Creating a Autonomous Learning Classroom Environment for Students Based on the Basic Electronics Course

Guojun Zhou^{1,a}*, Hongyu Zhao^{2,b}

¹ Department of Basics, Dalian Naval Academy, Dalian, China
² Department of International Military Exchange, Dalian Naval Academy, Dalian, China
^azhou.guojun@163.com, ^brich4@sina.com

Keywords: Knowledge; Classroom; Autonomous learning; Basic electronics; Instructions

Abstract. Given the characteristics of our times, the development trend of Teaching Designing Disciplines, and the limitations of traditional classroom instructions, this paper discusses the creation of autonomous learning environment with an aim of helping the development of learners capabilities and meet the requirement of our times. By selecting the appropriate instruction contents and establishing the problem setting of autonomous learning, the atmosphere of autonomous learning can be created and the time of autonomous learning can be provided, and finally the evaluation of the effect of autonomous learning and the further exploration of the classroom instruction of basic electronics are also reviewed in this paper.

Introduction

According to American psychologist Buss's research, half a century ago, about 70% of the knowledge acquired at colleges could usually be useful until retirement. Today, the percentage has shrunk to only 2%, this means 98% of the knowledge and skills have to be acquired from the world outside of colleges. Thus, if colleges are to educate the people needed by the development of its times, colleges should adjust themselves in its curriculum and instruction methods, develop the autonomous learning skills of students to make the students meet the needs of their times and autonomously learn the new skills to fit the development.

The basic teaching procedure of autonomous learning

Autonomous learning is the learning reflects learners' subjectivity. Autonomous learning is constructed based on learning related humanism, constructivism, and subjectivity education theory. Its main objective is the liberation and development of individuality of learning, the experience of classroom activities as well as the improvement of autonomous learning skills.

The teaching mode based on autonomous learning is constructed under the guidance of new education concepts, it has easy to apply. From the procedure, we can see that instructors play the leading role in the autonomous learning process. Under the guidance of instructor, the students actively participate, learn, construct, develop and perfect himself or her. It is the natural trend of modern classroom instruction transformation and the soul of education for quality to develop the students' initiative of autonomous learning, active learning, and skills of learning how to learn by developing the ideas, habits, ability and methods. The current problem we are facing is not that the concept couldn't be accepted by people, but how to change the ideas into actual practice.

The following phenomena are likely to occur in the activities of autonomous learning:

Autonomous learning only stay at the superficial level. Instructors worry that the progress of a course will be affected if students are left completely to themselves. With this idea in the instructor's mind, autonomous learning is just scratching at the surface, a kind of decoration for class.

The directing of students' autonomous learning is neglected by instructors. Autonomous learning has become free learning and the result of which is the stalemate of students' autonomous

learning skills, and autonomous learning is only a superficial activity, this is an urgent problem needs solving. The following is the my experience of placing the autonomous learning skills as the priority in the course of Basic Electronics.

Creating a classroom environment of autonomous learning for the course Basic Electronics

Selecting the right contents for autonomous learning. Basic Electronics is a course which involves lots of hands on practice. It's main activities include, with instructor's guidance, the students should understand the basic concepts, circuits, analyzing methods, and gradually form the engineering concept. This course is different from other basic courses, for example, mathematics. In mathematics, if you have learnt that 1+1 = 2, then you understand that 1+1 will always be 2. But the course Basic Electronics is different, if conditions change even a little bit, the same simulation circuit will give different result. Therefore, this course is relatively difficult to teach, and the students will also encounter great difficulty in learning it.

Since simulation circuit course has its own particular disciplinary features, not all the contents is suitable for autonomous learning. This demands the instructor to pick out the subjects which are fit for the students' autonomous learning after a careful analysis of the course in teaching designing. This picking out will be a key link in deciding the smooth progress of autonomous learning. Some abstract concepts, like the movement of carrier of semiconductor, the working principle of amplifier, are not fit for autonomous learning. The suitable contents for autonomous learning should be those that are related to students' daily experience and could be easily understood. For example, DC power supply, oscillator, power amplification circuit. In other words, the selected subjects by instructor should be able to arouse students' interests, and those which can be understood by using what they have learnt in the autonomous learning process, those can provide many reference resources, those can be proved by emulation experiment.

