

An Intelligent English Teaching Platform Based on Constructivism

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Abstract — The role of students increases considerably by the realization of constructive teaching method. To achieve autonomic learning of students, a tentative English teaching platform for the English majors is developed. The platform is designed according to the requirements of students and teachers. The modular design and implementation of the teaching platform is shown in the paper. It is characterized by project-based teaching task, digital teaching resources and visual teaching process. Experimental teaching has proved that the platform can effectively enhance the efficiency of teaching. The experiment results demonstrate the promising application of the proposed model in studying English and in supplying reliable data for the development of English teaching.

Keywords - English teaching platform; intelligent; visualization, constructivism

I. INTRODUCTION

Constructivist approach is a contemporary trend in teaching and learning and is gaining importance. The theory of constructivism teaching emphasizes that: firstly, the center of teaching should be students; secondly, teaching should cultivate the student's character of autonomy and cooperation [1]. In traditional English class in Shaoyang University, the students listen to the teachers and write down note, but seldom participate in presentation and group discussion. They are relatively negative in the process of learning. So it is necessary to figure out a new teaching pattern to enhancing students' involvement into active educational process. Implementation of an intelligent teaching platform in English teaching is a good solution. English teaching platform (ETP) fully makes use of the advantages of computer technology and Internet, providing comprehensive support for online teaching and learning. It is a new educational model accompanied by the development of English education and popularity of network. The ETP discussed in this paper is an intelligent platform for domestic university English education, providing comprehensive support for online English teaching. It is developed based on constructivism theory, aiming at establishing a software system with project-based teaching task, digital teaching resources and visible teaching process. It provides new teaching methods to enhance students' autonomic learning and to improve learning strategy.

II. RESEARCH BACKGROUND

With the development of new technologies, especially the development of Internet of Things, people attach great importance to building network teaching platform and educational cloud. Many typical software products which can be implemented in online teaching came into being. Some of the popular network teaching platforms are Blackboard, WebCT and Learning Spaces.

Several years ago many schools in the United States and other countries began to try to use the Internet for teaching. Some schools set up virtual universities. Now the network assisted teaching is applied in more and more schools. In many universities, it has become an indispensable part of teaching for teachers and students. Tom Kelly, global marketing director of Cisco Training, put forward an "e-learning" model which means "to train and learn through the network". He believes that the greatest contribution of "e-learning" is that it offers a variety of learning methods, and allows learners to get a fully selection [2]. Online education includes online courses and network teaching platform mainly used for higher education course management system [3]. Some scholars advocate blended learning in digital age. In a strategy of blended learning, traditional education will be adopted together with online learning technologies, e.g. learning management system, video broadcasting, desktop video conference, and interactive communication tools to enhance students' participation and exchange of knowledge, while valuable class time will be used for developing thinking skills and necessary attitude toward learning of students [4].

The teaching model of online education in China is mainly based on remote network, namely, teachers deliver teaching resources to the network teaching system via the Internet, and learners download and browse the resources through the system. With the advancing of English teaching reform and the universal application of computer technology in English teaching, many universities have begun to explore the campus network teaching system. A document of Higher Education Division points out "continuing to further promote the large-scale reform of English teaching, carrying out a nationwide College English Curriculum Requirements and implementing training on web-based and multimedia teaching methods". In this context, the English teaching platform based on network has become the current education research focus. In recent years, with the rapid

development of the Internet of Things, it's increasingly imminent to explore a smarter and personalized English teaching platform.

