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Research and Design of English Auxiliary Learning System Based on Human-Computer Interaction

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***Abstract*—Computer assisted English learning is a new field of English teaching assisted by computer and its software technology. With the development of computer technology and the popularity of the Internet, computer assisted English teaching has increasingly become an important means of English learning and one of the hot spots of information technology research. It will change the existing English learning environment and teaching mode, and greatly improve the efficiency of students' English learning. The research on English tutoring learning system based on intelligent algorithm is a research carried out by researchers of Ljubljana University in Slovenia. The purpose of this study is to find out how to use different methods to improve English teaching. The main goal of the project is to develop an intelligent algorithm to help teachers improve their skills and students' English teaching ability. Researchers also want to know whether there are some differences in English teaching ability among more or less trained learners.**

Keyword—English, Intelligent algorithm, learning system.

I. INTRODUCTION

Under the trend of globalization, English education in primary and secondary schools is becoming more and more important. The traditional English teaching methods can not meet the increasing English learning needs of primary and secondary school students because of their limitations. The competent department of education in China has also pointed out that it is necessary to vigorously promote the reform of Public English teaching with computer technology and network technology[1]. The reform mode is to change from the mode of textbooks, blackboards and teachers' speaking and students' listening to the mode to the learning mode of comprehensive application in the classroom with information, networking and teaching software as the carrier[2]. The new English teaching model has made up for the shortcomings of traditional English teaching to a great extent. Therefore, more and more digital English teaching based on human-computer interaction, informatization, networking and multimedia has entered the primary and secondary school campuses in China[3].

Computer assisted English learning (CAE) is an important part of digital English learning. It refers to the research and learning in the application of computer technology in English teaching and learning. The definition of computer-assisted English learning describes its application fields (education, teaching and learning), technical means (computer related technology) and objectives (Research and learning). It can be seen that computer-aided English learning system is closely related to computer technology. The rapid development of computer technology, especially in the fields of artificial intelligence, virtual reality, natural language understanding, speech recognition, speech synthesis and network technology, has greatly promoted the wide application of computer-aided English learning system. The development of computer-assisted English learning (CAE) can be divided into three stages;

From the late 1950s to the 1970s, it can be regarded as the experimental period of computer-assisted language learning. At this stage, the emergence and development of computer technology made some computer experts and language workers aware of the possibility and potential of computer application in language teaching, and began to research in this area[4]. They developed some English teaching systems and software, but they were only limited to experimental applications in a small range, It has not been popularized.

From the 1980s to the late 1990s, due to the rapid development of computer technology, PC appeared and popularized rapidly, which provided a solid foundation for the prosperity of computer-assisted English learning. At the same time, new English teaching ideas are emerging, articles and books on computer-assisted English teaching are emerging, and a large number of computer-assisted language teaching organizations are born. Under this trend, computer-assisted English learning is gradually accepted by people.

II. RELATED WORK

A. SSH lightweight JavaEE framework

The lightweight JavaEE framework is compared with the heavyweight JavaEE framework. It takes the traditional JSP as the presentation layer technology, and a series of open source frameworks as the solutions for MVC layer, business logic layer and data persistence layer. These open source frameworks are organically combined to make JavaEE applications highly scalable and maintainable. It can reduce development time and deployment time, which is very important to support the development of best practices, such as frequent unit tests.

SSH is the abbreviation of the most popular lightweight JavaEE framework struts+spring+hibernate. In order to improve the development efficiency of the system, this topic also uses SSH framework[5]. The following is an introduction to each open source framework.

Struts is an MVC framework based on JSP model2. It is mainly divided into three parts: model, viewer and controller. Its main design idea is to decouple presentation logic and business logic through the controller to improve the maintainability of the system.

Spin is an open source framework that was born to solve the complexity of enterprise application development. Specifically, it is a lightweight inversion of control (IOC) and aspect oriented (AOP) container. The so-called inversion of control (IOC) means that the container actively passes the dependency to the object without waiting for the object request during object initialization, rather than the object

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looking for the dependency from the container; The so-called aspect oriented (AOP) refers to the cohesive development that allows the separation of application business logic and system level services (such as auditing and transaction management).

