Explore the Self-study and Personalized Learning Model
Online of the "Principles of Computer Organization"
Based on Constructivism

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Abstract: In recent years, with the conversion of the dominant teaching theory from behaviorism to constructivism, the body part of the learning process, the learner, is widely concerned. Many scholars at home and abroad and people in the educational circles treat the ability of the self-study and personalized learning as the ultimate goal of education. The rapid development of computer network technology provides the reliable material condition for the implementation of constructivist theory in teaching. The "online learning" technology established on the basis of computer networks is increasingly becoming one of the development directions of education which makes the network teaching, distance teaching possible. In this paper, the author explores the characteristics, the purpose and significance of the research, the theoretical basis and the research design and procedures of the self-study and personalized learning with the knowledge and experience accumulated in the process of research and development of Academic Support System.

Keywords: e-learning; constructivism; self-study; personalized learning

1 Introduction

Principles of Computer Organization is the compulsory course of the Computer Science and Technology Undergraduate which is one of the important core hardware curricula. Because this course has a certain abstract and complex nature, it has been a more difficult one to teach and learn. At present, the common practice is that teachers give the lectures using the network resources platform and students attend the lectures passively who can do some simple verification experiments. However, the process of learning for the students should not be passively absorbing ready-made conclusions of the books, but personally involved in rich, vivid thinking and going through a process of practice and innovation. To help students better understand and master the course content and an important link in the foundation, change mode of study, from his Lord, a single, passive acceptance of learning, to independent, diverse, active learning approach to explore changes in students self-learning and personality the capacity of learning is a pressing task[1].

The author believe that it's not by the guidance of a link of teaching to improve the autonomous learning ability, but all the links throughout the teaching process. Build the teaching and learning environment. Anyone (anyone), at any location (anywhere), at any time (anytime), both through the platform of network resources into learning activities in the past, but also to learn that he or she would like to learn any knowledge of (anything), 4 the so-called ANY[2]. Guide the students to develop the autonomous learning and personalized learning with different approaches to establish confidence in learning.

2 On the aims and significance

China's theory circles of education has taken place of the cognitive research of laws during the teaching process by the epistemological principle for years which makes the behaviorist learning theories prevail for a time. After 1990s, with the increasing popularity of the constructivist theory, the main part of learning, students, are paid much attention by linguistics experts at home and abroad, as well as teachers of various types of institutions at all levels. The development and perfection of computer network technology provides reliable material conditions for the implementation of the theory of constructivism in teaching. As Jeffries (1997) predicted that "the contemporary information technology is to open the door of teaching and learning for teachers and learners."

The concept of learner autonomy developed in 1960s, with the rise of cognitive psychology and humanistic psychology. Its research mainly involves the definition of
self-learning and its meaning, the level and principles of self-study, the theoretical basis for self-study, the factors of self-learning conditions which promote or constrain the self-study, the characteristics of learner autonomy, the role of teachers in self-study, the suitability of culture in self-study, the establishment of self-learning centers, as well as self-learning strategies, approaches, and so on[3]. "Self-learning, personalized learning" is based on people-centered concept of education and emphasized on the subjective role of a person. The ultimate goal of this model is to develop and enhance the capacity of self-learning students based on making full use of computer network resources.

Based on learning and combined with guidance, the autonomy and individualized learning model can meet the needs of the majority of students who can arrange the time and process of learning freely. Especially, with the development of computer network technology, depending on the on-line teaching platform of our school’s network-center which provides various of media resources, students can complete their education and improve their own abilities and qualities through independent study and individualized learning with the guidance of qualified teachers.

3 The theoretical basis

Within the constructivism-based assumptions for teaching reform, there is one widely used in the core ideas which is learning through the high level of thinking. Construct knowledge bases on the problem solving and the application process is also a process of construction.

