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DESIGN OF ENGLISH INFORMATIONIZATION TEACHING SYSTEM BASED ON POSITIVE PSYCHOLOGY

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Abstract. Early computer-aided teaching systems fully played the leading role of teachers, but ignored the embodiment of students' subjectivity. In English teaching practice, there is still a current situation of emphasizing cognition and neglecting psychology, seriously neglecting students' psychological needs such as learning interest, self-confidence, and happiness. Therefore, in order to explore the promoting role of positive psychology in English teaching, this study, guided by subjective well-being theory and self-determination theory, adopted JSP+Struts+SQL Server technology to design an English information-based teaching system. The system was based on English knowledge, with students' personalized reasoning as the premise, and teachers' teaching strategies as the key. Personalized assistance was provided to English teachers for information-based teaching. Finally, through a controlled experiment, it was found that after half a semester of English information technology teaching, the excellent final grade rate of the intervention group X students was 56.67%; the pass rate reached 90%, and only 3 students failed. There was a significant improvement compared to the performance of the control group Y students. This experiment can prove the effectiveness of the English information teaching system designed in this article. The English information teaching system is a supplement to the traditional classroom teaching mode, which can enhance students' learning interest and English oral expression ability, as well as improve the quality of teachers' education.

Key words: English Teaching; Information Based Teaching System; Positive Psychology; Fuzzy Comprehensive Evaluation

1. Introduction. In the era of Internet plus, information globalization has become a trend. English, which is commonly used all over the world, is playing a leading role. In terms of English curriculum standards, teachers are also required to pay attention to, stimulate, and cultivate students' emotions, stimulate their interest in English, and cultivate their confidence in English. Positive psychology has a great promoting effect on improving the learning enthusiasm and innovative thinking of college students [1, 2]. As an auxiliary tool in English teaching, computers also play an important role in cultivating students' autonomous learning ability. Therefore, in English teaching, teachers need to improve their thinking, guided by the theory of positive psychology, and cultivate students' enthusiasm and creativity. Improvements should also be made in teaching methods, and computer-aided language teaching is used to organically integrate teachers' teaching and learning processes in a complete, continuous, interactive, and personalized training format [3, 4]. In this way, teachers can be prompted to carry out teaching reforms, resulting in a fundamental change in English teaching, transforming students from passive learning mode to active mode, and forming a new combination of teachers, students, textbooks, and teaching modes [5].

2. Literature Review.

Application of Positive Psychology in Language Teaching. There are many studies on the application of positive psychology in language teaching. Eva Gajdosova believed that the social and emotional health of students and teachers is one of the most important standards of school quality. He also investigated the social and emotional health of students and teachers in an inclusive primary school in Slovakia, and introduced the main organizational principles of an inclusive primary school in Bratislava, Slovakia. The research results indicated that teachers and students reported a high level of social and emotional health related to the school's core organizational principles guided by a positive educational framework [6]. Li examined the complex relationship between emotional intelligence, foreign language enjoyment, and English as a foreign language learning performance of 1307 Chinese high school students based on the theories and assumptions of positive psychology. The research results indicated that there was a small to moderate correlation between students' emotional

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intelligence, foreign language enjoyment, self-perceived English scores, and actual English scores; academic performance indirectly mediated the partial impact of learning ability on perceived and actual achievements [7].

Computer-Aided English Teaching. Computer-Aided Instruction (CAI) is a pioneering topic, and its development and popularization have already reached a large scale. There are also many studies on computer-aided teaching. Kaye developed a model to explore which factors must be in place to ensure that CAI helps improve learning outcomes. This model outlined key trends that promote or hinder the deployment of CAI tools in low - and middle-income countries. Finally, he discovered that key factors to consider when designing CAI interventions include the operating environment, stakeholder participation, infrastructure, trust in technology, CAI tool design, content management creation, student participation, classroom integration, teacher's ability, student's ability, and data collection and use [8]. Rosali explored the impact of implementing computer-aided teaching on the academic performance of high school physics students in his paper.

A quasi experimental pre test posttest control group design was adopted, involving 157 10th grade students from Philippine private schools. Finally, the study found that both CAI and traditional teaching methods can significantly improve students' physics grades. However, when comparing the effectiveness of the two methods, there was no significant difference in their impact on academic performance. Therefore, CAI can serve as an alternative teaching method [9].