Hibernate is an object relational mapping (ORM) framework for developing source code. It encapsulates JDBC with very lightweight objects, so that Java programmers can use the thinking of object programming to operate databases at will. Hibenate can be used in any situation where JDBC is used, either in Java client programs or in web applications, so as to complete the task of data persistence[6].

Fig. 1 shows the top-level view after integrating the three open source frameworks of struts, spring and hibernate.

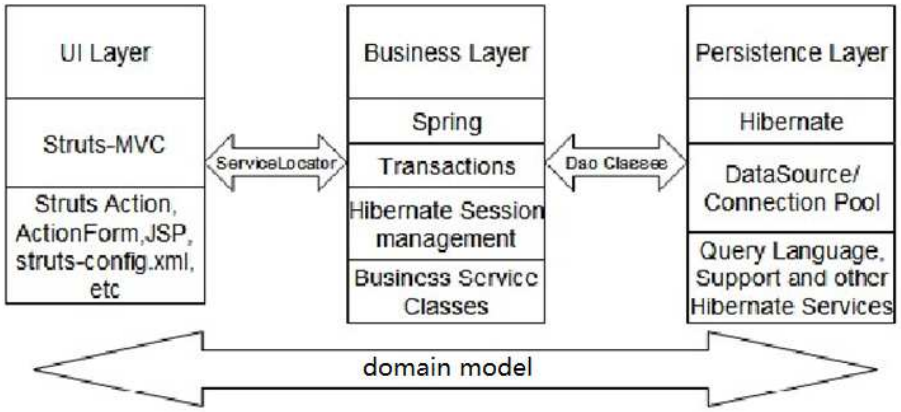

Fig. 1. SSH lightweight JavaEE framework

B. Basic composition of learning ability

According to Kirkpatrick's four level evaluation model, the learning effect of learning should be evaluated from the four levels of response, learning, behavior and results. Therefore, when building the learner ability model, we should not only consider the effect of the end of a user's learning or the process of learning behavior, but also include the changes in learners' behavior and the results of final learning into the evaluation indicators. Combined with Gagne's classification theory of learning outcomes, learning outcomes include five aspects: intelligence skills, cognitive strategies, verbal information, motor skills and attitudes. The reference value of this theory for the construction of learners' ability model lies in the inclusion of different dimensions such as learners' emotional participation, learning strategies and motor skills to divide learning objectives, which makes the evaluation of students' learning results more comprehensive[7]. Finally, Bloom's classification of educational goals from low-level goals to high-level goals also plays a key role in the construction of learners' ability model. Bloom divides the goals of cognitive field into six levels: memorization, comprehension, application, analysis, synthesis and evaluation. The evaluation dimension of students' personalized ability model should also be gradually improved.

With the support of the three theories, this paper divides learners' abilities into three categories, six secondary indicators, and teaching objectives from concrete to abstract. The first dimension is learning effectiveness, which mainly focuses on learners' ability to remember, understand and simply apply and analyze declarative knowledge. The second dimension is emotional attitude, which mainly examines whether learners have the characteristics of self orientation, active learning and peer assistance[8]. From the two dimensions of engagement and initiative, the evaluation is not only cognitive engagement, but also emotional engagement, which can excavate the level of students' learning enthusiasm and motivation. Dimension 3 is the most abstract learning transfer ability, which mainly focuses on learners' learning strategies, self-regulation, problem-solving ability and creative thinking ability. It is a more abstract and high-level teaching goal. The three categories and six dimensions of learner characteristics are progressive and interactive. Affective attitude affects learning ability and learning transfer, and learning ability and learning transfer can react on affective attitude.

III. English Tutoring Learning System Based On Intelligent Algorithm

A. Requirement analysis

English teaching is a complex and long process. In order to improve the effect of English teaching, relevant educators have put forward many advanced and effective English teaching ideas:

1) Communicative thinking: It is to develop students' English communicative competence according to ideational items and communicative functions. Its purpose is to help students take into account the role and position of the other party when communicating in English, and to consider the topics and situations involved, so that they can communicate in English appropriately.

