is mandatory until the age of 16.                            |
| Flexibility      | Teachers can build their own course, within limits of ministry of education. | No flexibility in hours, headmasters do not support novelty.                                         | School hours and room assignment are very non-flexible.               |

Another main difference between being a college lecturer and a high school teacher is the non-academic issue of salary versus investments. High school teachers must teach at least 24 hours per week for a full position while college lecturers need only to teach 12 hours per week for a full position. When you add that a full-time teacher makes less money than a full-time lecturer, one may understand why so little good educators do not choose to teach in high school.

### Long Life Learning Benefits

The main purpose of Long-Life Learning (LLL) is to teach college students the state-of-the-art tools that will help them succeed in the industrial world when they finish college. However, the continuity between high school education and college education is not less important. In recent years the will to allow more pupils from the periphery to have a full matriculation has caused a decrease in the level of science teaching in schools around the country while the demands of the colleges and universities remained the same, making an almost impossible barrier for average pupils to succeed as students. The purpose of LLL in this connection is to bridge over these difficulties by smarter teaching techniques and methods in high school. If more college lecturers will become schoolteachers, they will be able to build a strong teaching bridge between the two worlds

### Conclusion

In this paper the author described his own experience as an undergraduate electrical engineering college lecturer and a high school physics teacher. The author describes the similarities and differences between the two positions and the advantages and disadvantages of both. The author hopes that pupils will benefit from the teaching knowledge college lecturers bring from college and understand the aims of the different subjects taught. The author also hopes that understanding the basic problems of school pupils will help in

improving the teaching of undergraduate students and that more college lecturers will follow him.

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