

Reform and Innovation of English Teaching Based on Intelligent Embedded Sensors

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Abstract: With the advent of the information age, global economic integration and international exchanges continue to deepen in various industries and fields. The country's requirements for professional talents in foreign languages, especially English as an international language, are becoming more and more common, and the requirements for deeper English skills are also more prominent. This article takes four universities in Shanghai as examples to carry out the reform of College English Teaching by using questionnaire surveys and interviews with 500 students and 50 teachers from the four universities. From the perspective of application-oriented talent training, it centers on examining the current teaching mode and teaching results of English majors in our country's colleges and universities. After analyzing the results and data of this survey, it draws the conclusion that in order to research and develop applied human resource, it is impossible to imitate some traditional basic education curriculum frameworks, so it is necessary for us to build a new type of applied subject education curriculum framework. The formation and establishment of the curriculum system of applied disciplines is mainly guided by our country's modern educational thoughts. The research data is between 0.75-85, and the experimental data is very convincing. The use of intelligent embedded sensors in the reform of English teaching can effectively improve students' English proficiency and the quality of college English teaching. Students' learning motivation can be satisfied and the development of English teaching can be promoted to a large extent.

1. Introduction

English is the most versatile language in the world and is used most widely in global communication, and students' English ability is very important for students' future development. Effective use of English and cross-cultural communication skills are very important. Undoubtedly, reality puts forward higher demands on college English teaching. Teaching emphasizes general listening, speaking, reading and writing skills, and the actual goal is to improve students' test-taking ability. Network technology makes English teaching develop in a personalized direction, learners can learn anytime, anywhere, and are no longer restricted by time and space conditions. China is the

world's manufacturing center [1-2]. The innovation of college English teaching reform is an important carrier to promote the training of applied talents, which can further enrich the relevant theories of college English teaching practice and at the same time, can further promote the development of related theories of applied talents training [3-4].

The popularization of higher education has brought about structural adjustment and functional changes in higher education [5]. Structural adjustment means that in the communication stage, we must increase the intensity of applied human resource development, establish a new applied human resource development system, and make higher education closer to social needs [6]. For the training of English-oriented talents, functional changes are in the procedure of dissemination, more attention must be focused on the practical application of students' English and the cultivation of English professional ability [7]. However, based on the current view of mine, there are still many shortcomings in our country's college English education that need to be improved [8].

Wang X [9] said that undergraduate applied talents should not only possess the knowledge and skills required for related majors, but also have corresponding non-technical abilities and knowledge, such as good job adaptability, resistance to pressure and frustration, etc. They should change roles, integrate into society, and meet the requirement of production and society. Huang W [10] thought that application of applied undergraduate talents is very important. He also believed that this is an important requirement of the society for applied undergraduate talents, and it is also the main thread throughout College English Teaching. Zhao N [11-12] suggested that during cultivating applied abilities, relevant colleges or universities should regard applied education as their own positioning and foothold in running schools, highlight practical links, strengthen the integration of production, education and research, and cultivate practical talents. This theory proposed a reference of teaching of all courses, but the education model specifically for applied talents in English majors has not been discussed in depth. So far, this article has proposed a targeted education model for college English majors. [13-14].

From the analysis of the characteristics of college English courses, conduct a certain range of investigations and research, use social needs and individual needs of students, and adopt specific quantitative and qualitative analysis methods such as interview method, statistical description method, difference coefficient analysis method, and evaluation scale method. Analyze the current situation and existing problems of college English teaching [15-16]. At the same time, this article combines theory with practice, puts the results of theoretical research into practice, constantly revises the theory through practice, and accordingly improves some theoretical research on college English education [17-18]. This research method will inevitably serve as a role in the future of a scientific and feasible theoretical system of college English education, and will improve the level of Chinese college English education in many aspects. In this article, we will use literature review and interview methods to investigate the status quo of college English education, analyze the current market requirements for graduates' English proficiency, investigate the employment status of college graduates to find out the shortcomings of Chinese-style education and student applications skills and the root causes of these problems, explore the English teaching reform and innovation, and improve the ability to use English to ensure the smooth employment of graduates [19-20].