2) Game teaching idea: Review words, sentence patterns and relevant knowledge points in the form of games, so that students can enjoy learning and naturally acquire English knowledge in a lively, light and pleasant atmosphere[9]. The game should be brief, easy to play, interesting, and closely related to the teaching content of this lesson.

3) Situational teaching idea: Situational teaching is a life scene created or simulated by teachers. It has the characteristics of reality, vividness and practicality, which is convenient for students to comprehensively and creatively express and communicate the language materials they have learned. This teaching idea can change the monotonous and mechanical sentence pattern memory into lively and vivid communicative practice.

4) Activity teaching idea: It is to design and arrange situations according to different stages of students' physical

and mental development, provide materials, and let students actively participate, operate freely, observe and think. Let students know things, find problems and get answers by themselves through activities, so as to explore students' potential.

5) *Action teaching idea:* It is mainly for junior students. In Junior English teaching, concrete gestures and actions are used to assist English learning, stimulate students' interest in learning and improve learning effect.

6) Trinity Teaching Thought: According to the internal relations and cross relations among letters, phonemes and phonetics, English teaching is carried out by integrating them into one.

B. Overall structure of English tutoring learning system

The overall architecture of the interactive intelligent English learning system is shown in Fig. 2.

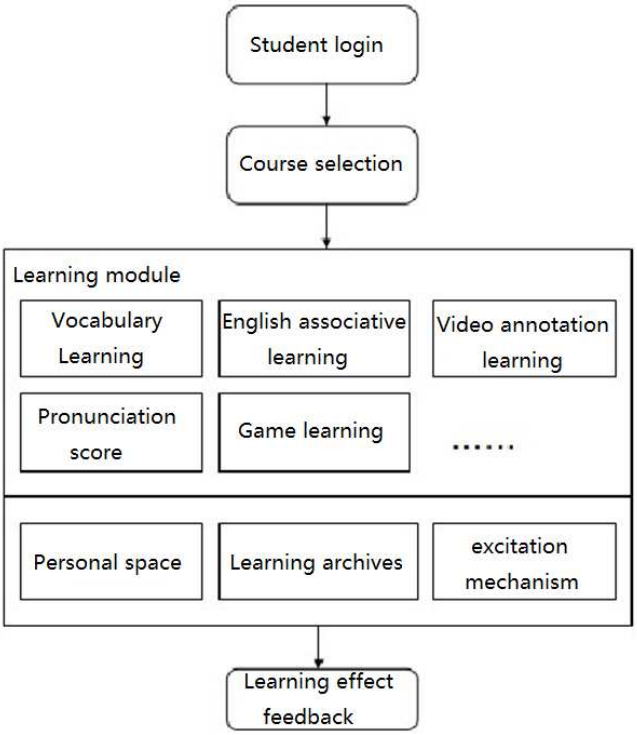

Fig. 2. Overall system architecture

The process for students to use the interactive intelligent English learning system is as follows:

- After students log in to the system, the system will first let them choose courses, including grade, number of copies and chapters. The courses here are synchronized with the English textbooks of the people's education press. The course selection reflects the textbook synchronization of the interactive intelligent English learning system, which can effectively control students' learning content.
- After course selection, students can learn the content of corresponding courses and supporting educational resources through modules such as word book learning, association learning, video learning, pronunciation scoring, game learning, etc. These educational resources include word books, associations of sound, form and meaning, English videos, interesting games, pronunciation exercises, etc[10]., which can help students deepen their understanding and memory of the courses from different angles.
- Each time a student selects a learning module for learning, the module will provide corresponding supporting exercises. After completing the corresponding exercises, students can obtain corresponding scores. After the scores of each module are summarized, the system will finally provide corresponding effect feedback to students.

