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Syntactic Evaluation and Teaching Mode of College English from the Ecological Perspective

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Abstract: After years of research and debate by researchers, the theory of educational ecology has been continuously enriched, but there are still many practical and specific problems to be solved. From an ecological point of view, the ecosystem of college English education has moved from unbalanced to balanced. However, with the development of society, the original balance system is disrupted. The purpose of this study was to review college English teaching from the perspective of educational ecology and combined with the analysis of college English syntax, and selected non-English language students, current English teachers and university administrators as respondents. Firstly, respondents were provided with questionnaires to determine the current state of development of college English in the educational ecosystem. Secondly, according to the principle of education ecology, the results were analyzed to find out the main problems. Finally, suggestions were made on how to improve these issues to facilitate English teaching. From this, it could be seen that only about 10% of students could often actively express in English classrooms, and about 60% of students did not express or rarely express.

1. Introduction

From an ecological point of view, traditional higher English education is an ecologically balanced system. Different ecological elements in an ecosystem have reached a relatively stable state over a long period of time. However, with the development of social technology, higher English education is finding its ecological balance more and more difficult to maintain, so higher English education is also constantly reforming. In order to solve these problems, this paper used the principles of educational ecology to analyze and discuss the causes of the phenomena and problems that needed to be improved in the current college English teaching ecosystem.

English learning and teaching are getting more and more attention in higher education. Yu Y proposed a new innovative model of college English teaching, and used the learning resources and MOOC systems that were more acceptable to students [1]. Feng T proposed to introduce empirical research methods in college English courses to quantitatively study the effectiveness of flipped classrooms [2]. Shi G investigated the relationship between teachers and students' error correction attitudes, teachers' error correction behaviors and teacher effectiveness in Chinese college English classrooms. The main conclusions were: Firstly, teachers had more negative attitudes towards error correction than students. Secondly, teachers and students viewed error correction differently. Among the types of error correction, formal negotiation was the best and was the first choice for

both teachers and students [3]. Li L H proposed a new way of thinking about the current situation of college English language assessment based on the Internet of Things. The Internet of Things would provide intelligent information, thereby increasing the flexibility of teaching. Data collected from formative assessment would be carefully analyzed using data mining algorithms to determine whether teachers could apply formative assessment to English teaching [4]. Sun Y's research results showed that the combination of face-to-face classroom teaching with online self-study or human-computer integrated learning was an ideal teaching mode that was popular with students and could improve students' language ability [5]. Although the above scholars have done research and surveys on college English, they have not put forward detailed solutions to the problems.

Ecological teaching is a new type of classroom teaching mode that is widely used, which is also often used in English teaching. The main purpose of Guo X's research was to investigate the ecological model of education and examine the current situation of college English teaching in the computer network environment. He highlighted the entire design process of the ongoing empirical research: Firstly, the research question was identified; secondly, the topic, variables, and appropriate research methods were selected; thirdly, the design process and its steps were detailed. Finally, category analysis and ecological analysis were performed based on the collected data and textual information [6]. In recent years, colleges and universities have begun to develop educational information systems and have achieved remarkable results; college English education and IT have worked closely together to create a large-scale English education IT system. Therefore, Zhang J believed that it was particularly important to deeply study the ecological imbalance of English higher education and find a suitable solution [7]. Zhang S studied the teaching effects of various learning methods such as MOOC, micro-learning, multimedia and online platforms based on the concept of ecological green education, and analyzed the parameters of information technology in a theoretical model [8]. The above scholars all use the perspective of ecology to conduct research and analysis on English teaching in colleges and universities, but they still lack specific experimental methods.

This paper drew on the principles of educational ecology and adopted a combination of qualitative and quantitative analysis. Based on the data from field research, this paper discussed the causes and optimization strategies of college English teaching problems from a new research perspective. This provided some guidelines for further improving the college English teaching system and enhancing the quality of college English teaching.

