Theoretical Overview on the Improvement of Interest in Learning Theoretical Course for Engineering Students

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Abstract

The phenomenon that engineering students have little interest in theoretical knowledge learning is more and more apparent. Therefore, most students fail to understand and apply theories to solve practical problems. To solve this problem, the importance of improving students' interest in the learning theoretical course is discussed firstly in this paper. The definitions and essence of interest are also studied and discussed. Secondly, the challenges that most teachers have to face when they carry out teaching activities are analyzed. Then, the theorem of Kolb educator role are discussed and applied to solve the challenges. Finally, the corresponding role that teachers should play when they face the different challenge is presented and some effective approaches on improving students' interest are provided.

Keywords: fostering interest, theoretical course learning, Kolb educator role profile

1. Introduction

As we know, interesting is the best teacher. Many researches have proven the importance of interest in learning activity. Siegle (2009), the president of National Association for Gifted Children in U.S., and his colleagues have been studying student achievement and factors that predict whether or not young people do well in school. In their studies, three factors interact to form an achievement-orientation attitude. One of factors is that successful students find the learning task meaningful. They are interested in the task or see a purpose to it. Then some other surveys were conducted. The results proved that there was a strong, positive relationship between students' interest in a talent area and their assessment of their skill in that area. Students do well in talent areas that interest them. Interest is more related to performance than students' beliefs about the importance of effort or natural abilities. Meanwhile, Gardner and Lambert (1959) and Gardner (1985) have provided extensive descriptions of the factors in social psychology influencing language learning. A key element of their theory is that good learner holds an interest either socially or psychologically. In Zhao (2002) and Yang's (2008) researches, they respectively noted and suggested that developing students interest in English is the significant role to change the case of the high investment but low efficiency in English learning. Therefore, there is nothing better than improving students interests for active learning in all learning areas and for all level students. The similar question arises as to how make engineering students become interested in theoretical learning which is far from their concepts about engineering. Sometimes, there are no corresponding experiments and there is not any advanced device needed to be used in theoretical courses. In the process of engineering education, many students prefer to make experiments rather than theoretical learning. For this problem, this paper discusses the challenges in engaging students' interest in theoretical courses and proposes some approaches. The definitions of interest are discussed simply in Section 2. The challenges and approaches of improving interest are presented in Section 3 and Section 4. Conclusions are shown in Section 5.

2. The Understanding of Interest

Krapp et al. (1992) proposed that there are three definitions of interest, including personal interest, situational interest, and interest as a psychological state. Elliott (2005) noted that personal interest is seen as a relatively stable and enduring characteristic of an individual. Situational interest is more transitory and is elicited by

conditions in the environment that focus attention and generated act. For the theoretical course, the interest means the intrinsic motivation and the passion to find out the inside reason of object variation. Many students are encouraged to learn by drill because it is believed that they interest in study. However, the fact is that the initial interest may be totally lacking for most students. At this time, an important goal for teacher is to raise motivation (Printrich & Schunk, 1996). To enhance intrinsic motivation, attention must be given to the four areas: challenge, curiosity, control, and fantasy (Lepper & Hodell, 1989). Consequently, a teacher's role in the development of interest on the part of students appears to be even more important due to the authoritative position of the teacher in the Chinese culture.

3. Challenges

In the mayor of engineering, there are three main challenges to engage interest in theoretical course learning, including the deficiency of connection between theory and practice, abstractness and logicality, and high level learning outcomes. Each challenge is discussed detailed as follows.

3.1 Deficiency of Connection between Theory and Practice

Engineering always makes students think of labs, experiments, machines, technological devices and so forth. In the class of engineering, students maybe measure physical parameters with some tools, draw diagram by computers, or mix reagents in glass container. In fact, all engineering must have their basic theories that must be understood before making practice. The theoretical course is more basic, monotonous, and universal. Sometimes, a certain theorem could even be applies to many sciences. In other words, it is hard to find the direct connection of theory we study to the practice we use in our lives sometimes. Taken the student with electronic engineering as an example, they are interested in electric circuit and Field Programmable Gate Array (FPGA) that are the intuitive reflections to the devices (e.g. mobile phones) they use very day. For other theoretical courses such as signal and system, communication system principle, they are confused that why they need to study these courses which are seemed too little connection with taking a call.

3.2 Abstractness and Logicality

The second challenge of theoretical course learning is abstractness and logicality. There are full of theorems and formulas in the theoretical courses. It is hard to remember them, understand them and utilize them to solve the real problems. The base of good understanding on these theorems and formulas is being good at mathematics. The students should be able to think abstractly and logically, recognize the intrinsic meaning of those parameters, and organize the scattered knowledge. Fortunately, many students lack of these abilities initially. Though they work hard, some principles are still hard to be understood. Then they lose their interest gradually if they always feel frustration.

3.3 High Level Learning Outcomes

The third challenge of theoretical course learning is that how to achieve goals, which are with different levels. The basic requirements of theoretical course are to remember and understand lots of theorems. If students lack of interests and attempt to remember them forcibly without any understanding, they maybe feel that it is too difficult and boring. The high level learning outcome is utilizing theoretical knowledge to solve realistic problem. Each group should accomplish an assigned project. Many students do not recognize the connection between theory and practice. Therefore they are not able to apply theory to practice. The outcome of designing a project is much higher than the level they can reach. Therefore, they may choose to give up although they are interested in this course at the beginning.