2. Theory of Intelligent English Teaching Reform

2.1. Evaluation of College English Teaching

We investigate the quality of classroom teaching in four colleges and universities by means of student evaluation, and use correspondence analysis methods, in order to analyze and research survey data, and explore the correspondence between different types of teachers and classroom teaching quality influencing factors [21-22]. The relationship provides theoretical and

methodological scientific basis for the improvement of the quality of classroom teaching of college teachers in the future.

$$x^* = \arg_x \max \frac{d(x, C)}{\sum_{j=1 \dots n} d(x_j, C)} \quad (1)$$

$$f(c) = \sin \int_{i=1}^0 \left[(j-1) \min \alpha \sum_i C / (C-1) \right] \quad (2)$$

x^* indicates the teaching quality of university lecturers, $d(x, C)$ indicates the teacher's evaluation of the teaching content, $\sum_{j=1 \dots n} d(x_j, C)$ indicates the evaluation of each student's teaching content [23-24].

$$f(t) = \langle f(t), g0(t) \rangle g0(t) + Rf(t) \quad (3)$$

$$D(x) + D(c) = \int_{c=1}^j f((t), g(j)) \| Rf(t) \quad (4)$$

$$\int \ddot{u} = \sin g / c \sum_{i=1}^0 c_i (j-1) \sqrt{\sin c} \quad (5)$$

$f(t)$ indicates the activity of each teacher's students at class, $\langle f(t), g0(t) \rangle g0(t)$ indicates student evaluation, $Rf(t)$ indicates the result of the teacher's self-evaluation.

$$f(t) = \sum_{n=0}^{N-1} \langle Rnf(t), gn(t) \rangle gn(t) + Rnf(t) \quad (6)$$

$$gn(i) = \sum_{i=1}^{1-c} \{g(i-1) + Rnf(T_{i-1})\} \quad (7)$$

$f(t)$ indicates the number of students who come to class, $Rnf(t), gn(t)$ indicates the number of students in this major, $Rnf(t)$ Indicates the number of non-majors who come to class.

$$W(t, f) = \int_{-\infty}^{+\infty} s\left(t + \frac{\tau}{2}\right) s^*\left(t - \frac{\tau}{2}\right) e^{-j2\pi f\tau} d\tau \quad (8)$$

$W(t, f)$ indicates the concentration of curriculum arrangement, $s\left(t + \frac{\tau}{2}\right)$ indicates a class schedule event, $s^*\left(t - \frac{\tau}{2}\right)$ indicates the number of extracurricular activities.

$$W(t, \omega) = \int_{-\infty}^{+\infty} S\left(\omega - \frac{\theta}{2}\right) s^*\left(\omega + \frac{\theta}{2}\right) e^{-j\theta} d\theta \quad (9)$$

$$f_1 + f(\omega) = \frac{1}{ij} \otimes \sum_{i=1}^{i-j} \sqrt{i_1^2 - j_0^2} \bullet \sin \theta \quad (10)$$

$W(t, \omega)$ indicates the concentration of students at class, $S\left(\omega - \frac{\theta}{2}\right)$ indicates students' self-evaluation of effective class time, $s^*\left(\omega + \frac{\theta}{2}\right)$ indicates the teacher's estimate of the effective listening time for students.

$$P(\omega) = |S(\omega)|^2 + \int R(\tau)e^{-j\omega\tau} d\tau \quad (11)$$

$$p_\omega = [P_e]^2 / \iint_{\tau} (-ij(\omega - d))_{i,1} \otimes s(s-1) \quad (12)$$

$P(\omega)$ indicates the student's rating for each course offered by the school, $|S(\omega)|^2$ indicates the grades of freshmen and sophomores, $R(\tau)$ represents the grades of the third and fourth-year students.

Educational evaluation is a process of objectively measuring and scientifically judging educational activities and their effects based on specific objective standards. It is very important to achieve the goal of college English teaching. The two documents "College English Course Teaching Requirements" and "College English Teaching Guide" both define the teaching evaluation of college English, as in Table 1.

Table 1: Description of the two documents on teaching evaluation.