Constructivism which is a branch of cognitive theory develops as the psychologists deepen the research of the learning process laws of human cognition and the modern educational technology extends and applies. It emphasizes the social foundation of the formation of human cognition and knowledge. It’s thought that human rationality is the product of the collective. Learning should not be based on the individual and not be divorced from social context and culture, but should study the social interaction between groups. Therefore, network resources platform should fully take collaborative learning mode into account and realize the continuity and development of the social and cultural experiences, and develop the sense of group awareness, the sense of rule awareness, the sense of belonging, the sense of responsibility and the skill of cooperation within interpersonal communication.

Constructivist learning theory holds that the human brain doesn’t passively learn and record the input information. Learning is the process of which the learner take the initiative to construct the internal mental representation. It doesn’t simply one-way input information from outside to inside, but is realized by the two-way interaction of the new information and the knowledge experiences of the learner, which is the interaction process of learner and the learning environment. Learning needs to construct the representation of things and its process. But it is not a direct replica of the outside world things and it’s built through the existing cognitive structure of the new information processing. In this process, each learner comprehends the new information based on the learning experiences and makes their own understanding. On this basis, constructivism also insists on that learning is a process of learner’s autonomy. During the process of learning, learners doesn’t absorb knowledge passively, but achieve the goal by a high level of thinking. The memories and information stored in the brain interact with the information received from the environment and then positive selection, organization, coding, storage and activation appear. Thus, take the initiative to construct the meaning with self-learning. This requires the students from passive recipients of external stimuli and the inculcation of knowledge object into the main body of information processing, knowledge of the active construction of meaning, the teacher from knowledge[4], and instill into the students who take the initiative to help construct meaning, the facilitator.

The new century, modern education and teaching ideas are mainly influenced by modern philosophy, constructivist learning concept, modern teaching ideas and so on. Education and teaching pay much attention to the development of people, even more to the care of people and the performance of people’s spirit. With the deepening development of informatization, digitalization and networking of society, computer and network technology has also been promoting in the field of teaching which provides the material conditions for the realization of self-study and personalized study.

4 Research design and procedures
4.1 The integration of campus network teaching resources platform

At present, our campus online teaching support system includes notification, schedule, tasks, academic achievement checking, e-mail sending, user directories modules and so on, which can help teachers complete the construction of network programs, publish teaching contents, organize various kinds of activities for discussion and communication and make the on-line test-evaluating of students and so on. It uses the teaching and network resources of our campus and strengthens the campus network to promote the role of teaching, which extends the classroom teaching to the network which provides a network communication platform for teachers and students. But, as for the positive state of the responsibility for self-study of students themselves, it doesn’t fully reflect.

In view of this, first of all, it needs to integrate the campus academic support system which can make full use of the platform, establish students information system of self-study online learning platform and of personalized student information, establish the profession and interest system of students. According to the actual situation of the professional provision of the Department of Computer Science, provide appropriate teaching resources, for example, the pipeline, RISC, virtual memory, multi-body cross-memory, access and so on will give an in-depth introduction in the follow-up courses. Here is just a brief introduction. As for the basic knowledge of the follow-up courses, much time will be spent in explaining and training. For example, interruption, instruction formats, addressing, floating-point, the controller’s basic structure and function, CPU's composition and working principle, the principle of supporting the work of memory and access, I / O devices, such knowledge points are treated as the teaching emphasis of principles of computer components. As for the teaching of computer main memory, focus on the established learning objectives, start from the actual operation, and guide students to get or verify the conclusions of relevant knowledge whose characteristics is emphasized on the cultivation of practical abilities. It’s suitable for comprehensive learning of components experiments or model design and so on. The above three learning styles, characterized by a common concern about the autonomy of students, emphasize the active participation, active experience and active exploring. For the teachers, change the classrooms for school. For students, change forced learning for active learning and change learning for how to learn.

4.2 reform the way of learning

Relied on the network resources, we advocate the following three types of teaching methods to achieve changes in learning styles, promoting the development of students.

1. Inquiry-based: On the basis of appropriate and reasonable teaching objectives, select appropriate learning resources (including teaching). According to the cognitive law of discovering problems, analyzing problems and solving problems, plan the processes of classroom learning activities for students and guide them to know how to learn and form the correct values while accessing independently to or using the knowledge and skills.