4. Approaches

4.1 Teachers Role Profile

The educator role profile offers a holistic typology of educator roles based on experiential learning theory (ELT) by Kolb (1984). ELT draws on the work of prominent 20th century scholars who gave experience a central role in their theories of human learning and development to develop a dynamic, holistic model of the process of learning from experience and a corresponding model of adult development. The Educator Role Profile (ERP) describes four role positions-Facilitator, Expert, Evaluator and Coach. Educators play these roles as they help learners maximize learning by moving through the four stages of the experiential learning cycle. To solve the different challenge mentioned before, teachers should play different roles and the corresponding approaches should be adopted to cultivate students' interest.

4.2 Coach Role

Students often complain that there are lots of formulas and the course is theoretical too much after they glance at

the textbook. When they think the theoretical course is far away their future jobs, teachers should play the role as a coach and be sensitive to students' thoughts. In the coaching role, educators help learners apply knowledge to achieve their goals. They adopt a collaborative, encouraging style, often working one-on-one with individuals to help them learn from experiences in their life context (Kolb 1984). They assist in the creation of personal development plans and provide ways of getting feedback on performance. The theoretical course teachers should let them know the value of courses, and foster students' interest. Teacher need to organize course well to make students to know there is nothing more practical than a good theory. Meanwhile, they could share their research experience and the state of art to make their students be curious to the science technology. Once they are interested in this course, they will be enthusiastic and study actively rather than passively.

4.3 Expert Role

The theoretical course, which is always full of formulas and equations, makes students confused, and then they lose interest. At this time, teachers should believe that playing expert role is very important. In their roles as subject experts, educators help learners organize and connect their reflections to the knowledge base of the subject matter. They adopt an authoritative, reflective style. They often teach by example, modeling and encouraging critical thinking as they systematically organize and analyze the subject matter knowledge. This knowledge is often communicated through lectures and texts (Kolb, 1984). Teachers are interested in and concerned with the quality of their lecturing and make every effort to improve the quality of students' achievement in course. It is important that the structured and organized lecture must be logical. Diagram and flowchart can be utilized to make the knowledge clear in class and to help students become aware of the implication of the courses subject matter in their lives. Taken communication system principle as an example as well, one main objective of this course is to know how to transmit information. The carrier of information cannot be seen and cannot be touched. It is preferred to utilize the simple similar and familiar case in our life to explain the abstract techniques and theorems. Furthermore, taken the technique of modulation as an example, when a modulation signal is needed to be transmitted far away, it likes a person wants to travel far away. If he chooses to go on foot, it is an impossible mission no matter how strong he is. If he takes an airplane, it becomes so easy. In other words, the technique of signal modulation means that let the modulation signal take an airplane so that it could be transmitted far away. Also, teachers maybe coordinate different activities well, group discussion, utilizing simulation software to help student imagine the way of information transmission.

4.4 Evaluator Role and Facilitator Role

Different achievements are required in the different study stages which may cause different level students interest. Educators should play the role of evaluator to protect the spark of interest. As a standard setter and evaluator, educators help learners master the application of knowledge and skill in order to meet performance requirements. They adopt an objective results-oriented style as they set the knowledge requirements needed for quality performance. They create performance activities for learners to evaluate their learning. For the low level outcomes such as remember and understand a certain theory. At this time, teachers may prefer to deduce on board rather than using slides. Thus, students could follow teachers' thinking and logical processing. Students could find the essence of these theorems and feel sense of accomplishment during the deducing. Therefore, one of assignments is to hand in the scribe note in electronic version. This assignment has three functions. Students do not know who might be chosen as a scriber before the class ends. Everyone must pay more attention on the course and their interest is accumulated gradually. Secondly, the thought provoking ideas should be present in students scribe note and be shared with classmates. Thirdly, students are trained to write science literature normatively and learn to use specialized software to input formula. Other case is that some students' interest deteriorates by the high level outcomes such as designing a new communication system. At this time, teacher should be a facilitator to help learners get in touch with their personal experience and reflect on it. They adopt a warm affirming style to draw out learners' interest, intrinsic motivation and self-knowledge. They often do this by facilitating conversation in small groups. They create personal relationships with learners. Teachers provide a safe space for students to talk about their thoughts and opinions. Teachers just remind students to come to them for help and assist to make their works become more perfect.

5. Conclusions

The interest is the most important factor to learning. The features of theoretical course make students' interest go away. In order to help student foster interest in theoretical course learning, this paper analyzes the challenges of theoretical course learning that are also the reasons why students lack interest. The four role profiles of educators are discussed. For each challenge, the corresponding role which should be played as by educator is provided and some useful approaches are proposed to help teacher foster students' interest. The approaches proposed in this

paper to foster students' interest are based on the theorem of Kolb educator role profile. Choosing a correct educator role is very important for a teacher, when he or she faces to the different challenge. In the future work, we will discuss various methods in detail and their effects on proving the study interest based on the survey data.

Acknowledgements

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