Research Article

English Proficiency Evaluation Model of College Students by Using Intuitive Fuzzy Information Theory

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English is a required university course in China and is a long-standing and consistent undergraduate-level course in China’s universities. It uses English as the medium and language of instruction to promote general education. As the most important content of undergraduate foreign language education, college English has different characteristics from other courses. It is only when its objectives, content, teaching activities, and assessment system fully reflect its unique requirements that it can truly achieve the ultimate goal of teaching this subject. With the advent of the information age, global economic integration and international exchange are deepening in various industries and fields. It is increasingly common for countries to require professionals to have foreign language skills, especially English as an international language. As a result, the demand for deeper English proficiency has become more prominent. In international communication, the English intercultural communication ability of key personnel directly affects the process of international communication, science and technology exchange, and the smooth transition of cultural conflicts in various fields and even determines the ultimate success of project cooperation. In this context, the effective use of English and cross-cultural communication skills is very important. Therefore, our higher education institutions are mainly responsible for training foreign language talents. However, the core problem facing English teaching in Chinese universities is the teaching value orientation. In particular, it seriously restricts the effectiveness of university English teaching. First, the value orientation of university English teaching deviates from the teaching objectives. It emphasizes the basic knowledge and skills of the English language, which makes teaching mainly stay on the foundation of the language. In other words, it is still limited to learning English for the sake of learning English, and the examination-oriented education is obvious, with a preference for instrumental teaching. Secondly, university English teaching focuses too much on the accumulation of English grammar rules and imitation drills, and the teaching style is dull and the teaching context is empty. This approach deviates from the characteristics of English intercultural communication, which makes the gap between the actual university English teaching and the real intercultural communication more and more obvious. Third, university English teaching lacks integration with other teaching values, especially with the humanistic orientation of university English teaching. Nowadays, a single teaching value orientation dominates university English teaching. As a result, the teaching around various English examinations has become a strange phenomenon in college English teaching.

1. Introduction

It is common knowledge that English is increasingly recognized as a tool for communication with the world [1]. In this context, universities are obliged to take up the important task of training foreign language talents to meet the needs of social and economic development. English, as an international lingua franca, has been chosen as a compulsory course in many universities [2]. The teaching of English in universities has become a basic public course in almost all universities and has long occupied an important position in the teaching system of Chinese universities. College English teaching is essentially a language teaching [3]. Whether it can be reasonably manifested or not is related to the quality of university English teaching. However, among the many problems faced by English teaching in China in recent years, the value orientation of English teaching in general has become a core issue that cannot be avoided [4]. Through years of college
English teaching practice and interviews with some teachers and students in Chinese colleges and universities, we found that the traditional college English teaching tends to emphasize humanism over instrumentality [5]. In other words, the value orientation of traditional college English teaching does not integrate the instrumental and humanistic features of English, which seriously restricts the development of college English teaching. There are many reasons for such confusion in university English teaching, but an important factor is the existence of teaching value orientation in the teaching concept [6]. As a result, to change the teaching efficiency problem of college English teaching, the value orientation of college English teaching has become an important breakthrough for the reform and development of college English teaching. In other words, the research on the value orientation of college English teaching has become inevitable [7].

College English is a compulsory public course in colleges and universities that uses English as the medium and language of instruction to promote general education [8]. As can be seen in Figure 1, the number of English learners in China keeps increasing in recent years. As the most important content of undergraduate foreign language education, English for university students has a unique property that is different from other courses, i.e., course characteristics [9]. It is only when the objectives, content, teaching activities, and assessment system fully reflect its characteristics that the ultimate goal of the subject can be truly achieved. The essential function of language is communication [10]. After all, language is not a combination of acquired rules and forms, but a product of the communicative process. There are several characteristics of the subject of English at the university level [11]. First of all, English is a tool for international intercultural communication. Students in the new century should be able to compete in the international talent market, which requires them to have intercultural communication skills [12]. University English teaching should not only help students acquire knowledge, expand their vision, and train their thinking through foreign languages, but more importantly, it should also meet the intercultural communication skills necessary for students’ study abroad, daily communication, and academic exchange [13]. In the future, learning English will no longer be just about learning English, but should be integrated with a particular area of expertise or a particular discipline. Therefore, the content of foreign language learning should be linked to other practical subjects. This will not only ensure the connection between the content and the reality and students’ own experience but also provide a communicative approach to foreign language teaching. Learner perceptions, motivation, and personality traits are important factors that influence learners’ language learning [14]. As a result of these individual differences, learners’ approaches, progress, and effectiveness in learning English can vary greatly. The teaching of English at the university level should be characterized by its objectives, content, methods, organization, management, and evaluation criteria [15].