2. Investigation of Teaching Algorithm Based on Cognitive Diagnosis from the Perspective of Ecology

2.1 Teaching Background

With the deepening of education and teaching reform and the rapid development of multimedia teaching and learning applications, test question banks and teaching tools for various disciplines have also been launched. This is not only conducive to the monitoring of teaching quality at the macro level, but also plays an important role in guiding curriculum development planning. In recent years, the number of e-learning resources has grown, and the degree of learning difficulties and information overload has become increasingly evident [9]. For students, a large number of learning tools can be very helpful in finding the learning resources they need. However, when students actually use the online education system, a large number of resources make it difficult for them to choose the resources that meet their needs, so the effective use of personalized learning tools is a key requirement for student learning.

Research shows that personalizing recommendations for learners in e-learning systems can be very effective in improving learning outcomes and increasing student effectiveness. The

recommendation of resources of different difficulty levels can help students enhance their confidence and interest in learning and improve their academic performance [10].

This paper classifies the main concepts of knowledge points, analyzes the personal characteristics of learning users, and explores modern methods for modeling learning users' personal cognitive abilities. The existing cognitive learner individual diagnosis model is improved by calculating the correct answer rate, and a cognitive learner diagnosis algorithm based on time-sensitive deterministic input and noise gate (Time sensitive Deterministic Inputs, Noisy And gate, which would be explained below using the abbreviation of TDINA) model is proposed.

2.2 TDINA Model Algorithm Design

(1) TDINA modeling

The student's initial response is defined by Formula (1). Among them, $\omega_{ji}=1$ means that the student has learned the knowledge. When $\omega_{ji}=0$, it means that the student has not learned the knowledge.

$$\omega_{ji}=\prod_{l=1}^{k}\eta_{jl}^{il} \tag{1}$$

(2) EM solution

The TDINA model is based on the conditional distribution of the response data t_{ji} of the student control vector $\vec{\eta}_j$. Among them, it is assumed that students' responses to each question for each attribute data vector are independent, so $\vec{t}_j$ the resulting conditional distribution is in Formula (2).

$$K(\vec{t}_j\,|\,\eta_j)=\prod_{i=1}^{m}q'(t_{ji}=1|\vec{\eta}_j)^{t_{ji}}(1-q'(t_{ji}=1|\vec{\eta}_j)^{1-t_{ji}} \tag{2}$$

(3) Experiment and evaluation

1) Evaluation indicators

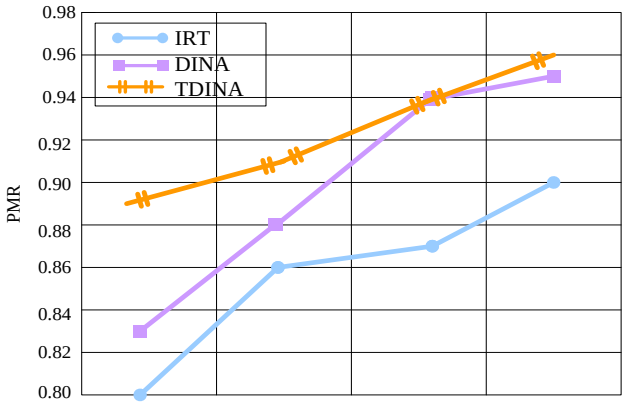
The model's performance was checked with the Pattern Match Ratio (PMR) and Root Mean Square Error (RMSE). PMR is calculated according to Formula (3).

$$PMR=\frac{\sum_{r=1}^{R}\sum_{j=1}^{N}J^{(r)}(\vec{\eta}_j=\hat{\vec{\eta}}_j)}{R*N} \tag{3}$$

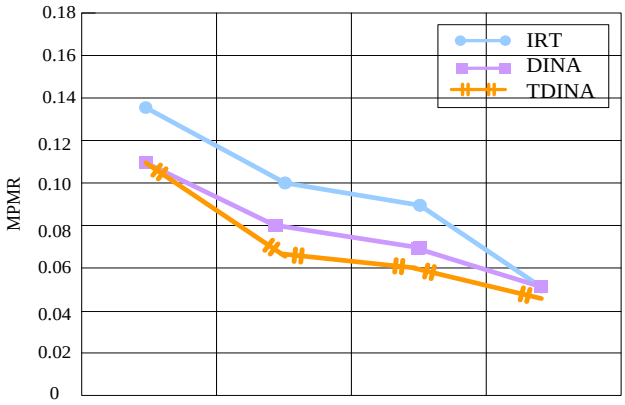
Among them, $J^{(t)}(\vec{\eta}_j=\hat{\vec{\eta}}_j)$ indicates whether the $\hat{\vec{\eta}}_j$ estimated by the rth experiment is exactly the same as the real value $\vec{\eta}_j$.