Jing D introduced the characteristics of the currently very practical Windows application programming tool Visual Basic 6.0 in his paper, and combined some program examples to illustrate the practicality of Visual Basic in the field of foreign language teaching. Moreover, he found that using VB to develop computer-aided teaching courseware can improve classroom efficiency and courseware production efficiency. After being applied in the teaching process, students' learning enthusiasm has significantly improved, providing a guarantee for the smooth implementation of professional English course design. The courseware produced is flexible and has a beautiful interface [10].

Although the research of the aforementioned scholars plays an important role in improving classroom efficiency and student academic performance, CAI lacks guidance for user learning, and cannot fully leverage the teacher's dominant position and guiding role in teaching. It also cannot automatically adjust learning strategies based on learners' existing knowledge system. The current CAI systems in the world also generally have the following shortcomings: (1) they do not support networks; (2) there is no intelligence; (3) supervisors are unable to effectively supervise, resulting in a weak student-centered role and low self-discipline in learning during the teaching process. Based on this, this article took positive psychology as the theoretical guidance, adopted JSP+SQL Server technology, fuzzy comprehensive evaluation technology, and designed a personalized English information assisted teaching system. This system can provide hierarchical teaching to students based on their cognitive level, and has more advantages compared to traditional CAI teaching systems in English information assisted teaching.

3. Overall Architecture of Information Technology Teaching System.

3.1. Introduction to Relevant Technologies.

JSP technology. JSP (Java Server Pages) is a technology based on the Java language and closely integrated with HTML. JSP programs can run on different platforms [11, 12]. Currently, Web/Server/Application Server systems that support Servle/JSP can be seen on most platforms. Software developers can develop, deploy, and expand in any environment. JSP has a rich and powerful development tool. It has the characteristics of separating content generation and display, emphasizing reusable components, simplifying page development with identification, and being widely applicable to various platforms [13, 14].

Struts technology. Struts technology is an MVC (Model View Controller) framework based on SunJ2EE, implemented through technologies such as Servlet and JSP, and has been widely used [15, 16]. Struts integrates Servlets, JSPs, and other things into one framework, allowing developers to implement a complete MVC pattern without the need to write code, thus saving a lot of time.

SQL Server 2008 database. SQL Server 2008 databases can directly extract data from structured, semi structured, and unstructured files. It can also perform operations such as querying, searching, synchronizing, reporting, and data analysis [17, 18]. Data can be stored on different devices, from large computers to desktop computers to mobile devices, and can be controlled by them no matter where they are stored.

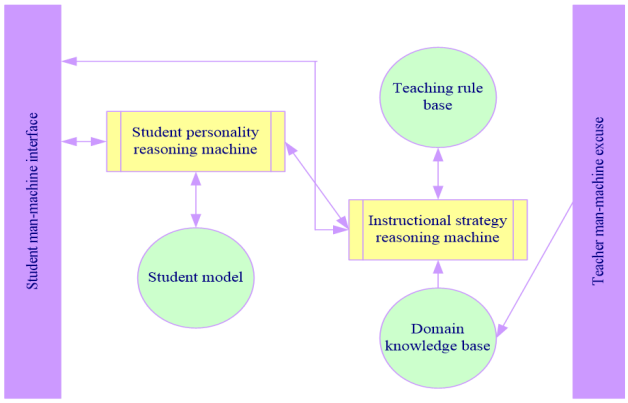

Fig. 3.1: System model of information-based teaching

Overall System Design Plan.

1. *English knowledge base.* The English knowledge base is an information system that stores English learning resources and knowledge point attributes in a knowledge expression manner. The organization and expression of knowledge are key factors that affect system efficiency.
2. *Student model.* The student model is a prerequisite for an information-based teaching system, which includes two parts: a student personality inference machine and a student model library. The function of the student personality inference machine is to evaluate students' English learning outcomes, diagnose problems they encounter in English learning, and evaluate their cognitive abilities during their English learning process. In addition to students' basic information, the student model library also stores information related to their English learning status, English learning ability, etc., which is the basis for formulating teaching strategies.
3. *Teacher model.* The teacher model is the key to information-based teaching, which includes a teaching strategy inference engine and a teaching rule library. The role of the teaching strategy inference engine is to use relevant inference algorithms to select suitable textbooks and teaching methods for students based on the personalized information provided by the student model. When inferring teaching strategies, it is necessary to select them based on relevant laws and store the laws in the teaching rules database to make them computer recognizable.

