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Practical Exploration of University English Teaching Reform in the Information Technology Era Based on Cognitive Mapping Construction

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ABSTRACT

In the era of information technology in education, accurate analysis of individual characteristics becomes the key to personalized learning and tailored teaching, which is of positive significance to the exploration of teaching reform paths. This paper constructs a cognitive map of college English courses under the guidance of cognitive theory, and establishes a reform model of college English teaching in combination with the cognitive map, so as to realize students' self-knowledge and cognitive construction in the teaching process. The idea of fuzzy set theory is used to quantitatively analyze the knowledge ability level of college students, and then the Logistic model and Bernoulli distribution function are used to calculate the students' cognitive level of mastering each knowledge point and their scores of answering the questions in the college English course. The analysis of the effect of the teaching model after practice found that the students' mastery and cognitive level of subjective and objective knowledge points in the college English course were significantly improved and higher than the ideal reference value. The correct rate of answering composition questions in subjective questions increased by 30.44% compared with that before the teaching mode was carried out. The informatization teaching mode proposed in this paper lays a foundation for the teaching reform of college English and provides an effective path for students to improve their knowledge mastery and cognitive level.

Keywords: cognitive mapping, fuzzy set theory, logistic model, Bernoulli distribution, pedagogical reforms

1. Introduction

College English, as a basic application-oriented discipline in the education and teaching system of colleges and universities [1], is not only a necessary course for colleges and universities to cultivate high-quality talents, but also the main educational method to guide students to develop basic English

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quality [2]. Today, when network information and communication technology is developed, it is of great practical significance to explore the innovation of university English informatization teaching [3].

The collision of science and technology and culture, technology and education, the generation of information technology teaching is the inevitable result of the link between science and technology and cultural education [4]. The development of modern information technology has long transcended a single field of penetration into all aspects of the social sector [5]. The trend of information technology is unstoppable, information technology education is thus generated [6]. Informatized teaching is a symbol of the power of science and technology to promote the development of education in the Internet era, but also a conscious manifestation of educational reform. In this process, advanced science and technology promote the change of education, and education brings out the function of information technology [7]. The benefits of reform brought about by information technology teaching are a joint manifestation of the efficiency of teaching and learning, especially in higher education institutions, where the goal of teaching has undergone a transformation from knowledge to skills [8]. In teaching, the main purpose of informatization teaching change is to promote the transformation of teaching methods and improve the efficiency of education, and the transformation of informatization teaching in colleges and universities is presented as a transition period in the current status quo, the results of informatization teaching in theoretical courses are less significant, and there is also a certain conflict between the traditional concepts of teaching and informatization teaching concepts [9-10].

The effective use of university English informational teaching resources is to promote the rationalization and scientificization of teaching resources, i.e., the optimization of information corpus resources in the overall English teaching content and the promotion of college students' English expression ability [11]. In terms of teachers' skills, although the reform of university English informatization teaching requires the unified planning of the school, in fact, the teaching reform still needs to be executed by improving teachers' information teaching ability [12]. The integration of information technology and English teaching informatization is reflected in the specific teaching skills of teachers, and the integration of teachers' teaching methods and information technology is the fundamental content to improve the efficiency of informatization teaching reform, and the only way to optimize and upgrade teaching is to strengthen the informatization teaching ability of college English teachers and their ability to integrate informatization resources [13].

Literature [14] concluded that based on the idea of MOOC teaching, with the support of the learning environment and advanced learning tools, it effectively promotes the students' desire to transform knowledge into active learning behavior, and improves the effect of college English online teaching. Literature [15] points out that with the in-depth development of "Internet +", it is necessary to actively explore the deep integration of "Internet +" and classroom teaching, and build a smart classroom. Literature [16] points out that English education is an important and special basic subject, and the concept of informationized teaching has a positive effect on improving the reform of English education and teaching. Literature [17] highly integrates vocational English education informatization with the national "Internet +" requirements, uses the "Internet +" space and platform for independent learning resources to carry out the reform of independent learning in English courses, innovates new forms of organization of independent learning in English, and reintegrates and builds a smart classroom with independent learning resources. Independent learning resources are reintegrated and reconstructed. Literature [18] analyzes the development trend of continuing education for English teachers in colleges and universities. It is proposed that making full use of "Internet+" has certain reference significance in the construction of teachers, effectively adapting to the different needs of students, improving the teaching level of English teachers, and reforming the teaching of English in colleges and universities. Literature [19] takes English as an example, through the construction of a blended teaching mode of "before class - during class - after class" and "combining online and face-to-face teaching", it promotes the high-frequency interaction between teachers, students and the technology platform, optimizes the teaching effect, and improves the learning effect of students to the maximum

extent.