2) Analysis of results

In the experiment, 10%, 30%, 50% and 70% of the dataset are used as test data respectively. Figure 1 shows the different values of the cognitive diagnostic model for each proportion of test data. The test results of PMR are shown in Figure 1(a) and the test results of RMSE are shown in Figure 1(b).



(a) Experimental results of PMR values



(b) Experimental results of RMSE value

Figure 1: Values of different cognitive diagnostic models under each test dataset ratio

As shown in Figure 1(a) and Figure 1(b), the PMR value of the TDINA model keeps increasing as the training set increases. However, the RMSE decreased first and then decreased slowly, which is generally better than the other three modeling methods.

2.3 Recommendation of Teaching Resources Based on Convolution Joint Probability Matrix Factorization Model

(1) Convolutional Neural Network (CNN)

With the development of deep learning techniques, CNN is widely used, indicating that its utility is effectively demonstrated by various studies [11]. CNN have many advantages mainly due to parameter sharing, weight dispersion and flexibility [12]. Its components are as follows:

A. Word embedding layer

The word embedding layer converts the raw test data into a dense numerical matrix as the input to the next convolutional layer [13]. The test questions are represented as a dense numerical matrix $R_i \in T^{q \times k}$ by concatenating word vectors from the test question data according to Formula (4). Among them, q is the size of the vector and k is the number of word vectors.

$$R_i = [..., w_{j-1}, w_j, w_{j+1}, ...] \tag{4}$$

B. Convolutional layer

Convolutional layers are mainly used to extract information about the attributes of test items [14]. The contextual feature $d_j^i \in T$ of the test question is obtained by the ith weight $W_d^i \in T^{q \times w}$ of the distribution.

$$d_j^i = fun(W_d^i \otimes E_{(:,j:(j+w-1))} + b_d^i) \tag{5}$$

Among them, "$\otimes$" represents the convolution operation; $b_d^i \in T$ is the corresponding deviation of W_d^i; fun is the nonlinear excitation function.

In the test vector matrix convolution, the test data m_d is represented as a marker matrix of one horizontal dimension. The dimensions of the test flag vectors are unequal, that is, the number of columns of the matrix is unequal [15].

$$e_h = [\max(d^1), \max(d^2), \ldots \max(d^i), \ldots \max(d^{m_d})] \tag{6}$$

3. Investigation of College English Syntactic Evaluation and Teaching Mode

3.1 Theoretical Principles

(1) Syntactic analysis

English is a semantically flexible language governed by a complex sentence hierarchy, which emphasizes the hierarchy and precision of sentence structure [16]. Sentence components at different levels produce different semantics under the constraints and authority of different rules. When learning English, it is easier to understand and use the language if have a good understanding of how sentences are organized and formed.

(2) Ecology and Educational Ecology

College English teaching is a whole, and every part of it is interconnected. The balance of the whole is maintained by the constant interaction of various parts, so college English teaching is not only an organic whole, but also a whole ecosystem.

1) Ecological subject

The main players in the ecological process are students and teachers. Therefore, these two groups complement each other and coexist together to create an excellent college English community and contribute to the sustainable development of the college English teaching ecosystem.