4. System Detail Design.

4.1. Teacher Model Design. In the theory of positive psychology, it is necessary to help students discover their potential and stimulate their interest in learning by leveraging their outstanding qualities and positive power. English teaching design needs to fully leverage students' initiative. Therefore, when designing a teacher model, it is necessary to divide and prune the knowledge tree based on student types to obtain the knowledge points that students should learn. The knowledge point tree is used to represent the hierarchical relationship between knowledge points, as shown in Figure 4.1.

The fuzzy support relationship between each knowledge point is utilized to determine the optimal order between each knowledge point. It is assumed that knowledge point TD_p is the direct precursor of TD_q. $W(TD\_p, TD\_q)$ is used to represent the direct support level of vertices $TD_p$and TD_q, and let $W(TD_p, TD_q) = \lambda(X_pq)$; By using WumW to represent the sum of the weights of the learning paths provided by a teaching sequence, it can be obtained:

$$WumW = \sum_{p=1}^{n} W(TD_p, TD_q) \tag{4.1}$$

Among them, the larger the value of WumW, the higher the correlation between the knowledge points on the

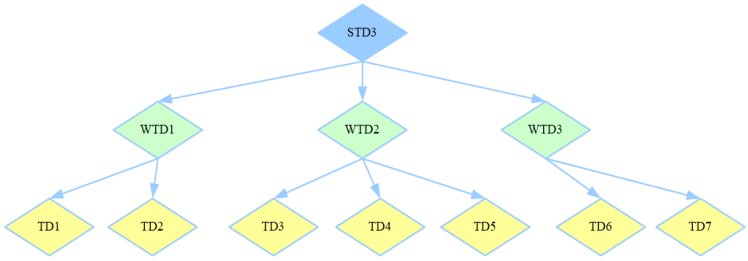

Fig. 4.1: The knowledge tree is used to represent the hierarchical relationship between knowledge points

corresponding learning path, and the better the learning effect of this teaching sequence. Therefore, the best teaching order is the largest topological order in WumW.

4.2. Student Model Design. Due to the existence of many highly subjective and fuzzy concepts in the teaching system, which cannot be accurately described using traditional mathematical methods, this article introduces fuzzy comprehensive evaluation to quantitatively and mathematically handle fuzzy phenomena and concepts when evaluating students' English learning outcomes, diagnosing problems they encounter in English learning, and evaluating their cognitive abilities.

1. Designing a module for evaluating students' English learning level In evaluation set A, the evaluation indicators are determined: English cognitive ability is A1, and learning interest is A2. It can be obtained: evaluation set A=A1, A2. Among them, cognitive abilities include: a11 memory ability, a12 understanding ability, a13 application ability, a14 analysis ability, and a15 comprehensive ability [19, 20]. Therefore, the corresponding elements can be represented as:

$$A1 = a11, a12, a13, a14, a15 \tag{4.2}$$

In comment set B, B=Excellent, Good, Medium, Pass, Relatively Poor, Poor, and the corresponding elements can be represented as:

$$B = b1, b2, b3, b4, b5, b6 \tag{4.3}$$

The indicator set A2 for evaluating students' learning interest is defined as A2=interest in learning English, and the corresponding elements can be represented as A2=a21. Comment set B is defined as B=very interested, interested, average interested, not interested, corresponding to element B=b1, b2, b3, b4.

2. Constructing membership functions The first level factor set is A=A1, A2; The second level factor set is: A1=a11,a12,a13,a14,a15; A2=a21, so the secondary evaluation matrix is:

$$A1 = \begin{bmatrix} a11 \\ a12 \\ a13 \\ a14 \end{bmatrix}, A2 = \begin{bmatrix} a21 \end{bmatrix} \tag{4.4}$$

3. Weight determination: For each subset of factors that have already been constructed, a comprehensive decision evaluation should be conducted. B is the decision set, and factor set A can be recorded as $A = \{A1, A2\}$. The weight coefficient of A is denoted as $M = \{M1, M2\}$, and the weight coefficient of A1 is denoted as $M1 = m11, m12, m13, m14, m15$ [21, 22].
Therefore, the first level evaluation can determine the student's English cognitive ability R1, and the weight of cognitive ability factors is determined as: $Ai \circ R1$. After normalization, $F1 = \{f1, f2, f3, f4, f5, f6\}$. Learning ability can be achieved by using fuzzy matrix synthesis operations to obtain a second level evaluation vector of $F = M \circ R = \{f1, f2, f3, f4\}$.