Set up the problem scenario for autonomous learning. Based on teaching objectives and the actual situation of the students, The problem scenario could be set up for the acquisition of new learning subjects. In the meanwhile, the materials for actuating the students to learn should also be presented. The problems could be used to form the skill developing guideline, all of them could be used to set up the problem scenario. Under the condition of fully understanding of the learning objectives, students can begin autonomous learning by following a clear path.

From Piaget's cognitive development theory: Set up a problem scenario which can help to make one to employ original cognitive schemata, by effective feedback, the students could find the existence of imbalance and fully experience the existence of conflict. They could give up the attempt to follow the original schemata and analyze the cause of failure in new scenario and begin to set up new schemata to achieve new balance.

Creating the classroom atmosphere of autonomous learning

Owing to the cognitive capability of the students, they are likely to be at a loss what to do in autonomous learning. Therefore, the instructor and students should go together, and progress together. The instructor should neither substitute learning with teaching nor let the student wander freely without any guidance. The instructor should closely monitor the students' performance, timely pep up the students' learning enthusiasm, accordingly adjust help the students adjust learning methods, assist the students to solve problems and difficulties, control learning process, and provide adequate and appropriate directing, guiding, and demonstration. The instructor should truly become a guide, organizer, cooperator, participant and facilitator. All of these can really contribute to the creation of classroom atmosphere for autonomous learning. The following are the methods for application. Create the atmosphere of free, equal and harmonious class to make the students free of repression; direct the students in class self-learning, organize students learning activities, change the lax attitude of the students in class unless there is a lecture by instructor; continuously challenge the students to debate so as to create the active thinking situation; drive the student to think, explore and use what they have learnt to settle the problems they are facing, so that they may also develop a

good habit even outside of the classroom. encourage the students to express different views, especially those are different from what the instructor said and what is written in the textbooks. Make the students change the idea that instructors and textbooks are always correct. The students can have the courage to get rid of the limitations of conventional thinking and develop divergent thinking and creative thinking. For example, in the chapter of DC power, the instructor first raise questions to the students for further finding: what is the usage and composition of DC regulated power supply? How to calculate its main technical parameters? How to use the integrated stable voltage circuit? After those questions, the students are organized for after class self-learning and group discussions. Finally, each group will send a representative to give a presentation based on the PPT provided by the instructor, during the presentation, the other students may raise questions. If necessary, instructor can cut in by questions to lead the direction of thinking and progress of discussion so as to keep the related activities to the point. From all those activities, the students have learned to find problems and improved their skills of analyzing and problem solution.

Provide students the time for autonomous learning

The in-class autonomous learning activity should provide the students enough time for reading, adequate space for thinking, more chances for practice. Under this condition, the students select the learning subjects, learning partner, learning mode, all of those will lead to learning results. How could the students' learning time be guaranteed? How could the learning time be guaranteed? The most practical method is squeeze from the instructor's instructions. The instructor should carefully raise questions, precisely provide solutions, and succinctly sum up. In class, students should play the leading role with an aim of promoting the self-learning capabilities and autonomous development. The students will read and understand all by themselves under the proper guidance of instructor. The following are the types of explanation I have used in class:

Suggestive explanation: the purpose is to lead the students to the right path. Interpretative explanation: the aim is to clear all the obstacles the student may not be able to overcome by themselves. Supplementary explanation: the objective is to direct the student to go further and higher.