2) Ecological environment

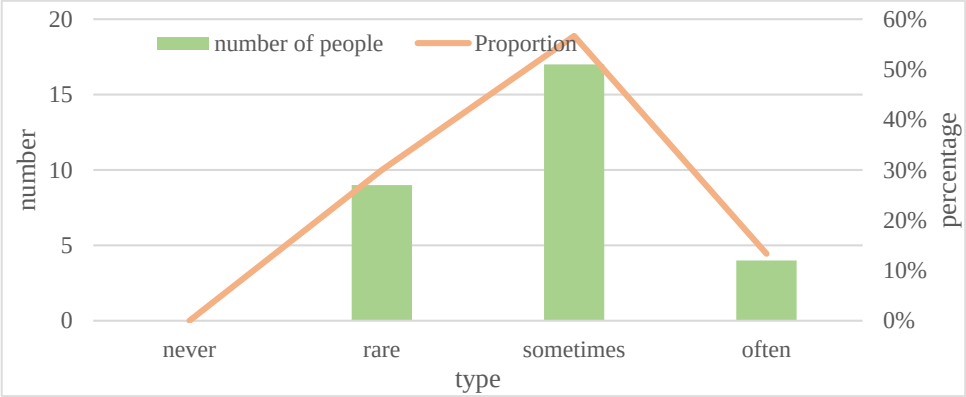
In universities, all English teaching activities are carried out in a certain environment, which affects the development of English subjects. Therefore, the ecological environment is also an important part.

3.2 Investigation and Evaluation

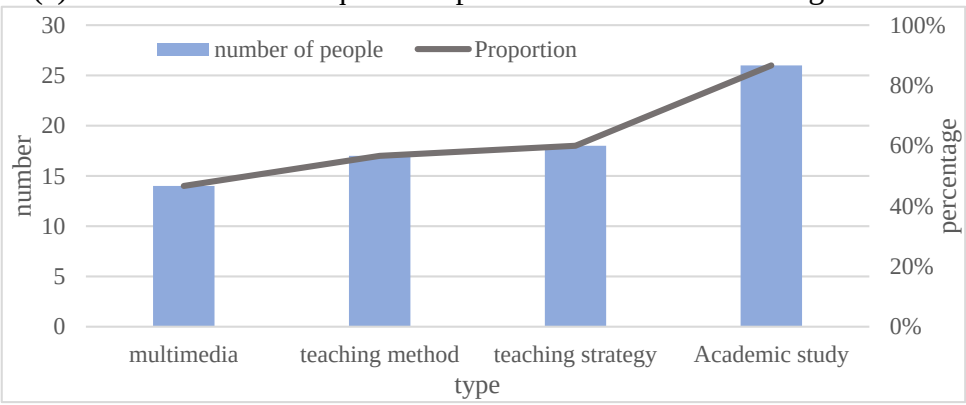
This paper uses questionnaire data for analysis to intuitively reflect the current situation of college English syntactic analysis and teaching mode teaching.

(1) Investigation and analysis of the status quo of ecological subjects

A. The statistics of the survey results for teachers' professional development are shown in Figure 2. Among them, (a) is whether the cooperation and research between teachers are often carried out, and (b) is the training in which of the following aspects teachers want to get.



(a) Whether there is frequent cooperation and research among teachers



(b) Teachers want training in which of the following

Figure 2: Statistics of teacher professional development survey results

As can be seen from Figure 2(a), 9 teachers never or rarely conduct joint research and curriculum evaluation with other teachers; 17 teachers occasionally conduct joint research; only 4 teachers used this method frequently to improve their teaching methods. This shows that most teachers are comfortable with this teaching style of collaborating and communicating with other colleagues.

From Figure 2(b), it can be concluded that 14, 17 and 18 teachers are willing to receive training in multimedia management, teaching methods and teaching strategies, respectively. Twenty-six teachers wanted to receive in-depth training in their subject areas to enhance their professional knowledge and skills, indicating an opportunity to enhance academic in-service training for teachers.