Teaching evaluation	
"University English Course Teaching Requirements"	(1) Evaluation of student learning: including formative evaluation and summative evaluation
	(2) Evaluation of teachers: the evaluation of teaching process and teaching effect
"University English Teaching Guide"	(1) Comprehensive evaluation system for college English courses
	(2) Comprehensive testing system for college English courses
	(3) Guarantee of evaluation and testing

"College English Curriculum Teaching Requirements" aimed at the development trend of exam-oriented education in college English education at that time, and divided the teaching evaluation into the students' learning evaluation and the evaluation of teachers. First of all, from the perspective of student learning evaluation, "University English Curriculum Education Requirements" advocates "formal evaluation" and "comprehensive evaluation". In other words, it refers to the formative evaluation process of education and development evaluation, while comprehensive evaluation refers to the evaluation after the end of the education phase. Second, teacher evaluation mainly evaluates the teaching process and the result of college English teachers teaching in view of teachers' teaching attitudes, teaching methods, teaching content, and student test results.

2.2. Embedded Sensors

With the development of computer measurement and control systems, especially multi-sensor computer measurement and control systems, the overall capabilities of the measurement and control system have been improved within a certain range, and system costs have been reduced.

Information processing, such intelligent embedded sensor system as a new research topic, makes people pay more attention to it. With the increase in the degree of automation and complexity of the system, the requirements for the accuracy, reliability and response speed of the sensor are getting higher and higher [25]. It is foreseeable that the wireless sensor network composed of wireless networked smart sensors will be a very large network that is pervasive, and most of the objects processed by smart instruments are analog quantities. Assuming that the system can be analyzed and judged from face to point and then from point to face, the reliability and fault tolerance of the system are improved. The output data can be expressed as:

$$E_{\alpha} = -\frac{1}{x * y} \int_0^1 E_i(l-1) s = -\frac{S_1}{x * y} \bar{E}_{i-1} \quad (13)$$

$$E^{-1} = \frac{1}{m} \sum_{i=1}^{m-1} l^2(\delta_i^{-i}) = \frac{m_i - 1}{m} \cos^2(\delta + l(\alpha_{i-1})) \quad (14)$$

$$f(e) = \frac{S_i}{2} \sqrt{m(m-1)} \sum_{i=1}^{m-1} [1 - \sin(2\delta + 2\alpha_i) / 2 \sin^2(i-1)] \quad (15)$$

With the configurability x and operability y of the network node, the information can cross any regional restrictions E^{-1} , directly transmit s , publish and share on the network δ , realize real-time remote online measurement and control, this process can be expressed as a formula:

$$\delta_{f(i)} = (E_{i-1} / \sqrt{x + y})^2 (1 + m) \quad (16)$$

$$z = \cos(\gamma_{i-1}(2\alpha / \delta_x - m) \sin(2\gamma - \delta_y(1 - (2\gamma / \delta_y - M)))) \quad (17)$$

When the network master control node needs to actively obtain the sensor data δ_x, δ_y of the corresponding channel, the networked smart sensor performs corresponding operations according to the received function address z and channel address M , that is:

$$\delta_{x,y} = s_x + \sum_{m=1}^{\rightarrow} x \otimes f^i * (1 - f) = s_x / (1 - y) \quad (18)$$

$$g(x)(y) = \left\| \sum_{\alpha}^1 (f(i) \bullet g(m)(m-1)) \right\| \sin \frac{\pi}{2} \quad (19)$$

$$g(i-1) = \delta_{i,j-1} \prod_{i=1} \sin \alpha \sin(x-1)(y-1) \quad (20)$$

Both the user instruction f^i and the reverse upload data $g(x)(y)$ have a fixed data format, which ensures that the user can browse each data information intuitively and correctly. Make further logical processing of the collected information to make the data more intuitive and accurate.

3. Experimental Methods of College English Teaching Reform

3.1. Embedded Sensors and Intelligent English Teaching Design

Applying wireless communication technology to the design of smart sensors, the sensor can log in to the network nearby and become an accessible node. On the network, the data and information

of the smart sensor can be remotely accessed and the sensor functions can be programmed online to make the signal connection it breaks through the limitations of space and region, omits the field wiring of smart sensors, and makes the layout of smart sensor nodes more free and flexible. Simple sensors may consist of only one sensitive element, while complex sensors include not only sensitive elements, but also signal processing circuits that match the sensor, even microprocessors, network adapters, and so on. Based on the traditional sensor, the intelligent sensor adds a conditioning circuit and a data processing chip to complete further processing of the signal collected by the sensor probe. The intelligent embedded sensor has high precision, high reliability, multi-function, and can communicate with computers, etc. Features have broad application prospects in process control, and point out a new direction for the development of sensor technology. The relevant parameters of the embedded sensors used in this research are shown in Table 2.