In recent years, the majority of teachers have made great efforts in the practice of teaching English at university and have made some achievements and encountered many problems. These problems have created a lot of confusion, and some of them are quite controversial, and the value orientation of university English teaching is one of the core issues [16]. The study of the value orientation of university English teaching has become a prominent and difficult issue in the theoretical research of higher education in China. Since the reform and opening up of China, university English teaching activities have been very active [17]. It has become a compulsory public foundation course in higher education institutions in China, thus becoming the course with the largest number of schools, the widest coverage of students, a large team of teaching managers, and a high social reputation. Nowadays, most of the English language teaching objectives are still focused on building a good language foundation, and the current teaching task is still to develop students’ general language skills [18]. In other words, the main goal of students is to learn English well. Schools do not set scientific and reasonable teaching goals and differentiated teaching strategies according to the needs of society and the differences among students [19]. The emphasis is on general listening, speaking, reading, and writing skills, while the actual goal is to improve students’ test-taking ability. In particular, the pass rate of the College English Level 4 examination affects students’ ability to graduate [20]. In particular, the pass rate of the Level 4 examinations affects students’ ability to graduate from the university, and the Level 4 certificate also has an impact on students’ employment, which forces students who do not have a good command of English or whose majors require less English to receive basic English education.

In addition, there is a big gap between the teaching of English at university and the requirements of intercultural communication [21]. There are many problems in the actual teaching of college English that do not meet the current needs of intercultural communication. It is difficult to reflect the real intercultural communication skills of the learners in the grades, or to say that the students’ intercultural skills do not necessarily increase when their foreign language skills improve [22]. As a result, it is relatively difficult to develop students’ intercultural competence in foreign language teaching that is mainly characterized by test-taking. The content of teaching is based on static knowledge and ignores the global intercultural context. The so-called intercultural
communication is covered in the classroom by introducing some intercultural knowledge, but mostly at the level of intercultural knowledge. The content of teaching is still limited to the language itself, with teachers teaching for the sake of teaching cultural knowledge and students learning for the sake of learning cultural knowledge [23]. The content does not reflect the nature of English learning as a tool to support other disciplines. To make matters worse, the effectiveness of teaching and learning is alarming. Surveys have found that many students lack interest in college English classes and find it difficult to learn what they really need because they believe that college English classes are focused on examinations [24]. Teaching English around various examinations is a feature of English teaching in China.

Self-directed learning is a way of learning in which individuals exercise their autonomy and creativity in learning activities. The new era is the era of lifelong learning and the era of independent learning [25]. As a result, improving learners’ self-directed learning ability has important practical significance and far-reaching influence. The rapid development of information technology, such as machine learning [26], mathematical modelling [27], and deep learning [28], has provided rich resources and convenient tools for English self-directed learning and gradually influenced traditional English learning, which has attracted the attention and discussion of many researchers. Computer technology not only plays a huge role in English classroom teaching but also has a significant impact on the process of independent learning outside the classroom [29]. Self-directed learning is a process in which learners determine their own learning goals, select content and materials, use appropriate learning strategies, and evaluate and reflect on the results of their learning. Computer technology can provide a vast amount of resources for independent learning and enhance students’ willingness to learn independently [30]. In addition, it can stimulate students’ interest and enthusiasm in learning English, make efficient use of resources in their own learning, and share learning resources effectively. In summary, the English teaching objective can be seen in Figure 2.

Independent learning in the information technology environment uses information technology as a learning environment, learning resources, learning methods, and cognitive tools, emphasizing students’ skills in using computer technology and their ability to acquire effective information and process information in the learning process [31]. In this context, students can use computer technology to conduct English-related independent learning more efficiently and conveniently, thus largely compensating for the shortcomings of traditional classroom-based teaching and learning and greatly improving their English proficiency. Therefore, it is important to encourage and support students to use computer technology to learn English independently outside of class. In the field of education, especially in the teaching of English, computer technology has become an important driving force in the reform of teaching and learning. On the one hand, it can be used to organize the content needed for learning to complement traditional teaching. Therefore, the integration of computer technology and education is of great significance and is an important part of the current educational reform.

2. Analysis of Current Situation of English Proficiency of College Students in China

Since 1985, English has been a compulsory public course in general higher education in China. In the three decades since the introduction of public English courses, there have been fundamental changes in the objectives of teaching and learning. The change in English language teaching in universities is a key component of the quality and change in teaching in higher education in China. The theory and practice of teaching change not only cover the development of public English as a discipline but also has important implications for the teaching of other courses. The quality of public English instruction at the university level will contribute significantly to the overall quality of student development. At the same time, it also has a role in the economic and social progress of China and in the improvement of international competitiveness. However, in China, English teaching has been limited for a long time by grammatical translation methods.