III. METHODOLOGY

3.1 Theoretical Basis

Constructivism was first proposed by Swiss psychologist Jean Piaget. He believes teachers should create a good learning environment for students, help students coordinate activities, and inspire students' internal driving force. Constructivism is based on the idea that, unlike a computer disk or an empty container, students do not wait passively to be filled up with knowledge. Rather, students actively build, or construct, their own knowledge. Teachers cannot entirely control their students' learning; expert teachers can do much to facilitate students' own active learning processes. A central assumption of constructivist approaches is that all learning is "discovered", even if we tell students something, they must perform mental operations with information to make it their own. The external environment and the role of teachers are important to help students to promote the significance of Construction. The characteristics of a constructivist classroom are as follows: the learners are actively involved; the environment is democratic; the activities are interactive and student-centered, the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous [5]. Papert conducted experiments on Piaget's theories and confirmed that the construction of new knowledge is on the basis of previous experience [6]. In assisted or mediated learning, the teacher is the cultural agent who guides instruction so that students will master and internalize the skills that permit higher cognitive function. The ability to internalize cultural tools relates to the learner's age or stage of cognitive development. Once acquired, however, internal mediators permit greater self-mediated learning. Each of learning styles and strategies has access to learning. Teachers should respect the student's choice.

Since the construction is the process of learning, teachers have a big role like (a) to influence, or create motivating conditions for students, (b) take responsibility for creating problem situations, (c) foster acquisition and retrieval of prior knowledge, (b) create the process of learning not the product of learning [7]. Self-directed approaches role in the learning process are the fundamental advantages of the constructivist theory. Shift of responsibility "from teacher-directed courses to a negotiated curriculum" enables learners to define their own learning needs as well as giving the opportunity to fulfill their needs by choosing the appropriate strategies [8]. Moreover, in 21st century students are more demanding and are more in need to connect new information with their prior knowledge and other disciplines. Moving from this point, applying integrated program (connection between disciplines) together with constructivist teaching process are seen to be effective on intellectual and sensual development of the learners [9].

3.2 Demand Analysis for ETP

The development of the Internet determined the increasing role of computer-based instruments in the learning process. As a result, a series of applications appeared, with the role in the integral management of the on-line learning process, as well as the blended learning-type applications [10]. This type of platforms have two roles: on the one hand, they enable the content management (courses, homework), ensure synchronized collaboration (by chat, videoconferences), as well as non-synchronized collaboration (forum, messages, blog.) and, on the other hand, they can be used in managing the courses and the students that applied for these courses [11].

We get a clear idea of the construction of ETP, that is, to highlight the dominant position of students, to strengthen the guiding role of teachers, to construct an interactive learning environment. First we carried out the demand analysis for ETP. Fully considering the demand of teachers and students is an important factor in the design of intelligent teaching platform. We delivered questionnaires for teachers and students respectively. The questionnaire is designed considering the following four aspects: flexibility, functionality, visualization and intelligence. The users of ETP are English majors. The respondents are from the Department of Foreign Languages of Shaoyang University. Each randomly selected student and teacher got a questionnaire. The questionnaires for teachers and students are different. We delivered 300 questionnaires to students (including freshmen, sophomores and juniors), 30 questionnaires to teachers (mainly related to professional teachers of English). The total number of questionnaires is 330, among which 280 are valid. Table 1 shows the demand for different functions of ETP.

TABLE 1 DEMAND FOR DIFFERENT FUNCTIONS OF ETP

demand degree / functions	badly needed	needed	don't know	unnecessary
visual teaching	82%	13%	4%	1%
smart interaction	81%	14%	3%	2%
powerful function	73%	15%	10%	2%
open platform	65%	18%	12%	5%
various resources	75%	15%	7%	3%

TABLE 2 DEMAND FOR VARIOUS MODULES OF ETP

demand degree / ETP modules	badly needed	needed	don't know	unnecessary
autonomous learning	83%	13%	3%	1%
achievement evaluation	70%	20%	7%	3%
video teaching	72%	15%	8%	5%
resource management	68%	21%	7%	4%
management module	65%	22%	9%	4%

When questioned on whether visual teaching is needed in the platform, 82% of the respondents answered that it is

badly needed (table 1). Only a small proportion of respondents think visual teaching in the platform is unnecessary. Smart interaction, various resources and powerful function are also key functions required by the students.