This paper combines the characteristics of the university English course and the students' learning situation to construct a cognitive map of the university English course, realizing the visual analysis of each student's cognitive level and state. Based on the cognitive map and constructivism and other related theories, we design a college English teaching reform model consisting of pre-course preparation, in-class teaching and post-course summarization. Under the guidance of fuzzy set theory, this study corresponds the knowledge and skills of college students in college English courses to the corresponding fuzzy sets, and calculates the college English knowledge and ability level of college students according to the Logistic model. Then the fuzzy logic method was utilized to calculate the students' mastery of the knowledge points of subjective and objective questions in the college English course. At the same time, Bernoulli distribution and Gaussian distribution are used to analyze the real scores of students' responses. This paper analyzes the students' mastery and cognitive level of each knowledge point in the college English course after the implementation of the teaching mode in order to explore the effectiveness of the teaching mode.

2. Method

2.1. A Cognitive Mapping-based Reform Model for College English Teaching

With the technological changes in the university English learning environment and the development of cognitive theories, the accurate portrayal of learners' cognitive state is not only limited to the knowledge state, which may cover the assessment of students' learning ability and learning effect, the promotion of personalized learning, and the assistance of teachers' teaching reflection. Therefore, this paper is based on cognitive mapping to construct a reform model of college English teaching in the informationization era.

2.1.1. The Construction of Cognitive Mapping of College English. The cognitive mapping framework constructed in this paper is shown in Figure 1. From the cognitive perspective of learning, adding quantitative information of learners' cognitive level to the knowledge spectrum of course knowledge mapping can effectively diagram the learners' cognitive schema. Based on this, the study first constructs the curriculum knowledge map of college English, and then, conducts precise cognitive diagnosis of learners' performance. Finally, the visualization of individual cognitive state is constructed to show students' cognitive level in learning in a clear diagram. The cognitive map shows the individual's mastery of each knowledge point, and each node corresponds to the knowledge nodes in the course knowledge map.