2. Experience-based: Based on appropriate teaching objectives, provide the processes of appropriate scenario, independent experience, mutual communication, induction and migration. Plan the learning activities of students and guide the students to know how to learn and promote the development of the correct value orientation while accessing independently to or using the knowledge and skills.

3. Practice-based: focus on the established learning objectives, start from the actual operation, and guide students to get or verify the conclusions of relevant knowledge whose characteristics is emphasized on the cultivation of practical abilities. It’s suitable for comprehensive learning of components experiments or model design and so on.

4.3 Improve the network resources for enhancing the role of students
After years of building, education support system has had some foundation, but a lot of online resources are just the digitalized version of the text books and audio-visual textbooks with single forms and dry contents which can't satisfy the students' demands of self-study and personalized learning. According to the feedback from the students, the students have gradually begun to adapt to the use of online learning resources to carry out self-study, but facing the online resources of simple content and single form, many students are very frustrated. Therefore, it needs to take the advantage of network, change the content and structure of the online resources, and increase the adaptability, feedback, selectivity and expansibility of online resources, which provides great convenience for students of self-study and personalized learning and improves the network resources for enhancing the role of students.

In order to improve the online resources for enhancing the role of the student, on one hand, learn independently with the instruction of the teachers. Make use of the multi-media technology and increase the interaction between teachers and students. Improve the plan of self-study and take the advantage of computer multi-media teaching, which can provide different ways of learning and different choices of contents for learning. It's convenient for students to learn selectively and step by step, which can arouse the interest of students for learning and improve the efficiency of learning. In addition, it is also of advantage to the training of information acquisition. Perfect the interactive teaching resources mainly of synchronous teaching, case analysis, exercises analysis, database of exercises, online self-test and so on and change the boring textual resources to create a user-friendly, interactive and riched in resources network learning environment to support the students for learning as well as possible.

On the other hand, a completely open and personalized learning should highlight the emphasis of timeliness, applicability and expansibility of network resources. The online resources have the advantages of timely updating, presenting various kinds of knowledge and tracking the trend of application and development of disciplines. Encourage students to use the widely received and used method to make teaching interaction, such as the web-based forum BBS, online classroom, online live chat, e-mail E-mail, SMS, video on demand at any time. Give the latest information of the teaching resources timely to students who are divided by major and interest and teachers will answer the questions in the self-study process timely. At the same time, combined with the requirements of Office of Academic Affairs about creative credits, determine the self-study credits, according to the time of online learning and the time of interaction during the period. At the end of each semester, determine the credits of the course or the extra-curricular credits. The following chart, Figure 1, shows the process of own learning and personalized learning model.

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![Figure 1](image-url)

Figure 1 self-study and individualized learning process for learning

It can be seen from the chart, under the platform in an interactive network resources personalized self-study students to learn how to make rational, scientific planning for their own learning and Internet resources allow students to have more autonomy in learning which can improve their ability of self-study and personalized learning.

5 Conclusion

In accordance with the requirements of the Division of Higher Education, "The institutions of higher learning should be based on the conditions of their own situation and students make full use of multimedia and network technology. Adopt the new teaching model to improve the original teaching model which is a single classroom-based model of teaching mainly by teachers. Make sure that students play a leading role in the teaching process. However, whether it is on machine learning, or classroom learning, teachers should arrange to provide sufficient guidance or instruction. " I take the responsibility of the Principles of
Computer Organization. During the teaching process of experiment, I always carry out the Ministry of Education's Teaching Requirements. According to the specific circumstances of students, make full use of computer network technology and adopt the personalized autonomous learning model to improve the ability of students, based on the constructivist theory. This kind of learning model can provide plenty of online learning materials, provide a large amount of time and space, provide easy and convenient ways of communication which can effectively stimulate students' interest in theory courses used to be considered as boring and promote the autonomy of learning.

References