

Undergraduate Practical Teaching Exploration -In the case of ESIGELEC(France)

Lin Chen* and Ying Lyu

College of Optical & Electronic Information Engineering, University of Shanghai for Science and Technology, Shanghai 200093, China

*email: linchen@usst.edu.cn

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Abstract Scientific quality refers to the ability that people relate to science which can be used to participate in scientific activities to solve scientific problems, which is an important indicator to measure nation's scientific and cultural growth. As the main force of engineering, for a better society undergraduates are eager to improve their scientific quality. From the view of Electronic Embedded System, this article analyzes some disadvantages of traditional teaching method, puts forward a brand new teaching method that concentrates on four areas namely "Active theoretical teaching method", "theory with practice", "Experimental teaching in small groups" and "Performance Evaluation" "The cooperation between lab and companies", "Increasing English teaching method, mix the students of foreigners and Chinese", "Put internship as a part of curriculum" which improves students' scientific quality effectively.

1. Introduction

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

ESIGELEC has More than 1650 students. It has 5 departments: Information Technology, Electronics and Telecommunication, Electrical Engineering and Energy, Embedded Systems and Instrumentation, Humanities Languages and Management and 8 labs. 16 dual degree programme: 3 Manager-Engineer double-degree programs (in partnership with NEOMA BS, AUDENCIA, TELECOM MANAGEMENT SCHOOL), 12 dual degree programme abroad (USA, IRLAND, GERMANY, CANADA, UK, DANMARK). School supported by the Chamber of Commerce and Industry of Rouen (CCIR) and managed as a non-profit association by an Administration Council, including representatives of: the Alumni Association (SIGEELEC), local public bodies (Chamber of Commerce and Industry of Rouen, Regional Council, Greater Rouen – CREA), companies (Aircelle, EDF, France Telecom, Synchronic, Thales Air Systems, Valéo and UIMM), and higher education (University of Rouen, Institute "Mines Telecom"). Also provided masters programme fully taught in English: 2 Masters in Sciences and Technology, with a speciality in "Electronic and Embedded Systems" or a speciality in "Information Systems", and an MSc [1-4].

This article takes Electronics Embedded System as an example to clarify how ESIGELEC engineering school does improve their students 'practical ability and innovation. School's curriculum highlights the theoretical and practical teaching method, focus on training students' problem-analyzing and problem-solving skills, enhance the students 'practical ability ,create a solid foundation for the future work of embedded engineering design, integrated circuit design and development work like software development [5-7].

2. Problems in traditional teaching

Compared with the abroad' concept of education theory and practice teaching method, traditional teaching problems mainly behavior as follows:

2.1 Class atmosphere is not lively

At present, China's university classroom teaching is still largely following the cramming school teaching methods where teachers teach and students learn from it. It leads to passive learning by students. Students lack the initiative that they do not use their knowledge into real work.

2.2 Resource Constraints

Our teaching is mainly theoretical -based, supplemented by experiments, the students had just started practice, experiment class is over, and except class time, students are not allowed to enter the lab to review.

Probe the reason is that limited laboratory, limited circuit board, and the school cannot guarantee the rational allocation of resources. Because of the completed soldering circuit board prices are generally more expensive, students do not have the economic capacity and there is no pressure in the experimental task, due to these reasons, it cannot guarantee that all the students would buy the board consciously and do efficient experiments.

2.3 Number of Students

In our domestic classroom, assuming that one class has 50 students, if a student has a problem, the teacher is unlikely to solve the problem during teaching time, instead of asking questions after class, because students less likely interrupt the teacher when they are teaching. Other aspect is too much students in classroom, interrupting the teacher means delay others getting more knowledge in case of teacher will spend more time answering questions. In the meantime, the teacher's teaching progress will be delayed as well.

2.4 Stress on theoretical teaching

In China's classroom, written exam always occupy a higher proportion of the final scores. This leads too many students sleeping in the class, but still be able to get good remark at the end of the term and lacking practical knowledge. Why has this happened? As the basis for written exam comes from book knowledge, students can just review books and remember some key points then they will get good score, the pity is that memories are too short; they couldn't get deep impression via practice and the problem solving process. As a result, most students could not remember the concept they learned before, the mastery of knowledge is uncomprehensive and there is a need for scientific and practical approach.