Table 2: Relevant parameters of embedded sensors

ADC resolution	20-bit
Response rate	2.2
Maximum signal-to-noise ratio	65.7-69.1
Supply voltage box	55dB
Power	3.2=345
Operating temperature	0 °-65 °
Encapsulation	52

Embedded system, as a special computer system, is used in different occasions. Its appearance and function are not the same, but the basic structure is generally the same. As the application field of embedded products expands day by day, the application scope of the vision system also expands. Use different numbers of English vocabulary samples to test the accuracy of the data, and the data results are shown in Figure 1.

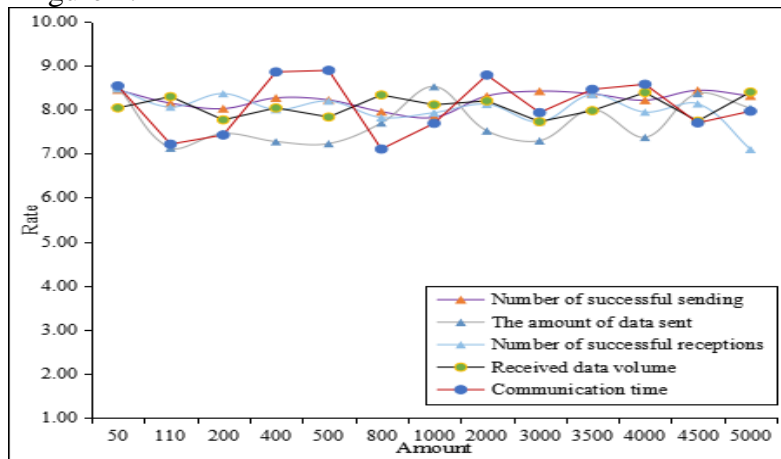


Figure 1: Embedded system English vocabulary test.

It can be seen from the data in the above figure that the intelligent embedded sensor is at a high level in vocabulary data processing, and the data processing accuracy rate is between 7 and 9. On this management platform, a variety of different sensors can be managed and controlled at the same time, and the sensor data can be transmitted through wireless transmission technology. At the same time, in order to test the actual performance and usability of the platform, this paper also built a wireless self-organizing network; the embedded sensor system is shown in Figure 2.

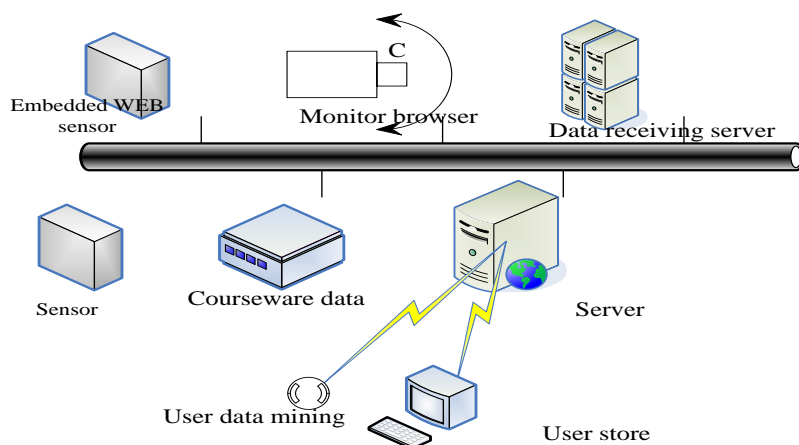


Figure 2: Embedded sensor system.

3.2. Subjects

The theory of foreign language teaching will be fully reflected in different courses, and a variety of teaching methods will achieve personalized teaching while putting forward high requirements on the comprehensive ability of teachers. The research objects selected for this study are English majors from four universities in Shanghai. These four universities are all in college English teaching. It is more representative and can provide a better reference for other schools offering English majors. To this end, we distributed questionnaires to English majors and English teachers in these four universities to understand their learning situation and learning status.