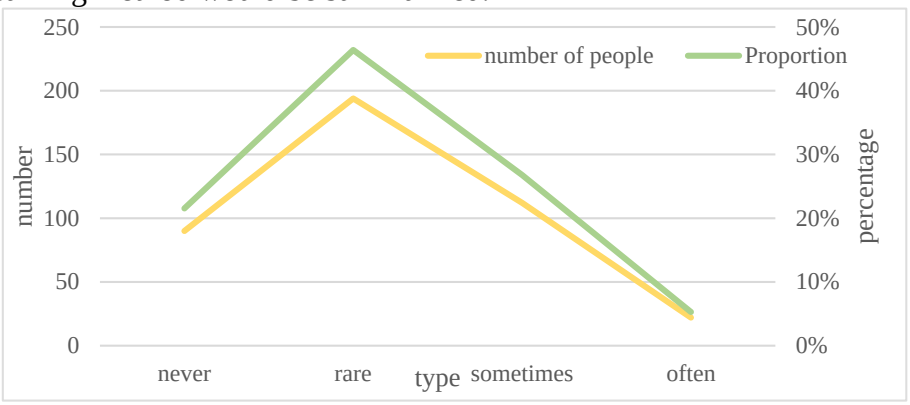
B. The statistics of the survey results for students' learning methods are shown in Figure 3. Among them, (a) is whether the English class would be summarized and organized, (b) is whether the learned vocabulary is often used to make sentences.

As can be seen from Figure 3(a), 21.53% of students basically do not summarize what they have learned after English class; 46.41% rarely summarize; 26.79% sometimes summarize; only 5.27% often summarize. Class observation shows that this small group of students has a relatively high level of English. It seems that summarizing after class is a good habit and can promote the progress of students' performance.

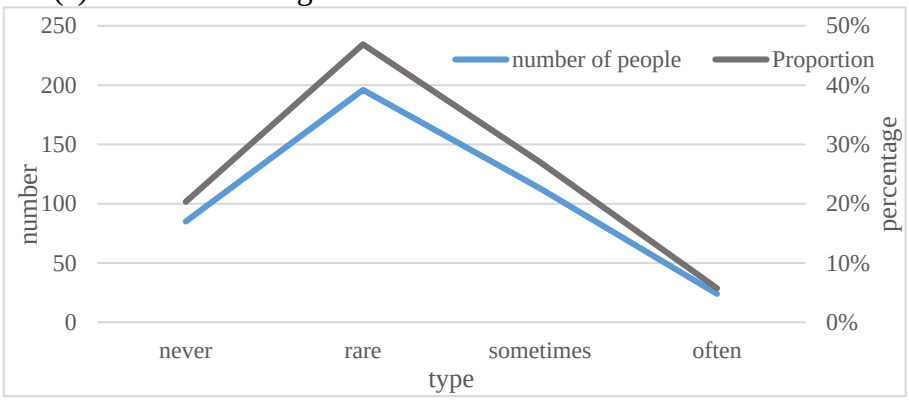
As can be seen from Figure 3(b), the proportions of students who never or rarely make sentences are 20.33% and 46.89%, respectively. 27.03% of them can make sentences under the guidance of teachers, and only 5.75% of them often make sentences. It shows that most students are unfamiliar with this learning method and reluctant to try it.

C. The statistics of the survey results for students' study time are shown in Figure 4. Among them, (a) is whether the time to learn English is planned every day or each stage, (b) whether one's

own English learning method would be summarized.