For example, in the learning of series DC voltage stabilizing circuit, the students know the working principle from textbooks, the instructor will start from explaining parallel stabilizing circuit, to emission follower, voltage series negative feedback, finally to series DC stabilizing circuit to help students understand that the above mentioned circuits are the integrated application of what they have learned. By shifting the knowledge, the students will have a better understanding and use of the new subject. This practice not only helps review the contents of the previous chapters, but also deepens their understanding of new contents. Through the cooperation between instructor's directing and students' autonomous learning, the students can build their confidence and develop their interest in learning the simulation circuit. This method can turn the passive learning into active learning, forced learning into desiring to learn. It can also explore the students' potentials, improve learning efficiencies and become the master of their own learning activities

The Assessment of the effect of autonomous learning

In autonomous learning, the instructor should timely establish the feedback mechanism and assess the effect of autonomous learning in various methods, for example, checking, questions or writing on the blackboard, to know the quality of problem solving and the effect of autonomous learning. For those items that are not quite understood by the students, instructors could help by directing, multi-exercise so as to achieve the teaching aim. However, it is not practical to assess each student in a large class, the assessment could be done by means of instructor's assessment, students' mutual assessment as well as the assessment by student him or herself. This can not only protect the learning enthusiasm of the students but also help cultivate their confidence. For example, the brief summary made on each section of classroom can usually done in the form of group discussion, which can not only help each student learn sth. New, but also help students develop summarizing skills and oral expressing skills. After each quiz prior to class, the desk partners can check each other's performance. The assessment process not only help learn to listen to other people's opinions, but also help develop their logical thinking, at same time, develop the students' enthusiasm of participating in discussion as well as experience the feeling of good achievement.

Conclusion

Classroom instruction is a process demands continuous exploring and summarizing and contributing creative ideas. Classroom is not only for teaching new knowledge, but also the means to develop the way of thinking, improve students' innovative capabilities as well as the basis of other teaching activities. Therefore, classroom instructions, to a great degree, reflect the quality of education. As an instructor, he/she should have a strong sense of responsibility, continuous upgrade his/her teaching philosophy, keep improving his/her professional skills, always update instruction contents, adjust the method of teaching, improve teaching methods. An instructor should be fully aware that autonomous learning is not a kind of decoration, not a free floating of students, but, under the directing of instructors, of ordered, disciplined and carefully planned activity. All teaching activities should be based on the autonomous learning of students, with an aim to let the students to play the leading role. It should integrate the individual exploration with the cooperation of group members and develop the enthusiasm of each student, cultivate the subjectivity and creativity of students, application capability, spirit, and communication skills. It should not only help the students to understand the subject, but, most important, they learn how to learn well, which will help the students to acquire the capabilities of raising questions, exploring and creatively solving problems.

References

- [1] Kang Guanghua, Basic Electronics(simulation section), Higher Education Press, Beijing, 2013. pp.213-227.
- [2] Hou Jianjun et al, Guiding Autonomous Learning and Promote the Interactivity of Learning Transformation and Teaching Transformation[J], Chinese Higher Education Research,2004(1):35-36.
- [3] Cheng Shuming. On Exploratory Teaching Mode[J], Chinese Higher Education Research, 2004(3):46.
- [4] Huang Xiangmin. A Brief Discussion of Autonomous Learning and Development of College Students[J], Nanchang Teacher's College Journal. 2010(5):59.
- [5] Yuan Weihua. On the Development of Students'Autonomous Learning[J], China Higher Education Research, 2008(3):23-25.
- [6] Li Aiguo, The Analysis and Solutions of Autonomous Learning Skills of Vocational College Students[J], China Electricity Education, 2012(3):41
- [7] Wang Yuxiao. Research on the Efficiency of Autonomous Learning[J], Suzhou Teachers College Journal, 2011(2):62-64.
- [8] Ge Qiufen. A Summary of Cooperative Learning Research[J], Social Psychology, 2013(3):124.
- [9] Ma Yan. Developing Autonomous Learning Skills of Emulation Software Application in Circuit Analysis[J], Value Project, 2011(8)229-230.
- [10] Liu Liang. Some Ideas on the Transformation of the Course of Basic Electronics[J], Technology and Market, 2013, 20(4)196-197.