3.3. Experimental Process

First of all, teachers, especially experienced teachers, not only directly participate in the process of university English teaching, but also a significant section of college English teaching. We conducted a question list survey. A number of 40 volunteers were chosen and 40 valid questions were received. Among them, the gender, rank and title distribution of 40 faculty members are as shown in Table 3:

Table 3: Teachers' personal information statistics.

Basic Information	Sample Statistical Characteristics	Number of Samples	Percentage
Gender	Male	25	64.00%
	Female	16	37.00%
	Total	39	100.00%
Grade	Freshman	13	32.50%
	Sophomore	10	25.00%
	Junior	9	22.50%
	Senior Year and Above	6	15.00%
	Total	40	100.00%
Job Title	Lecturer	25	62.50%
	Associate Professor	8	20.00%
	Professor	7	17.50%
	Total	40	100.00%

Secondly, this research will be carried out among English majors from four selected universities, mainly for second-year students. The second-year students have one year of learning English, so they can more truly reflect their opinions from the expectation of the recipients. Their views widely reflect the mainstream knowledge and understanding of English majors, and also ensure the credibility and validity of this research to a certain level. Statistics on the evaluation of the current classroom by these 40 teachers, as shown in Figure 3.

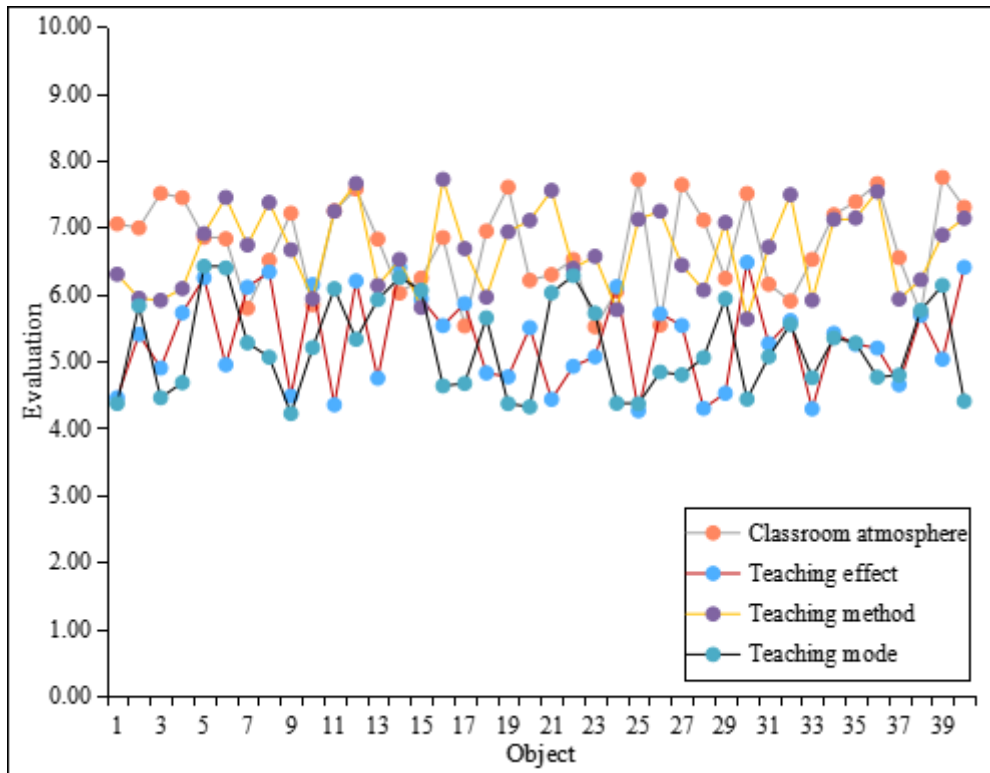


Figure 3: Teacher evaluation.

Meanwhile, for a small number of freshmen, juniors and seniors, a part of the questionnaire was also distributed to conduct a certain degree of comparative analysis to verify the conclusions. The distributed questionnaires mainly include online collection and offline collection. A total of 550 questionnaires were distributed to English majors from four universities, and 500 valid questionnaires were counted. After sorting out the questionnaires, we can see the basic situation of the students as shown in Table 4.