Table 2 shows the demand for various modules of ETP. The results of the questionnaire show that English majors are eager for the intelligent ETP. Autonomous learning module is the most desired one. Video teaching module and achievement evaluation module are also badly needed. Students show great interests in the powerful functions and various modules of ETP. This owes to the fact that the platform can provide them a new way of learning. What's more, the platform enables a visual teaching process, which makes most students feel interested. In terms of platform module, they are more concerned about the high demand for self-learning and teaching platform digital resources.

When asked "What other facilities do you want the platform to provide you with?" the respondents gave the following answers:

- 1) Upload for listening materials and video resources;
- 2) Automatic check for the exercises;
- 3) Synchronous or asynchronous communication;
- 4) Existence of certain on-line tests;
- 5) Feedback service;
- 6) Evaluation for the on-line learning.

The above-mentioned answers show that the students are really willing to use the platform, as long as they are provided with diverse materials that support them in their learning process.

Some other non-functional requirements, such as the system's response time and system throughput are also important for the reliable and stable performance of the platform. It is required that ETP can support about 300 people online simultaneously. ETP need to get response in a short delay, and to meet customers' demands to the greatest

extent. In addition, reliability and security of the platform is also needed to take into account, for the teaching activity is directly affected by the performance of the platform. Finally, under the premise to meet basic performance, the platform can provide a higher quality of service for users.

IV. MODULAR DESIGN OF ETP

According to the previous theoretical analysis of the platform, we proposed three basic ideas for the platform design, namely, project-based teaching task, digitalization of teaching resources and visualization of teaching process. Project-based teaching task means that, to achieve the teaching aims teachers should first analyze the teaching conditions according to certain teaching ideas and knowledge. Engineering philosophy is essential to guide their teaching process. The nature of the project-based teaching task is that teachers get, exchange and deliver knowledge by engineering thinking. Through engineering of teaching management and design, the task of teaching is turned into effective independent learning, and finally receives good results. Digitalization of teaching resources means that the knowledge is digitized by computer tools. Via the application of computer graphics and other digital information technology, some of the existing teaching resources become digital, and the static knowledge becomes dynamic. Visualization of teaching process is a dynamic process in learning and teaching. By collecting the data in the process of teaching and learning, the whole teaching process can be analyzed. And then through adaptive visualization tools the teaching process can be further improved.

Through the modular analysis of the teaching platform, we designed the overall framework of ETP, as shown in figure 1 and figure 2.

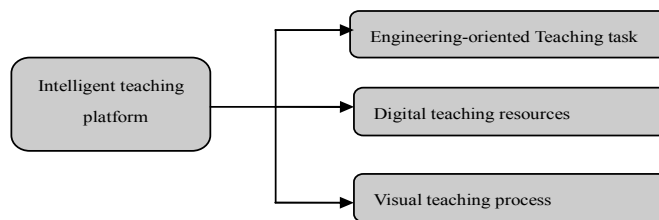


Figure 1. Platform modularization

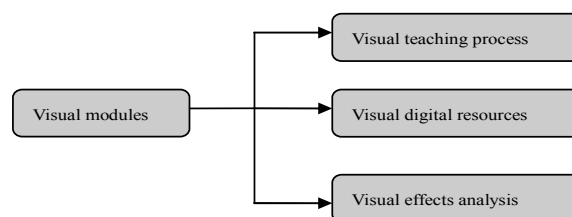


Figure 2. Visual modules

Figure 1 shows three main modules of ETP, they are project-based teaching task, digital teaching resources and visual teaching process. Figure 2 shows the specific visual modules, which include visual teaching process, visual digital resources and visual effects analysis. By modular design of ETP, three main modules are refined. The project-based teaching task is a complex engineering development in that the problems in teaching is difficult to accurately define, classroom activities are changing and are difficult to design in advance. Resources digitalization is a technical topic, which requires the use of multimedia and network technology and other modern equipment. The dynamic characterization of these digital resources can stimulate learning motivation and cultivate learning skills. The most important module is the visualization of teaching process,

which includes the visualization of teaching steps, digital resources and data analysis of the learning effect.