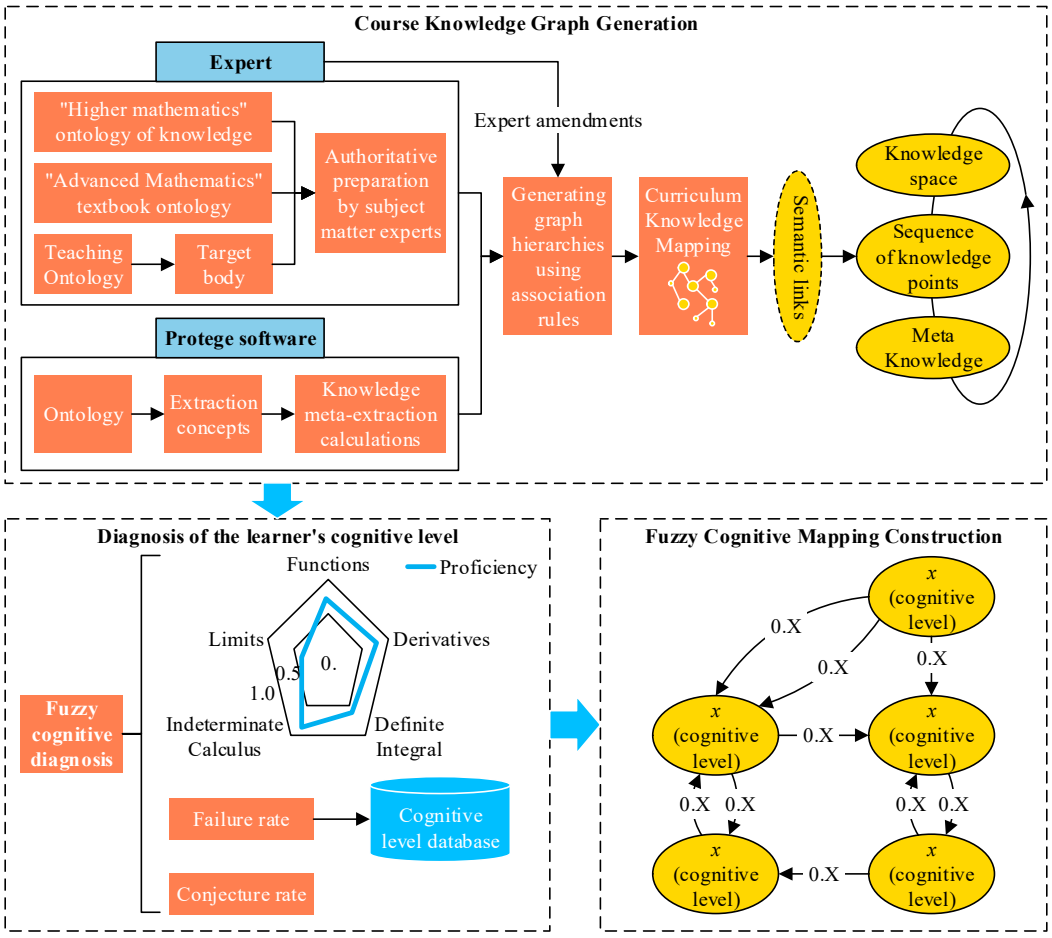

Fig. 1. The research framework of the cognitive map

2.1.2. Design of the reform model of university English teaching. In college English teaching, the application of the knowledge map can allow teachers to fully understand the learning, evaluate the learning effect for each student, and build the adaptive learning plan.

Combined with Bruner's principle of cognitive structure theory, cognitive structure theory, learner-centered theory and constructivism theory, the university English teaching model constructed in this study is implemented in accordance with the conditions of the three elements: teacher, learner and environment, with the students as the center and the teachers as the monitors and auxiliaries. At the same time, the personalized learning system is intervened to support the digital learning environment for the learners' learning, and the teaching reform model integrating personalized learning environment is constructed based on cognitive mapping. The university English teaching reform model is designed as shown in Figure 2, and the teaching process is carried out and circulated according to the three links of pre-course preparation, in-course teaching and post-course summarization, which are closely linked with the service system. The pre-preparation is that the teacher analyzes the learning situation, analyzes the teaching materials, and determines the teaching objectives and contents of college English. After passing the pre-course preparation, teachers carry out college English classroom teaching, and during the teaching activities, teachers carry out the process according to the regular teaching.

1) Course introduction, the teacher constructs the introduction scenario of the university English course, which is set by the teacher himself to attract students' attention.

2) Knowledge lecture, the content of this stage of the lecture is the teacher prepared in accordance with the requirements of the course to explain the knowledge points, the first time for the students to build their own cognitive map of college English to provide the first constructive environment.

Students at the same time enrich the metacognitive knowledge-cognitive base, providing a knowledge-cognitive source for solving the task.

3) Student diagnosis. Intervene in the personalized service system to detect the mastery of college English knowledge points absorbed by students, students review what they have learned in the process of knowledge testing and construct their cognitive maps for the second time. After completion, students view the learning portrait to first judge the self-situation and construct a remedial plan to enhance metacognitive experience and the ability to test and control.

4) Task grouping. Based on the diagnostic results, the teacher groups the students according to the structural similarity of the knowledge points and assigns group learning tasks.

5) Task execution. Students select learning resources to assist learning based on self-portrait, cognitive mapping and task requirements, diagnose their own knowledge structure, and analyze task completion strategies.

At the end of the learning cycle, the teacher initiates the test again, the students test the new cognitive structure, adjust and check the knowledge nodes that have not yet been mastered for supplementation in accordance with the test results, record the problems in the process, and finally complete the learning reflection to write into the system, which is the fourth cognitive construction stage of the knowledge review and summarization in which the knowledge and ability of metacognitive evaluation, testing and management are enhanced. According to this university English teaching model, combined with the diagnostic results at this stage, the teacher will use the students' learning results as a learning situation analysis for the preparation of the next lesson as the basic conditions for the next lesson.

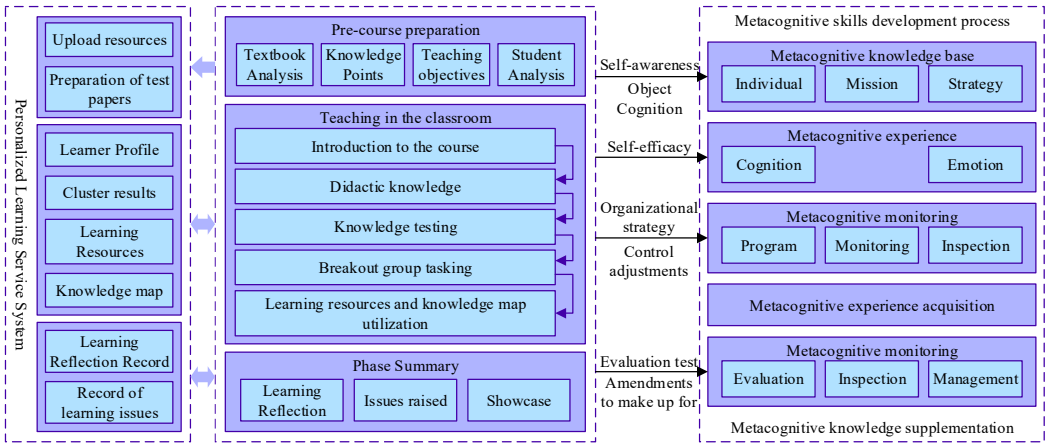

Fig. 2. The college English teaching reform model of fusion personalization

2.2. Methods of assessing students' cognitive level

This paper examines the implementation effect of the college English teaching reform model designed in this paper by assessing the cognitive level of college students in college English courses. The cognitive level is mainly analyzed from three aspects: students' knowledge ability level in the college English course, the degree of mastery of knowledge points, and the real score of test answers.