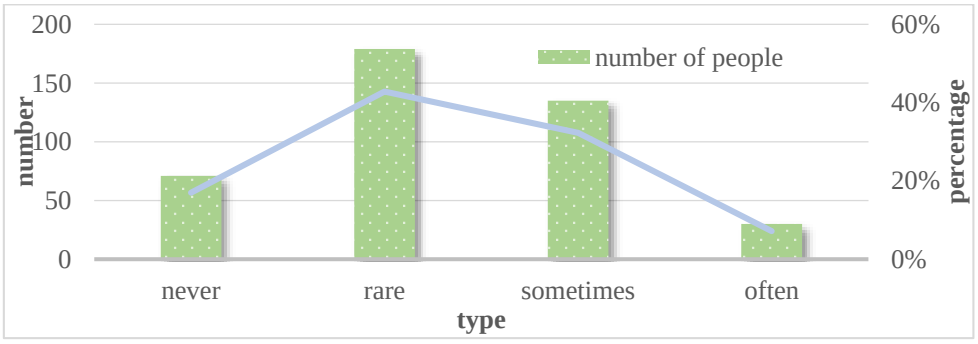


(a) Whether the English class would be summarized after class

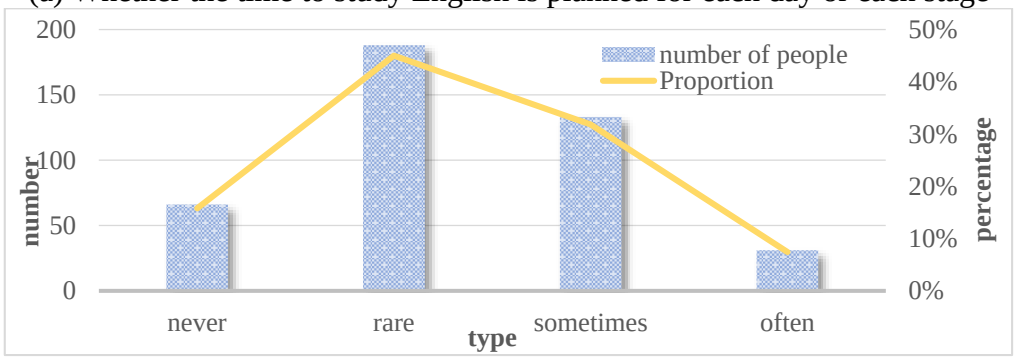


(b) Whether the learned vocabulary is often used to make sentences

Figure 3: Statistics of student learning methods survey results



(a) Whether the time to study English is planned for each day or each stage



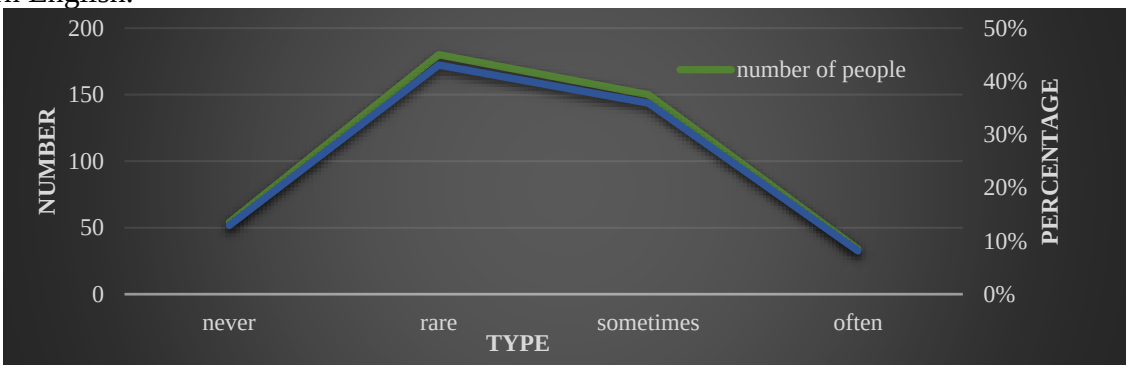
(b) Whether their own English learning methods would be summarized

Figure 4: Statistics of student study time survey results

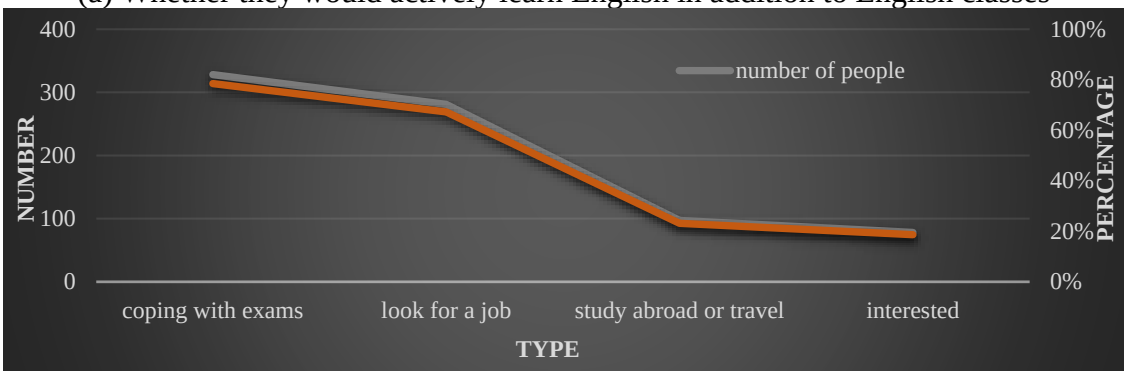
From Figure 4(a), it can be seen that the proportion of students who never or seldom plan time is more than half; the proportion who plan sometimes is 32.3%; only 7.18% of students plan English time regularly.