Main modules include interactive systems, visual platform and resource subsystem. Interactive system is for teacher-student interaction in teaching process. Resource subsystem is used to store the teaching and learning materials. Visual platform can realize the visualization of whole process of teaching. Students end includes an APP module for teachers and students, the client and the Web end. Students can log in the platform by the APP at anytime, or study with personal computer by downloading the exclusive client. Teachers' end includes the APP, the server and the database. Teachers can interact with students through the APP, and also can manage the server and database via platform. Figure 3 shows the structure of the platform.

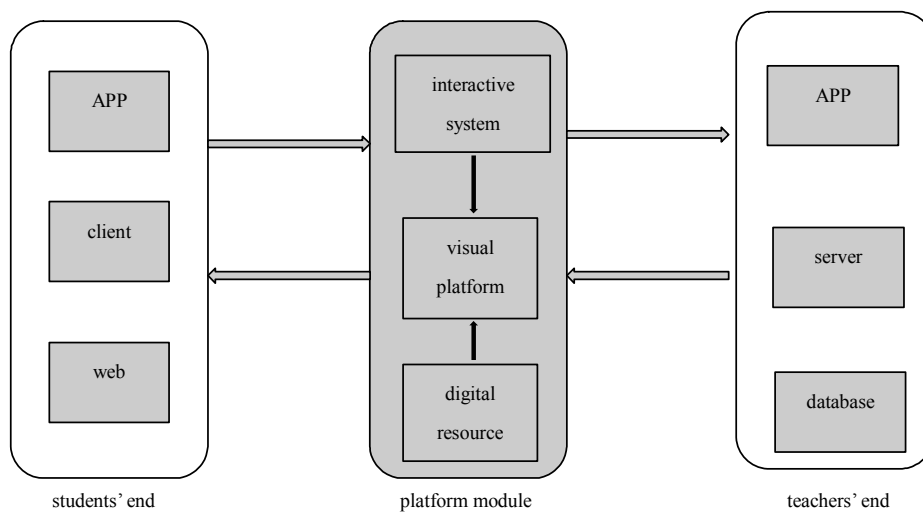


Figure 3. The structure of the platform

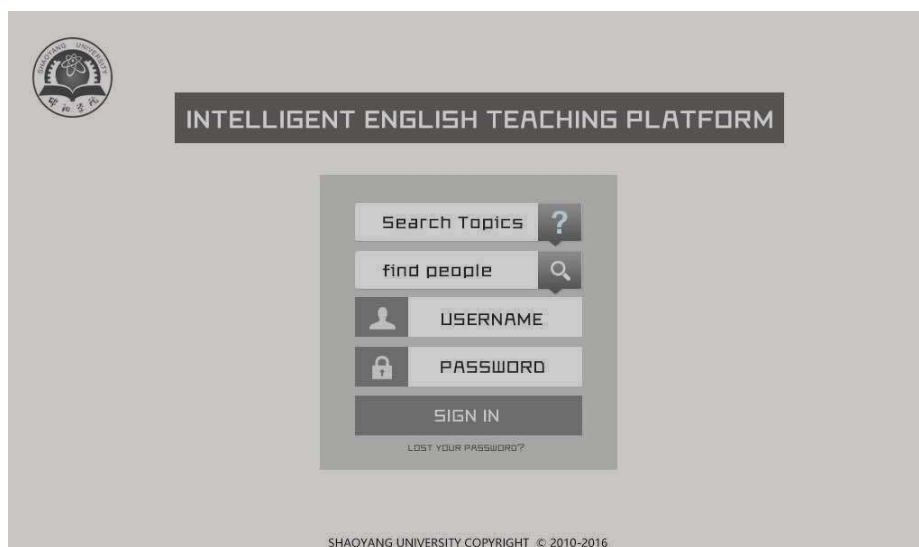


Figure 4. Login interface

With the designed modules, the intelligent ETP was created with considering the following aspects.