2.2.1. Methodology for analyzing the level of knowledge and competence. This paper analyzes the individual's level of college English knowledge competence at the level of college students' latent traits and incorporates fuzzy set theory, which uses fuzzy numbers to accurately quantify and analyze the more qualitative and subjective information. The term "fuzzy" refers to the transformation of binary variables into values in the interval [0,1] to quantify students' knowledge competence level. Therefore, this paper assumes that a student's level of intellectual ability is the student's affiliation in the fuzzy set corresponding to that intellectual ability. The structure of the probability map is shown in Fig. 3,

where J denotes the set of students, θ_j denotes the higher-order latent traits of student j, and α_{jk} denotes the level of student j's skill knowledge competence with respect to the knowledge points k in the university English course. q_{ik} denotes whether or not the test question i relies on the knowledge skill k, η_{ji} denotes the extent of student j's knowledge of the knowledge point of college English on question i. s_i and g_i denote the rate of student j misses and guesses on question i, and R_{ji} denotes the actual response score of the student j on question i that is not affected by the factors of misses and guesses.

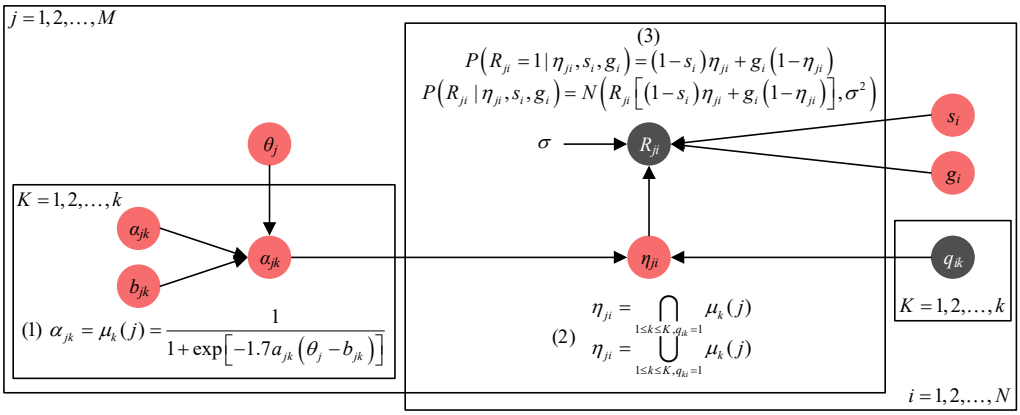

Fig. 3. Probability diagram structure

Assuming that each knowledge skill k in the university English course corresponds to a fuzzy set (J,μ_k), $\mu_k : J \to [0,1]$ is the corresponding fuzzy set affiliation function, and each university student j's university English knowledge competence level α_{jk} in skill k is the student j's affiliation in (J,μ_k). If student j has mastered skill k to a certain extent, student j belongs to the fuzzy set, i.e., $0 \le \alpha_{jk} = \mu_k(j) \le 1$. In this way, the study can map the knowledge competence level α_{jk} of college students in college English courses to the values in the interval [0,1]. According to the Logistic model in Item Response Theory, α_{jk} and $\mu_k(j)$ are defined as shown in Equation (1):

$$\alpha_{jk} = \mu_k(j) = \frac{1}{1+\exp\left[-1.7a_{jk}\left(\theta_j - b_{jk}\right)\right]} \tag{1}$$

The student's level of knowledge competence (α_{jk}) depends on the student's higher-order latent traits (θ_j) and the differentiation of the knowledge skill k for the student j (a_{jk}) and the difficulty (b_{jk}). where the coefficient 1.7 is an empirical parameter in the model that minimizes the difference between the normal and logistic distribution functions. Thus, the study can then calculate the level of knowledge competence of the students on the knowledge skill by virtue of their latent traits.