3. Useful teaching methods abroad

3.1 Hybrid of theoretical and practical teaching method

In classrooms abroad, taking Electronics Embedded Systems as an example. Before the first class begins, the teacher provides student with the liberty to ask questions without any hesitation so students always ask question during classes instead of keeping them in questions. In this case, it has an advantage that when teacher answers the questions, other students would focus on this problem and make a deep impression in their memory. Most importantly, if one student posts a question, others would follow to ask. Then the atmosphere of class becomes lively.

During the break, if the students have some doubt or suggestions, they can feel free to talk with teacher for longer time, sometimes professors would introduce their own projects to the students, and then one could take part in the project and gain recognition from the professor. It would become an open environment for learning.

3.2 Theory with practice

Take Labview, which is one subject in Electronics Embedded System as an example, students having their classes in lab. The professor gives lesson in the first two hours of morning, she would introduce how to open the interface of Labview and explain the function of each blocks via PPT. Then the students should finish exercise 1.1 according to the corresponding guide by step by step.

This would let students get the basic knowledge of Labview and get familiar to the usage and function of each element of environment. Students who have finished exercise 1.1 should finish exercise 1.2, which only has questions with no procedures and help tips. Students have to think how to draw circuit for their own design based on exercise 1.1. During experiment, professor always answers any questions that is put forward by students so problems can be involved using exercise steps or debugging. Four hours passed, a majority of students can easily use some electronic elements. Two weeks past, a small part students can make their project running a calculator.

3.3 Experimental teaching in small groups

It is very common to have group activities aboard. It is usually of 2 or 3 students as a group. Such as embedded C courses, each team was assigned a circuit board. The advantage of working as group is that it can promotes the students to discuss together and learn from each other; this will built students team work spirit. When students work in a team in future, the trust plays an important role in teammates. The group leader always thinks highly of it as this will boost working efficiency and make project moving faster.

3.4 Performance Evaluation

In the course curriculum, basically test scores only take fifty percent to sixty percent of the total score. Experimental courses accounted from forty to fifty percent, attendance accounts 10 percent. Based on this assessment of the proportion, students treat experimental classes seriously; even pay more efforts to review it after class.

3.5 Increasing English teaching method, mix the students of foreigners and Chinese

In France, most lessons are taught by French professors using French. But a small part of lessons are taught by English. In this English class, there are some foreigner students who takes part in. English teaching, not only improve students 'specific English, but also promote the communications with Chinese and other countries' students. Let them know more cultures. It is also a benefit for them working in a world culture environment enterprise. This provides platform for growth of interpersonal and intercultural skills. For example, the student who has never known India culture would invite Indians to eat beef, which makes visitors feel embarrassed.

3.6 Put internship as a part of curriculum

It is not permitted to do internship during study term by some universities in China. However in abroad, engineering school require students do the internship in the final year, it will be 4-6 months. Students get an experience of working as an engineer, get an overview of how will the work environments be like. What kind of abilities should have before working? Maybe after internship, some students will get the new idea of choosing career in their life.

Students can go to job fair or apply online to find internship by themselves. Engineering schools have 5 years study. Student should do internship every year in summer holidays. The first two years one can find internship which has less relationship with major. But the last three years forced to find internship in the similar field with your major. And the last year, after 4-6months internship students should finish internship report and give presentation in ESIGELEC. During the internship period, professor would go to the company in person for research.

Campus learning and working has a certain gap, so internship is needed to connect with both. From this perspective, internship is not just a bridge, but also a key step to enable students to adapt to society. After internship, it has a good meaning to give a presentation based on internship report. From a perspective of the company, interns always do research for a team which is the future jobs that the team will meet.

For example whether the board under a new software environment can run is a big issue. So the team will ask an intern spend half year to do research of it. For companies, when the team goes further, they will have information that can be referred (intern papers), this will help the team to save time and cost.

Meantime, students themselves get more experience form internship. They put their knowledge into practice and finish their own project. It also has good advantage for the Universities, the final presentation and report would introduce a lot of new things to the schools which could give a new way of teaching.

4. Summary

Universities' aims are cultivate the students who have qualified scientific quality, including innovation, problems-solving skills, determination, teamwork spirit, and enthusiastic of working in their fields. Improving teaching method, leading them to a better way of learning, can let our students performing better on their stages.

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