(1). to provide a student-centered platform

Student-centered teaching requires the liberation from traditional teaching methods. The network platform allows students to learn by themselves. In an open network environment, students are allowed to learn according to their own needs. They can learn at any time and choose whatever they want to learn. The platform fully embodies the idea of student oriented design.

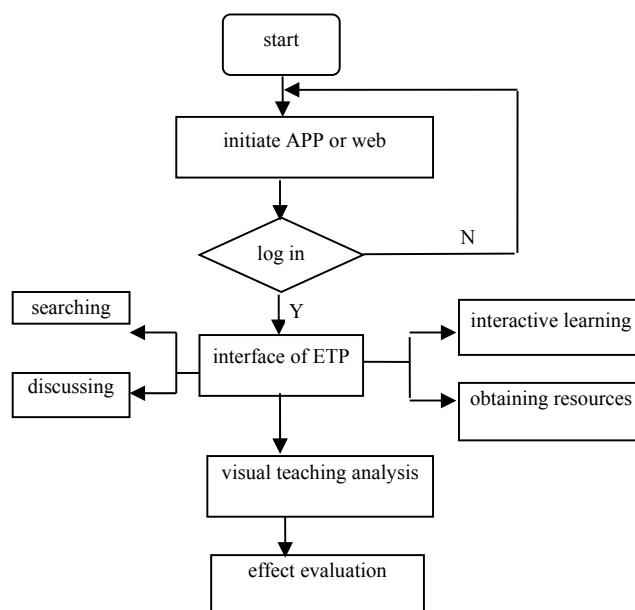
(2). through the interactive platform, teachers play a guiding role in stimulating students' learning potential

oriented teaching process, teachers participate in the network teaching platform and have proper guidance on making the teaching process more smoothly.

(3). full analysis of the data in ETP guarantees a visual teaching process.

Traditional ways of learning is often somewhat tedious. This intelligent teaching platform provides the students an opportunity to feel the interest in learning. Learning process can become lively.

Based on the above design principles, we designed the following teaching platform, as shown in Figure 4. The flowchart of ETP is illustrated in Figure 5



In the platform, the teacher's role changes from an authority to a guide. Especially for the task of engineering-

Figure 5. Flowchart of ETP

Through the test run of the platform, it is proved that the platform can meet the needs of diverse teaching methods and independent learning. It is able to resolve the following issues:

- 1). to observe student's learning behavior;
- 2). to solve the problem of students' lacking of self-confidence;
- 3). to improve students' ability of self-learning;
- 4). to establish a better link between teachers and students;
- 5). to provide better decision-making teaching methods with the interactive features and visualization tools of the platform.

In order to verify the effectiveness of the platform, we select the course of "Advanced English" as a sample. Via the data processing tools we analyzed the whole school year students' online test scores and got a statistic result. Compared with the previous sessions of the students, the students involved in the English teaching platform have

better academic achievement. Evidence shows that most students have improvement in speaking, reading, listening and writing skills. In terms of participation in the classroom, there is a substantial increase in the proportion of students. Students' learning ability has been significantly enhanced.

On the basis of experimental results, a survey was conducted among the English majors. The result of the survey shows that the majority of students (90%) did the assignments with ETP after class, and 82% of students intensively studied additional resources. More than half students interact with teachers and group-mates in ETP. We draw a conclusion that most of the students think ETP increases their interest in learning English. Real-time interaction makes up the defects of lacking good English learning environment.

V. CONCLUSION

The intelligent English teaching platform is a model of a real educational process that organized the students' and

teachers' activity and manages the whole process using the tools of information and education environment. It allows the teacher to carry out the functions of organization, management and monitoring of students' learning activity and progress based on the scientific concepts and to implement the goals declared in the state educational standard and the special course syllabus. With the implementation of ETP, the autonomous, individualized, learner-centered character of learning is preserved.

Visual teaching process creates a good English learning environment as well as promotes the reform of traditional teaching model towards a more intelligent direction. Facts have proved that the use of the platform has received good teaching effectiveness, practicality, improved learning efficiency.

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