2.2.2. Methods of analyzing the level of knowledge mastery. In the development of the reform model of university English teaching, the students' mastery of the knowledge points in the university English course will be subject to the co-action of the students' level of knowledge and ability required for that test question. Therefore, the diagnosis of learners' cognitive level must take into account the different differences in the co-action of knowledge and ability on the subjective and objective questions. In college English programs, the co-action of knowledge and ability received on objective questions is generally considered to be associative. In contrast, subjective questions are more open-ended and free-form, and students' scores are based on their responses to give them the marks they deserve. Based on the calculated level of students' knowledge and ability, the cognitive modeling of these two co-actions using fuzzy logic can yield the degree of students' mastery of the knowledge points related to the university English test.

Student j's level of mastery η_{ji} on objective questions i in a college English course is defined as shown in Equation (2), and q_{ik} indicates whether the question i requires knowledge skills k. Student j's level of mastery η_{ji} of knowledge points on subjective questions i in a college English course is defined as shown in Equation (3):

$$\eta_{ji} = \bigcap_{1,,k,,K,q_{ik}=1} \mu_k(j) \tag{2}$$

$$\eta_{ji} = \bigcup_{1,,k,,K,q_{ik}=1} \mu_k(j) \tag{3}$$

More, without loss of generality, standard fuzzy intersection and concatenation operations are further used as shown in Eq. (4) and Eq. (5), respectively:

$$\mu_{A\cap B}(x) = \min\left(\mu_A(x), \mu_B(x)\right) \tag{4}$$

$$\mu_{A\cup B}(x) = \max\left(\mu_A(x), \mu_B(x)\right) \tag{5}$$

According to the above calculation process, both objective and subjective questions, it will be possible to calculate the students' mastery of the knowledge points in the college English test.

2.2.3. Methods of analyzing true scores of responses. The level of students' performance in the examination of university English courses is related to their mastery of the knowledge points of the examination questions, but also may be adversely affected by the guessing and blundering factors, which may lead to the existence of overestimation or underestimation of students' real abilities. In order to eliminate the influence of guessing and blundering factors on the assessment of the real cognitive level of learning, this paper fits the properties of the four-parameter Logistic model through the sirt toolkit in the R software, and estimates the values of the blundering and guessing parameters that may exist in the process of the examination of the students, and the model is calculated as shown in Equation (6):

$$P\left(X_{ji}=1 \mid \theta_j; a_i, b_i, c_i, d_i\right) = c_i + \left(d_i - c_i\right)\frac{e^{1.7a_i\left(\theta_j - b_i\right)}}{1+e^{1.7a_i\left(\theta_j - b_i\right)}} \tag{6}$$

Where, c_i denotes the guessing parameter and d_i denotes the sleep (mistake) parameter. The analysis process of students' real performance is shown in Figure 4, students may have the following four situations when answering college English test questions, the first is mastering the knowledge skills, but due to lapses answering wrongly. The second is not mastering the knowledge and skills, and there is no error in answering. The third is not mastering the knowledge skill, but relying on guessing to answer correctly. The fourth scenario is mastery of the knowledge skill and there is no guessing to answer correctly.

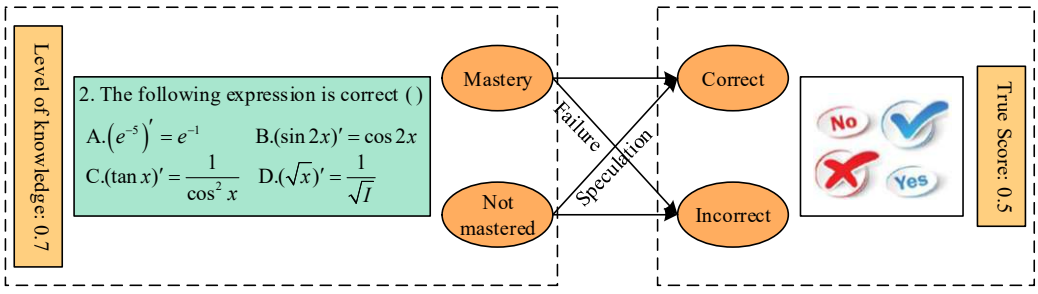

Fig. 4. Student's real performance analysis process

In summary, the true score of a student's answer can be calculated based on the student's mastery

of the subject matter, eliminating the effects of errors and guesswork. In the calculation process, the student's score on objective questions can be expressed as a binary variable in the set {0,1}. In the case of multiple scores for subjective questions, the learning score can be converted into a continuous variable value in the interval [0,1]. Therefore, in this paper, Bernoulli and Gaussian distributions are used to model the real scores of students' responses on objective and subjective questions, respectively, and the calculations are shown in Equation (7) and Equation (8), respectively:

$$P\left(R_{ji}=1\mid\eta_{ji},s_i,g_i\right)=\left(1-s_i\right)\eta_{ji}+g_i\left(1-\eta_{ji}\right) \tag{7}$$

$$P\left(R_{ji}\mid\eta_{ji},s_i,g_i\right)=N\left(R_{ji}\mid\left[\left(1-s_i\right)\eta_{ji}+g_i\left(1-\eta_{ji}\right)\right],\sigma^2\right) \tag{8}$$

where R_{ji} represents student j's true score on question i, s_i and g_i represent student j's mistakes and guesses on question i, and $\left(N\cdot\mid\mu,\sigma^2\right)$ is a probability density function of a Gaussian distribution, where the mean is μ and the variance is σ^2. $\left(1-s_i\right)\eta_{ji}$ indicates that the student has mastered the knowledge and skills required to answer the college English test questions and answered them correctly without making mistakes, and $g_i\left(1-\eta_{ji}\right)$ means that the student has guessed the correct answer and has not mastered the knowledge and skills required to solve the college English test questions.

3. Results and discussion

3.1. Validity test of the analysis of students' cognitive abilities

In order to verify the validity and explanatory power of the data computed by the method proposed in this paper for assessing students' cognitive ability in college English courses, this paper adopts the DINA model and combines it with the cognitive diagnostic analysis platform flex CDMS to diagnose and analyze the quiz data. The study subjects selected students from six different regions of the university. The students were both in the second grade of the university, and they used random sampling to ensure the universality of the sample. Assuming equal variance, the results obtained from the calculation and analyzed in this paper were analyzed for difference using t-test. College students' cognitive ability in college English is mainly divided into two aspects, which are subjective and objective questions. Among them, the subjective questions include composition and translation, and translation consists of two kinds of questions: Chinese to English and English to Chinese. Objective questions include listening comprehension and reading comprehension. Listening comprehension is divided into short news, long dialogues and listening chapters. Reading comprehension consists of three parts of questions: vocabulary comprehension, long reading and close reading. The results of the validity test analysis of the methods proposed in this paper for assessing the level of students' cognitive ability are shown in Table 1, and the p-values are all higher than 0.05, which indicates that the variances are approximately equal. The p-values (two-tailed) are also all higher than 0.05, which means that there is no statistically significant difference between the calculations of these 2 methods. Therefore, it can be assumed that the data have explanatory power and validity when using the method proposed in this paper for cognitive diagnosis of college students in college English courses.

Table 1. T test results (N=169)

Topic type	Knowledge point		F	P	T	P (Double tail)
Subjective problem	Writing		3.996	0.076	-0.783	0.461
	Translate	Translation from Chinese to English	3.766	0.408	-0.288	0.069
		Translation from	2.589	0.245	0.485	0.114

		English to Chinese				
Objective question	Hearing comprehension	Short story	1.04	0.221	0.137	0.153
		Long conversation	2.081	0.059	0.607	0.423
		Hearing passage	0.558	0.207	-0.541	0.246
	Reading comprehension	Vocabulary comprehension	3.063	0.35	-0.085	0.070
		Long reading	3.965	0.41	1.098	0.204
		Read carefully	1.552	0.081	1.555	0.325

3.2. The effect of the application of information technology teaching reform mode

In this paper, 54 students in a second-year class of University X in Siping City are taken as the research object of this college English teaching reform model to verify the teaching effect of the college English teaching model based on cognitive mapping. The students in this class are in the middle of their grade in college English, they do not know enough about the types of questions in college English, and they do not practice enough English test questions after class. The students are willing and interested in learning college English and can actively participate in this teaching reform study. The experimental model of this study is a two-group pre and post-test, and the teaching reform model was implemented for 10 weeks. At this stage, teachers identified students' cognitive problems in the college English program based on the diagnostic results and data of the pre-test, and designed and implemented targeted college English teaching based on the students' problems. In the process of teaching, students improved their cognitive maps and learned to improve their lack of knowledge and cognitive ability, in order to improve their mastery of knowledge and performance in the university English program.