Table 4: Student personal information statistics.

Basic Information	Sample Statistical Characteristics	Number of Samples	Percentage
Gender	Male	164	32.80%
	Female	336	67.20%
	Total	500	100.00%
Grade	Freshman	50	10.00%
	Sophomore	330	66.00%
	Junior	60	12.00%
	Senior Year and Above	60	12.00%
	Total	500	100.00%

For the sake of further understanding the influence of the current teaching pattern, the author made two teaching modes survey and teaching evaluation method survey forms as shown in Table 5.

Table 5: Survey and Statistics of English Teaching Mode.

Teaching Mode	Proportion
Face-to-Face Instruction	46.30%
Classroom Face-to-Face Instruction Plus Computer-Assisted Instruction	19.67%
Self-Directed	10.33%
In-Class Language Training with Teacher Tutoring	21.67%
Other	2.00%

From Tables 5, it can be seen that most of the school's curriculum settings pay more attention to systematic learning step by step, and more than 60% of the students' learning achievements are judged by the students' final grades. This setting indicates that the school is only a preliminary test of students' learning achievements, and no attention is paid to the practical aspects of students' use of English. Statistics on the intelligent equipment commonly used in English teaching, as shown in Figure 4.

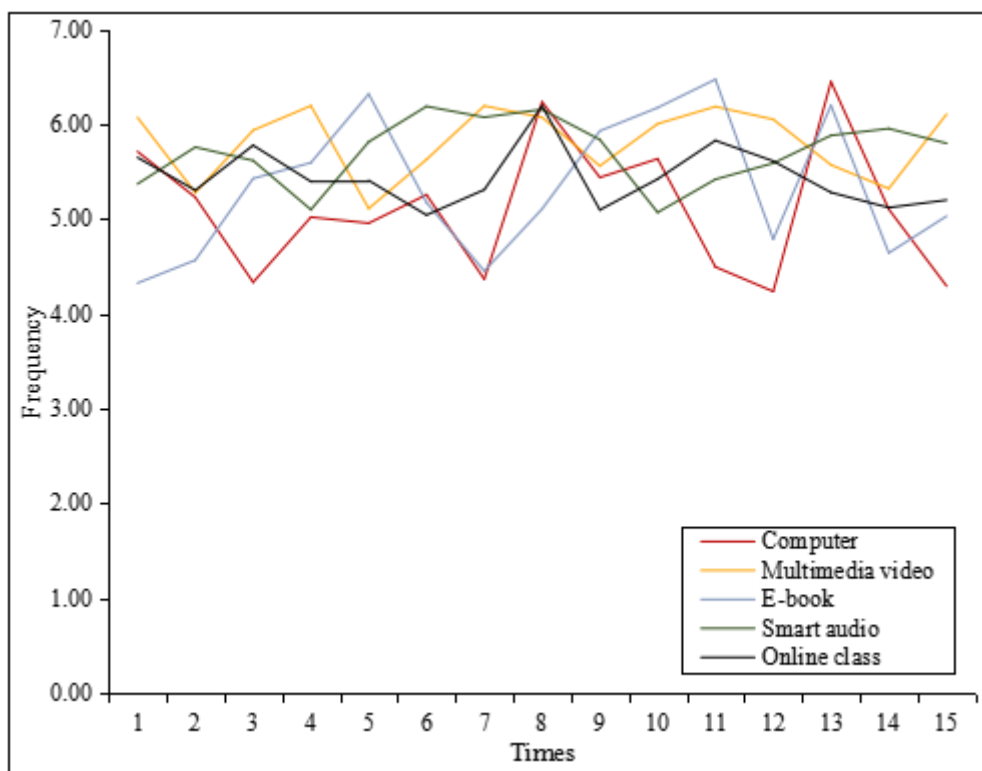


Figure 4: Intelligent equipment for English teaching.

3.4. Experimental Method

The author retrieved the questionnaire from the subjects, sorted out the questionnaire data, and performed data analysis on the collected data using statistical software. Through the interview method, in order to explain the difficulties in college English courses, this article investigates the current learning situation of college English as a subject. This article uses the Cronbach's α coefficient to analyze the reliability of the data from 500 student questionnaires and 50 teacher

questionnaires. If the Cronbach's α ratio is between 0 and 1.5, the larger the α worth, the higher the reliability of questionnaire. If the value of α is between 0.75-0.85, it indicates that the reliability of the tested questionnaire is better. If the value of α is between 0.85-0.95, it indicates that the questionnaire in the test is ideal.