Through data collection and analysis, this section will objectively identify the shortcomings of current university public English teaching and provide objective data and reference for the reform of English teaching.

2.1. Data Collection. This study used hierarchical analysis to develop the questionnaire. This method can closely link the qualitative and quantitative aspects, so that the analysis can be carried out systematically and in a hierarchical manner. As can be seen in Figure 3, the questionnaire was designed to improve the overall English proficiency of college students, and the four aspects of students’ English learning process, namely theories that must be learned, theories that are missing, students’ knowledge and skills, and students’ motivation, were used as the guideline level. The statistical analysis of the questionnaire results in the target, criterion, and program levels can identify the commonalities among
different levels and groups with different needs, which can serve the reform of college English teaching.

After confirming the validity of the questionnaire, the study was conducted in February 2022. Due to time and geographical constraints, it was not possible for the researcher to conduct a face-to-face survey. The study was conducted by sending an electronic version of the questionnaire by email to the respondents’ instructors, who then downloaded and printed the questionnaire and distributed it directly to the respondents during the classroom in a natural class sampling method. The survey was completed on the spot, and the instructor gave instructions on the spot and collected the questionnaires in a uniform manner to ensure a high return rate. The lecturer who assisted in the survey confirmed the number of questionnaires distributed and collected, and then, the questionnaires were sealed and sent back to the researcher’s location, where the researcher would sort the questionnaires. A total of 1500 questionnaires were distributed and 1378 questionnaires were returned. The reliability and validity of the questionnaires were tested using SPSS software. As can be seen in Table 1, the alpha value of Cronbach’s reliability test was 0.917, and the KMO value of validity test was 0.944, and Bartlett’s test passed significantly. Therefore, the results of the questionnaire have reliable reliability and validity.

2.2. Data Analysis. Since the distribution of the indices did not reflect that individual students had significant agreement on college English teaching, only three aspects of learning environment conditions, learners’ knowledge and skills, and learners’ motivation, showed significant differences. As a result, the analysis of variation coefficient is conducted on the survey data of the above three criterion items, and the results are shown in Tables 2–4.

2.3. Result Analysis. In fact, the educational objectives are mainly focused on three levels, namely the cognitive domain level, the affective domain level, and the motor skills level, as shown in Figure 4. The objectives of the cognitive domain are divided into two main parts: knowledge objectives and competence objectives. In addition, the objectives of the

![Figure 3: Hierarchical analysis chart.](image-url)
cognitive domain can be divided into six categories, and they form a ladder from high to low.

Therefore, the process of setting educational goals should not only include the desired outcomes to be achieved, but should also consider whether evaluation and measurement can be achieved. Second, the classification of objectives will serve the educational purpose of a tool to support education, teaching, and research. In addition, the classification of educational objectives will serve not only teaching but also research. The method is not intended to achieve the ultimate goal of classification, but rather to provide a basis for measuring the results of teaching and learning. More importantly, the method will enable the analysis of educational problems by realizing various assumptions about the teaching process and student change.

A reasonable course structure refers to a reasonable relationship between courses, including a reasonable set of courses, a reasonable sequence of courses, and an orderly connection between courses. To reflect the value of integration in the selection of teaching contents, first of all, we need to set up a college English curriculum that fully reflects the needs of language communication and cross-cultural understanding by taking advantage of the teaching value of integration of instrumentality and humanism. Secondly, it is necessary to set up a university English curriculum that reflects the needs of language communication and inter-cultural understanding, in accordance with the inherent rules of the integration of language communication, language and cultural understanding, and language use. The sequence of university English courses is then determined, and the number of hours in each course is allocated in a reasonable manner. Second, it is important to strengthen the articulation between courses.

**3. Evaluation Model Based on Intuitive Fuzzy Information Theory**

As a basic activity of everyday life, work, and study, comprehensive evaluation is present in all our actions in connection with the external world and things. It allows us to grasp the overall level of things from the diversity of phenomena. Comprehensive evaluation techniques are an important branch of the statistical methodological system and can be widely used in the quantitative and comprehensive evaluation of various socioeconomic phenomena.

However, with the development of society and the advancement of science and technology, the evaluation environment has become more and more complex, and evaluators are often influenced by their own subjective and objective factors. In addition, in daily life, the vagueness of the decision problem itself makes most of the information people exposed to vague and uncertain due to the presence of ambiguity in the objective world. As a result, the traditional fuzzy set theory is increasingly constrained and challenged by its inability to fully express all the information of the problem under study.