IV. SYSTEM TEST

For the test of this system, we mainly focus on two aspects: system smoothness and system control. First, we test each individual module separately. If there is no problem with each module test, we will conduct the overall test. However, it is necessary to ensure the integrity of each individual module. Including database, etc. Correctly test whether all modules can be executed correctly. Secondly, when we test the whole system, we must test the response of the system. The environment we use is shown in Table I. The system test results are shown in Fig. 3 and the teaching effect is shown in Fig. 4.

TABLE. I. SYSTEM TEST ENVIRONMENTAL

Serial number	Environmental	Configuration paremeter
1	OS	Huawei Cloud
		Linux
2	Developing Environ-ment	IDE:Eclipseneon
		Plug-in unit
		Springtoolssuite
3	Database	MySql 6.3.0
4	Tomcat	Tomcat 10.0

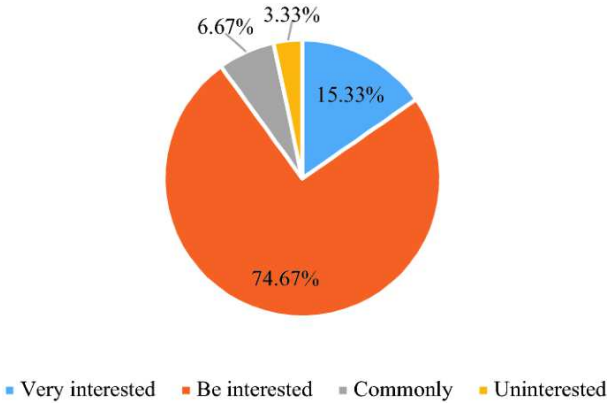

Fig. 3. Statictics numbers

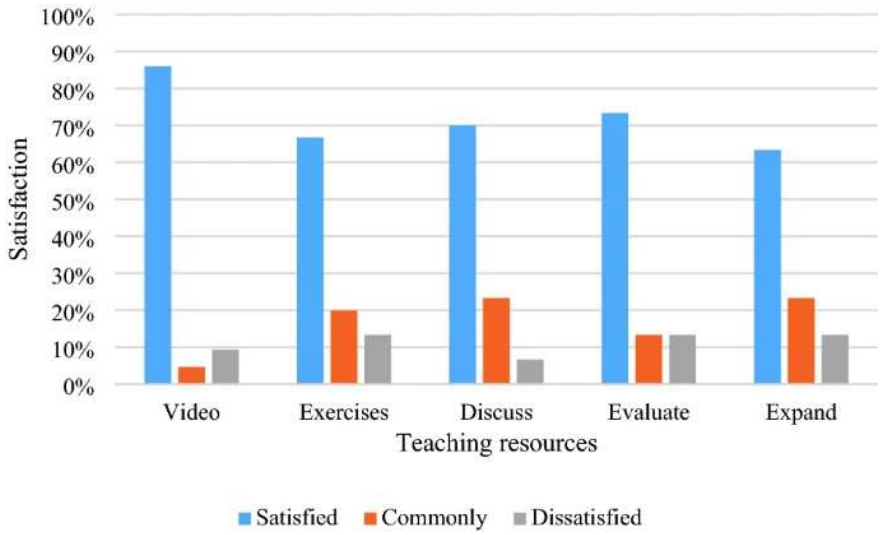

Fig. 4. Teaching effect

V. Conclusion

Because the system involves too many modules, combined with the key and difficult points of my work, this paper focuses on the research and implementation of video annotation learning module and pronunciation scoring module. In the implementation process, the video annotation learning module uses Flex technology to realize a video player integrating subtitle plug-in, annotation display, question and answer pop-up and voice repetition functions. Students can deepen their learning of corresponding vocabulary by watching the video. During the video playback, the questions edited by the teacher will appear in time, and students will get corresponding scores if they answer correctly. By comparing the advantages and disadvantages of various pronunciation scoring methods and analyzing the feasibility, the pronunciation scoring module uses the audio comparison algorithm based on HMM statistical model and establishes the corresponding pronunciation scoring mechanism. Students can practice their oral pronunciation through the pronunciation scoring module and obtain the corresponding scores and correction information. As an incentive mechanism, these scores can help students build confidence and encourage them to make continuous progress.

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