3.2.1. Analysis of the impact of teaching on the level of English knowledge acquisition. This section analyzes the changes in students' English knowledge mastery before and after the implementation of the teaching reform model by using the methods of knowledge ability level analysis and knowledge point mastery analysis proposed in the previous section. The data were processed after organizing them in the order of school number, and the data of pre-test, post-test and ideal reference value were presented in the form of graphs in order to be analyzed and compared, in which the ideal reference value is the teacher's ideal value for the students' mastery of the knowledge points after the implementation of the information-based teaching mode. The results of the comparative analysis of the students' mastery level on the objective knowledge points of college English are shown in Figure 5, where A, B and C represent the cognitive level of mastery on the knowledge points of essay writing, Chinese-to-English translation and English-to-Chinese translation, respectively. As can be seen from the results of the comparison between the pre-practice and post-practice of the university English teaching model designed in this paper, the students' mastery level of the knowledge points of the subjective questions has been significantly improved, in which the mastery level of the knowledge points examined in the English-Chinese translation questions has increased from the initial level of 0.39 to 0.72, and at the same time, it has been found that the level of the post-test of the teaching is higher than the ideal reference level by 0.07. This indicates that after carrying out the informationalized university English teaching mode, the students' mastery and cognitive level of the knowledge points of the subjective questions in the college English course have been improved. However, students' mastery of Chinese-to-English translation (0.66) is still not up to the standardized reference level (0.70), which needs to be further improved in future teaching.

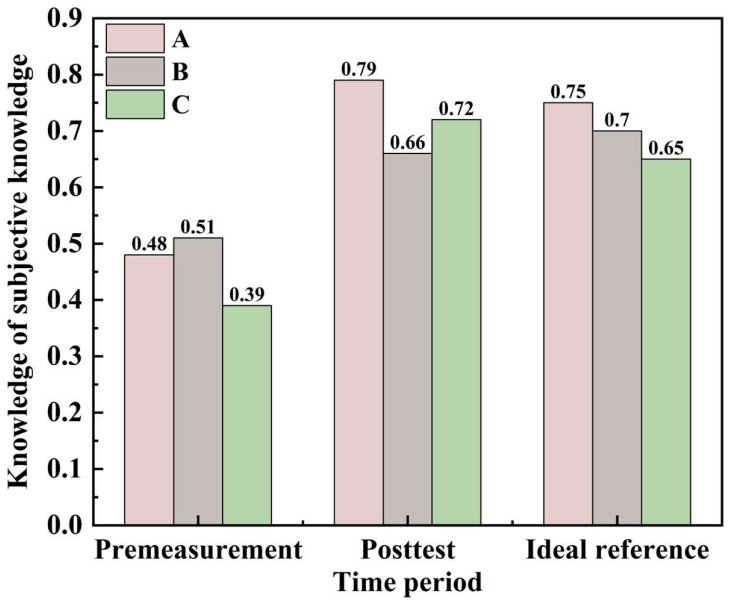

Fig. 5. Subjective knowledge points to master horizontal analysis results

The results of the analysis of the changes in the mastery and cognitive levels of the knowledge points in the objective question items are shown in Figure 6. The average mastery and cognitive level of the knowledge points examined in the listening comprehension section increased from 0.32 before the teaching practice to 0.78 and was higher than the ideal reference value (0.71), which indicates that the students' competence in listening comprehension in the university English program has improved compared with the pre-test. However, it can be seen that the mastery and cognitive level of the knowledge points examined in the short news items (0.73) is only slightly higher than the ideal reference value (0.71), and students and teachers need to pay attention to the importance of listening to and comprehending the short news items in their subsequent study and listening practice. According to the results of the analysis of the level of knowledge mastery in reading comprehension, students' knowledge mastery in vocabulary comprehension (0.90), long reading (0.81) and close reading (0.81) improved significantly after the 10-week reform teaching mode. The knowledge level of vocabulary comprehension has reached 0.9, which is much higher than the ideal reference value of 0.76, indicating that students can enrich their vocabulary through cognitive mapping and improve the knowledge level of vocabulary comprehension. Combined with the above comparative analysis of the mastery and cognitive level of the knowledge points examined in the subjective questions, it can be seen that the reform model of college English teaching based on the cognitive mapping construct has had a positive impact on the learning ability and mastery of the knowledge points of the college students in the college English course.