**3.1. Intuitive Fuzzy Set.** Based on the understanding of fuzzy set theory, it is necessary to understand the basic knowledge and algorithms of intuitionistic fuzzy sets.

Let $S$ be a nonempty set, and then, the intuitionistic fuzzy set is defined as shown below:

$$ F = \{ s = (\mu_F(s), v_F(s)), s \in S \}. \tag{1} $$

Also, the hesitancy of the element $s$ belonging to $F$ is expressed as follows:

$$ h_F(s) = 1 - \mu_F(s) - v_F(s). \tag{2} $$

In general, the intuitive fuzzy number is defined as follows:

$$ n = (\mu_n, v_n). \tag{3} $$

As a result, for an intuitive fuzzy numbers, it can be evaluated by the score function $y$:

$$ y(n) = \mu_n - v_n, \tag{4} $$

where $y(n)$ refers to the score value of the intuitive fuzzy number $n$.

Actually, the basic algorithms of intuitionistic fuzzy numbers are as follows:

$$ n_1 + n_2 = (\mu_{n_1} + \mu_{n_2} - \mu_{n_1} \times \mu_{n_2}, v_{n_1} \times v_{n_2}), $$

$$ n_1 \times n_2 = (\mu_{n_1} \times \mu_{n_2}, v_{n_1} + v_{n_2} - v_{n_1} \times v_{n_2}). \tag{5} $$

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**Figure 4: Cognitive domain teaching diagram.**
After that, based on the above basic algorithms of intuitionistic fuzzy numbers, we can get the evaluation matrix:

\[
M = \begin{pmatrix}
\mu_{11}, n_{11} & \cdots & \mu_{1n}, n_{1n} \\
\vdots & \ddots & \vdots \\
\mu_{m1}, n_{m1} & \cdots & \mu_{mn}, n_{mn}
\end{pmatrix},
\]

(6)

where \( M \) refers to the evaluation matrix based on the intuitive fuzzy information theory.

3.2. Process of Intuitive Fuzzy Analysis. Intuitionistic fuzzy sets can better represent the state of decision-makers when they represent neutrality to the research object. As a result, the method is more consistent with human judgment thinking and increases the accuracy of subjective judgment, thus improving the efficiency of decision-making. The specific process of intuitionistic fuzzy hierarchical analysis is as follows.

Firstly, it is necessary to build intuitive complementary judgment matrix. Let the set of evaluation indicators be denoted by \( E \), which are defined as follows:

\[
E = (e_1, e_2, \ldots, e_n).
\]

(7)

Next, after the comparison between \( e_i \) and \( e_j \), the judgment matrix can be obtained:

\[
Z = (z_{ij})_{n \times n},
\]

\[
z_{ij} = (\mu_{ij}, v_{ij}),
\]

(8)

where \( \mu_{ij} \) indicates the extent to which the decision-maker prefers \( e_i \) when comparing scenarios \( e_i \) and \( e_j \).

To make the degree of importance between attributes standard, the importance of attributes is usually quantified and defined in Table 5.

If the consistency test is passed, the intuitive complementary judgment matrix is established. The process of consistency test is illustrated in Figure 5. The weight coefficients of the indicators reflect the relative importance of each level of indicators in the whole. At the same time, the weights represent the importance of the factors as perceived by the decision-maker; i.e., the more important the factor, the higher the weight value. In risk evaluation, different intuitive fuzzy numbers for the same indicators will result in different weights in the final evaluation results. Therefore, evaluators should be careful in determining the intuitive fuzzy number of indicators. The intuitive fuzzy number is usually determined subjectively by the decision-maker based on experience and actual problems.

After calculating the weights of each level of indicators, we have to make a comprehensive evaluation of the evaluation results based on the actual data. First of all, we need to find out the evaluation matrix and then calculate the affiliation degree for each level separately. The solution of affiliation degree can be obtained by comparing the actual value of each evaluation index with the standard value of each evaluation index. To make a smooth transition between the levels and not to have data jumps, we have to fuzzify the data. Finally, the scores are calculated according to the scoring formula, and the scoring levels are derived.

4. Conclusion

This study concludes that the issue of teaching value orientation in college English is a key factor affecting college students’ English proficiency. The practical solution to the value orientation problem will be the time to improve the effectiveness of university English teaching. Therefore, this study starts from the concept of university English teaching and its integrated value orientation and analyzes the nature and characteristics of university English in depth. On the basis of this, the study continues to examine the characteristics of the integrative value orientation of university English teaching. As a result, this study considers that this is the fundamental premise of the value orientation of the integration of university English teaching.

Data Availability

The labeled data set used to support the findings of this study is available from the author upon request.
Conflicts of Interest
The author declares that there are no conflicts of interest.

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