Table 5.1: English Scores of Students in Group X and Group Y at the End of the Semester Before the Experiment

Group	Number	Final English average	Pass rate (%)	Rate of excellence (%)
Group X	30 (30)	88.03 (88.03)	76.6 (76.6%)	36.6 (36.6%)
Group Y	30 (30)	88.2 (88.2)	76.6 (76.6%)	40.0 (40.0%)

* Note: A score of 0-72 on the final English test paper is considered a failure; a score of 72-96 is considered good; and a score of 96-120 is considered excellent.

5. Implementation and Testing Experiment of English Informationization Teaching System.

System Architecture. According to the requirements of the information based teaching system, this English teaching system provides users with the following functions for operation: administrator function - login, teacher management, department management, and other functions; student functions - login registration, query course related information, searching for true question explanations, answering questions, online quizzes and data statistics, submitting assignments, etc; teacher functions - student and class management, course related information module management, test question type management, real question explanation module management, and other functions.

This article uses a Browser/Server structure, which is mainly divided into three layers: Web server, Apache server, and database management.

System Development Environment. The operating system adopts Windows XP Professional; The database system adopts SQL Server 2008; The webpage creation tool uses JSP.

5.1. Experiments.

Experimental Content and Objects. In order to test the effectiveness of the English teaching information system, this article conducted an experiment in a middle school in Nanchang City. The experiment was divided into an intervention group and a control group, with the intervention group consisting of Class 1, Grade 7 (hereinafter referred to as Group X) and the control group consisting of Class 2, Grade 7 (hereinafter referred to as Group Y). Before the experiment began, there was no significant difference in academic performance between Group X and Group Y students, and the teaching conditions were consistent. In the experiment, Group X adopted a combination of English information-based teaching and traditional lectures. Firstly, Group X students were preliminarily evaluated and graded based on their cognitive ability and interest values. Then, corresponding learning content was selected for them based on their level, and after they have completed a knowledge point, they were given a test. The test results were combined with their interest values to obtain their comprehensive score on this knowledge point, which was then used to adjust the students' learning ability and level. Only traditional teaching methods were used for Group Y. Teachers use information technology to create language contexts for students, and students follow the teacher's progress in learning. Before the experiment, the English scores of students from Group X and Group Y at the end of the semester are shown in Table 5.1.

Experimental Results. After half a semester of experimentation, two groups of students were given written English exams to explore the effectiveness of English information technology teaching in students' learning of English subjects. The learning effectiveness was demonstrated by the passing rate and excellent rate of students' written English test scores.

Figure 5.1 shows the descriptive statistical results of the final written English test scores for Group X and Group Y, respectively. From the graph, it can be seen that the performance of Group X was better than that of Group Y. In terms of passing rate, Group X achieved 90%, with only 3 students failing. In terms of excellent rate, Group X achieved 56.67%, and more than half of the students achieved excellent English written test results. From it, it can be seen that using English information technology teaching can enhance students' enthusiasm for English learning, help them correct their learning habits, and improve their academic performance.

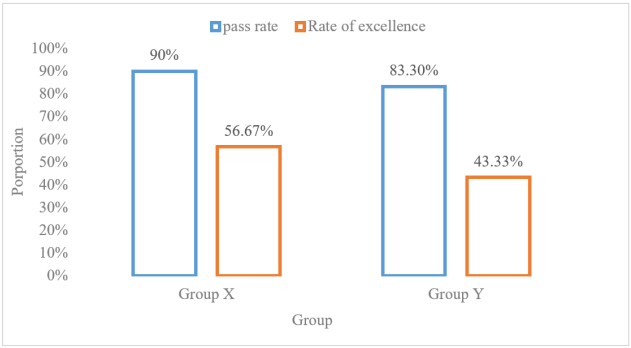

Fig. 5.1: Comparison of the passing rate and excellent rate of the written English test between Group X and Group Y after the experiment

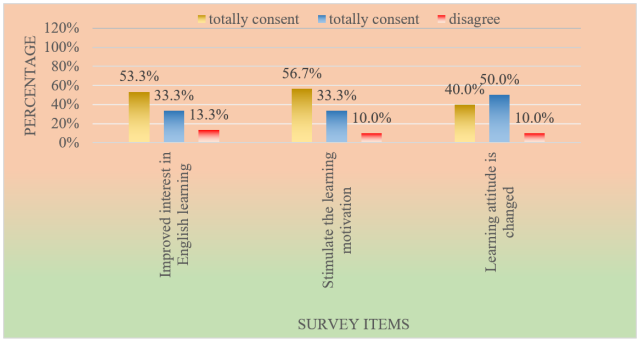

Fig. 5.2: The attitude of X group students towards English learning before the experiment

Experimental Discussion. Before and after the experiment, discussions and exchanges were held with students in Group X, and they were asked to fill out a survey questionnaire to explore their attitudes towards English learning.