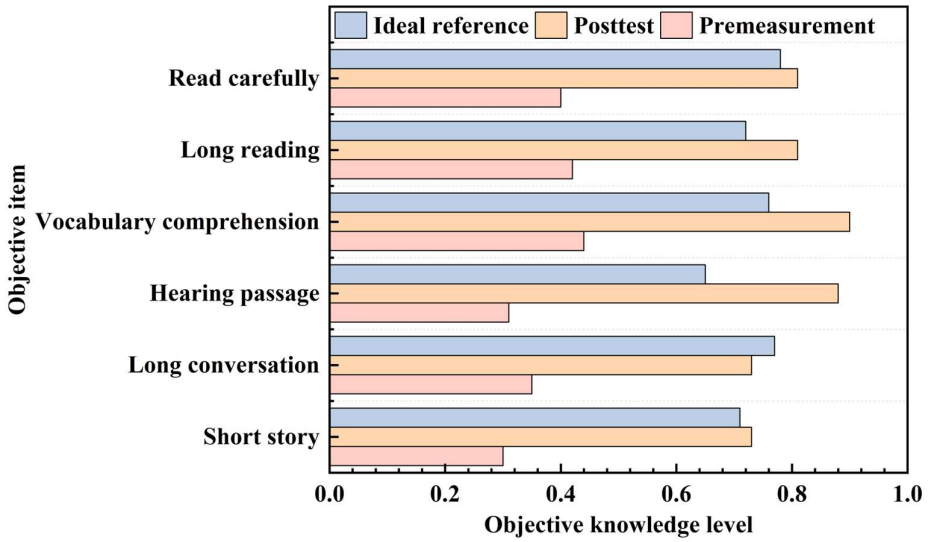

Fig. 6. Objective knowledge control level analysis

3.2.2. Changes in the percentage of correct answers to English questions. In this section, the correct rate of college students in college English exam questions is analyzed by using the method of calculating the true score of the answers, and the results of the changes in the correct rate of the answers to the English questions before and after the teaching mode obtained from the analysis are shown in Table 2. After 10 weeks of the implementation of the college English teaching mode, the overall correct rate of students' responses to each item in the college English test questions has been improved. From the results of analyzing the correct rate of answering subjective questions, college students' correct rates of answering essays and Chinese-to-English translations before the implementation of the teaching model were 58.4% and 51.81% on average. After the implementation of the university English teaching reform model constructed in this paper, the correct rate of answering the essay in the test questions increased to 88.84%, and similarly, the correct rate of answering the Chinese-to-English translation increased by 27.49%. In the analysis of the correct rate of answering the objective questions, after the implementation of the teaching model, the students' correct rate of answering all the questions in the university English exam increased significantly, with the growth rates ranging from 13.91% to 33.02%. In addition, by comparing the growth rates of each question type before and after the implementation of the university English teaching reform model, it was found that the growth rate of the students' correct answers to two questions, namely, essay in subjective questions and listening chapter in objective questions, was larger. This may be due to the fact that in teaching the university English teaching model under the cognitive mapping construct, students need to plan, regulate, monitor and reflect on logical strategies, and judging the topic options based on the content in the listening dialogues and writing compositions according to the topic requirements are two important logical strategies. In addition, the improvement of students' writing ability may also be due to the fact that students are required to analyze the main idea of the essay in the reform model of college English teaching, and then make self-revision and self-reflection in the process of writing.

Table 2. Comparison analysis of the correct accuracy of the question

Topic type	Knowledge point		Accuracy (%)		Growth rate (%)
			A	B	
Subjective problem	Writing		58.4	88.84	30.44
	Translate	Translation from Chinese to English	51.81	79.3	27.49
		Translation from English to Chinese	56.35	79.52	23.17
Objective question	Hearing comprehension	Short story	56.91	71.66	14.75
		Long conversation	64.43	79.83	15.4
		Hearing passage	52.14	85.16	33.02
	Reading comprehension	Vocabulary comprehension	56.85	73.06	16.21
		Long reading	52.78	71.42	18.64
		Read carefully	66.49	80.4	13.91

4. Conclusion

This paper designs the teaching reform model of college English based on the construction of cognitive mapping of college English courses. It also proposes a student cognitive level analysis method to analyze the English learning situation of students after the teaching mode is carried out.

1) There is no significant difference between the analysis results of the cognitive ability analysis method and the cognitive diagnostic analysis platform in this paper ($P>0.05$), which proves that the proposed method is able to effectively analyze the cognitive level of students in college English courses and supports the subsequent research.

2) After 10 weeks of reform teaching, students' mastery of subjective questions has increased significantly, with the mastery level of English to Chinese translation increasing from 0.39 to 0.72. The mastery level of vocabulary comprehension in objective questions has reached 0.9, much higher than the ideal reference value of 0.76, which indicates that students can improve their mastery of vocabulary comprehension through the cognitive mapping. Continuously enrich the vocabulary they have mastered and improve the level of knowledge mastery in vocabulary comprehension.

3) The average correctness of university students' responses to essays and Chinese-to-English translations before the implementation of the teaching model was 58.4% and 51.81%. After the implementation of the university English teaching reform model constructed in this paper, the percentage of correct answers to the essay in the test questions increased to 88.84%. It was also found that the students' correctness in answering both the essay in the subjective questions and the listening chapter in the objective questions increased more.

Comprehensive analysis of the results, this paper based on cognitive mapping constructs of college English teaching reform model in practice has achieved good results, can effectively improve the students' knowledge of the level of knowledge and the correct rate of question answering.

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