4. Experimental Analysis

4.1. Experimental Data Analysis

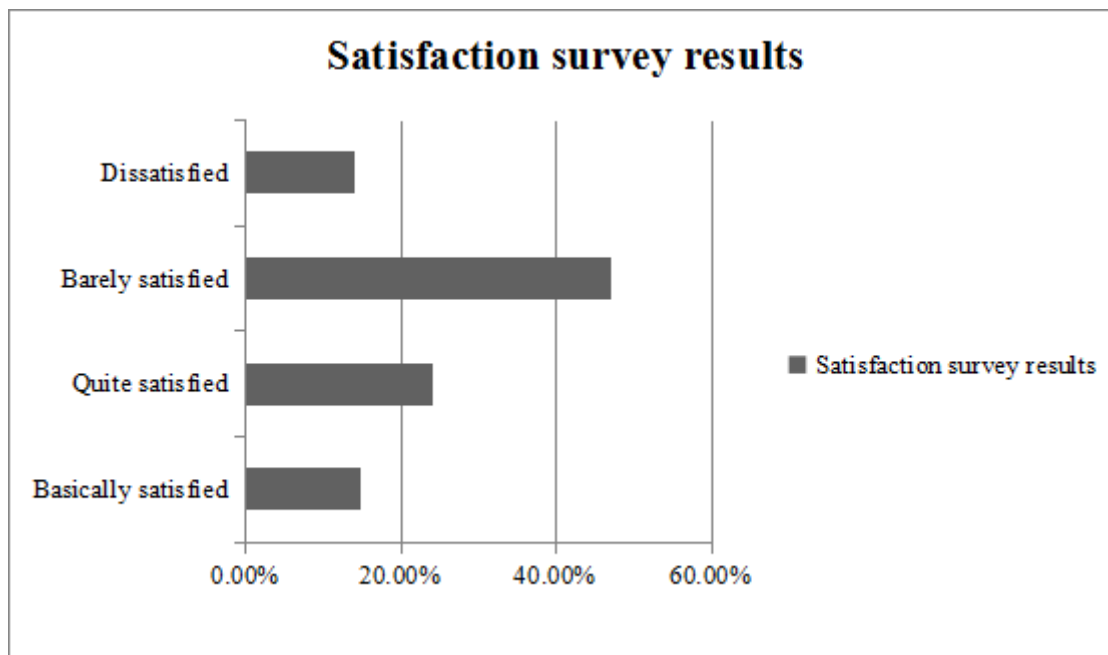


Figure 5: The results of college English course satisfaction survey.

From Figure 5, we can see that 86% of the students are "barely satisfied", "relatively satisfied" and "basically satisfied" with the college English curriculum of the schools. We can know that the current university English curriculum can basically satisfy the learning needs of students. However, 48% of the students are "barely satisfied" with the current college English curriculum, and 13% of the students are "dissatisfied", and this proportion still has a certain gap in the college English curriculum. After investigation, it shows that current college English curriculum is generally satisfactory, but there are also some shortcomings. The colleges should make appropriate adjustments according to the characteristics of students and the newly promulgated "University English Teaching Guide" with the goal of meeting the student's learning requirements and increasing the college English teaching quality.