From Figures 5.2 and Figures 5.3, it can be seen that the attitudes of Group X students towards English learning before and after the implementation of English information technology teaching showed significant changes in the three dimensions of students' interest, motivation, and attitude towards English learning. Before the experiment, 53.3%, 56.7%, and 40% of students held positive attitudes towards learning interest, motivation, and attitude, respectively. Only about half of the students had a positive attitude. After conducting English information technology teaching, 96.7%, 90%, and 83.3% of students held positive attitudes towards learning interest, motivation, and attitude, respectively. It can be seen that after English information technology teaching, most students have improved their confidence in learning English, maintained a positive attitude, and showed a strong interest in English learning.

5.2. Comparison between English Informationization Teaching System Based on Positive Psychology and Traditional Informationization Teaching. In order to further understand the innovation of the English information-based teaching system constructed in this article, this section compares the English information-based teaching system constructed in this article with traditional information-based teaching systems from five aspects: functional integrity, richness of teaching resources, personalized learning, evaluation of teaching effectiveness, and satisfaction of teachers and students. The evaluators are X groups of teachers and students, with an evaluation level of 1-5 points. The higher the evaluation level, the better the system evaluation effect. The comparison results are shown in Figure 5.4.

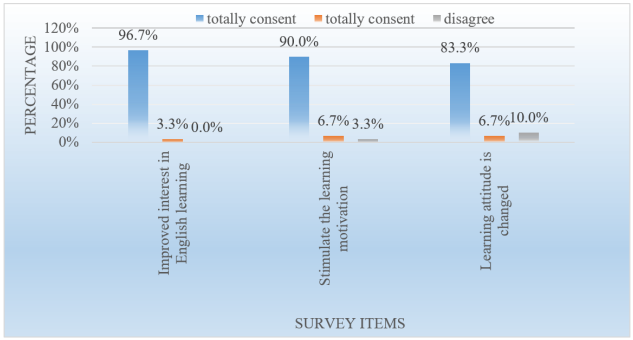

Fig. 5.3: X group's attitude towards English learning after the experiment

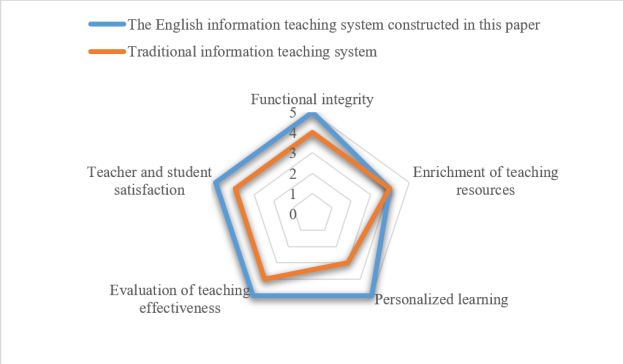

Fig. 5.4: Comparison results

From Figure Figure 5.4, it can be seen that the English teaching system constructed in this article performs well in five aspects: functional integrity, rich teaching resources, personalized learning, teaching effectiveness evaluation, and teacher and student satisfaction.

6. Conclusions. How can traditional English teaching be combined with computer-aided English teaching to achieve better teaching by teachers? What is the purpose of students learning better English? Through experimental research and analysis and discussion of the experimental results, a conclusion of "yes" was reached. Under the guidance of positive psychology theory, this article used JSP+SQL Server technology and fuzzy comprehensive evaluation technology to design an information-based teaching system that assists English teaching. Recently, a middle school student in Nanchang City was selected as the experimental object, and students from two classes were divided into a control group and an intervention group for a controlled experiment. The results of the controlled experiment showed that the intervention group had a significant improvement in the excellent rate and pass rate, reaching 56.67% and 90% respectively. This indicates that combining English teaching with information technology can fully mobilize and enhance students' learning enthusiasm and initiative, and can also improve the quality and efficiency of English teaching activities. However, the English information-based teaching system established in this article still has some shortcomings: (1) So far, the system does not have autonomous learning function; (2) The system has not yet implemented automatic knowledge extraction; (3) The system has weak error detection and correction functions.

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