From Figure 4(b), it can be seen that about 60% of the students never or rarely reflect; 31.82% reflect from time to time; only 7.41% of the students often think about their English learning methods and summarize their strengths and weaknesses. This means that most students do not reflect on their English learning methods to improve their learning efficiency.

D. The attitude of students towards English learning is shown in Figure 5. Among them, (a) is whether they would actively learn English in addition to English classes, and (b) is the motivation to learn English.



(a) Whether they would actively learn English in addition to English classes



(b) Motivation to learn English

Figure 5: Students' attitudes towards English learning

It can be seen from Figure 5(a) that more than half of the students never or rarely learn actively, and less than 10% of the students would learn actively. From this, it can be seen that students are not very conscious of actively learning English, and they still regard the subject of English as a learning task.

From Figure 5(b), it can be seen that the main motivation for studying is to cope with the exam in the university, and only a small number of people learn English because of interest or to go other countries.

(2) Investigation and analysis of the status quo of the ecological environment

A. The survey on whether teachers think students are actively participating in classroom activities is shown in Figure 6.

Figure 6: Survey of teachers' perceptions of whether students are actively participating in classroom activities

It can be seen from Figure 6 that students basically do not actively interact with teachers, and only 10% of students would actively interact in class. It can be seen that the number of students passive learning is the majority.

B. The survey on student exchanges is shown in Table 1.

Table 1: Frequency of discussing learning methods with classmates

Options	Number of people	Proportion
A. never	88	21.05%
B. very little	185	44.26%
C. sometimes	120	28.71%
D. often	25	5.98%

It can be seen from Table 1 that more than 65% of the students rarely or never cooperate in learning, and only 25 students often cooperate and communicate. Therefore, the students who are available do not often cooperate and exchange learning.

3.3 Discussion of Experimental Results

(1) Emphasis on teacher development

In the college English education ecosystem, teachers' words and deeds affect all aspects of students. The higher the teaching ability of teachers, the better the quality of students. The more suitable teachers' teaching methods and strategies are for students, the better students' English language skills can be mastered and the more harmonious the teaching development would be.

(2) Adjustment of teacher-student relationship

Teachers and students must first change their roles. Teachers need to make appropriate changes in teaching objectives, methods and styles to meet the actual needs of students. The relationship between teaching and learning is handled in such a way that they become not only facilitators of teaching and organizers of classrooms, but also partners of students.

(3) Rational use of science and technology

Teachers reorganize the logical content of textbooks into guides that match the knowledge and skills of learners, but it is not enough to rely on textbooks as effective teaching and learning tools. Teachers must mobilize all available resources to support teaching and learning and expand learners' access to English to overcome language limitations.

4. Conclusions

With the growth of students' interest in English learning and the development of higher education, college English compulsory courses have assumed more and more responsibility, which has laid a foundation for the all-round development of talents who are about to integrate into society. However, the current situation of college English teaching is not ideal, because the students do not have the ability to learn independently, the professional quality of teachers also needs to be improved, and the learning environment needs to be strengthened. In order to improve the syntactic analysis and teaching mode of college English and improve the effectiveness of college English teaching, this study followed the method of "discovery-analysis-problem solving" and selected non-first-year college English teachers and current college English teachers from a certain university as the research objects. The method of questionnaire was adopted, and the teaching algorithm of cognitive diagnosis was combined. Finally, the research results were analyzed and appropriate optimization strategies were proposed.

Due to the limitation of my research ability, this paper has the following shortcomings: Firstly, the time and energy spent are limited. For example, the interview questions and the number of respondents are small, which can only cover part of the data related to the research; secondly, the sample size of the research and the data collected are not enough to fully reflect the current situation in college English teaching.

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