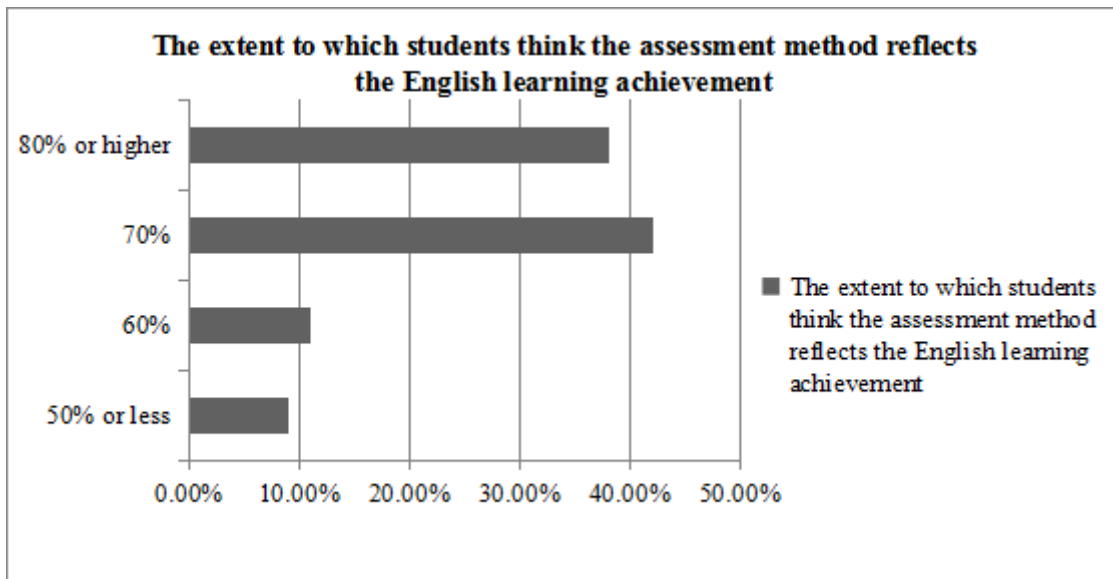


Figure 6: The degree to which students think the assessment method reflects the English learning achievement.

What we can see from the results in Figure 6 is that, in teaching evaluation, schools pay more attention to classroom performance, usual homework, and test conditions, while not paying enough attention to formative evaluation methods such as student self-evaluation and peer evaluation. The driver structure of embedded sensors used in classroom equipment is shown in the figure 7.

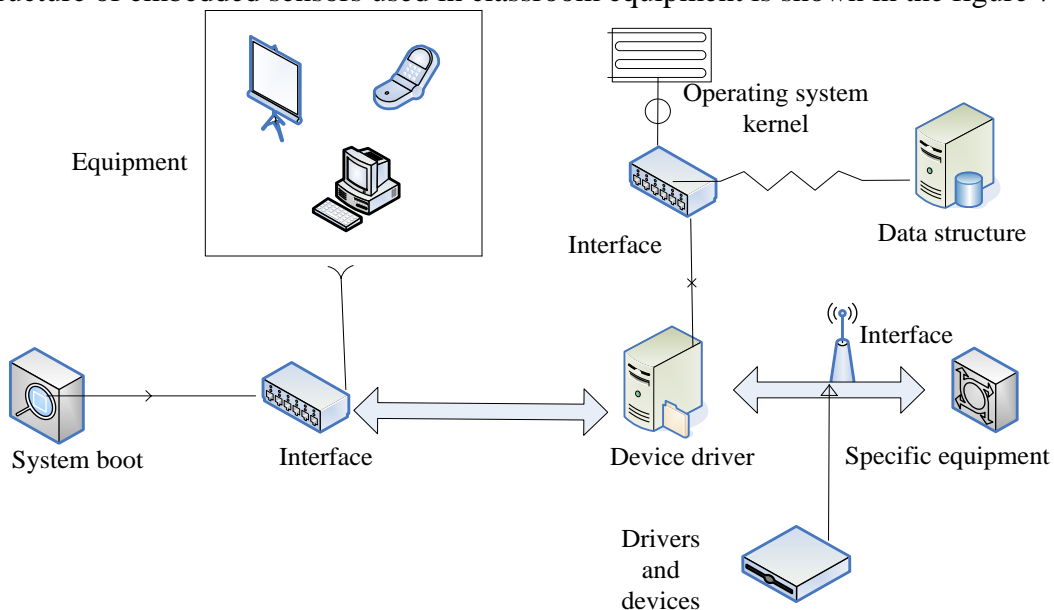


Figure 7: Classroom device driver.

As far as the evaluation content and evaluation subject are concerned, most students believe that the evaluation content should include independent learning ability and learning attitude in addition to the mastery over language knowledge, focusing on students' online autonomous learning ability. It summarizes the elements that students think the current intelligent English teaching classroom needs to have, as shown in Figure 8.

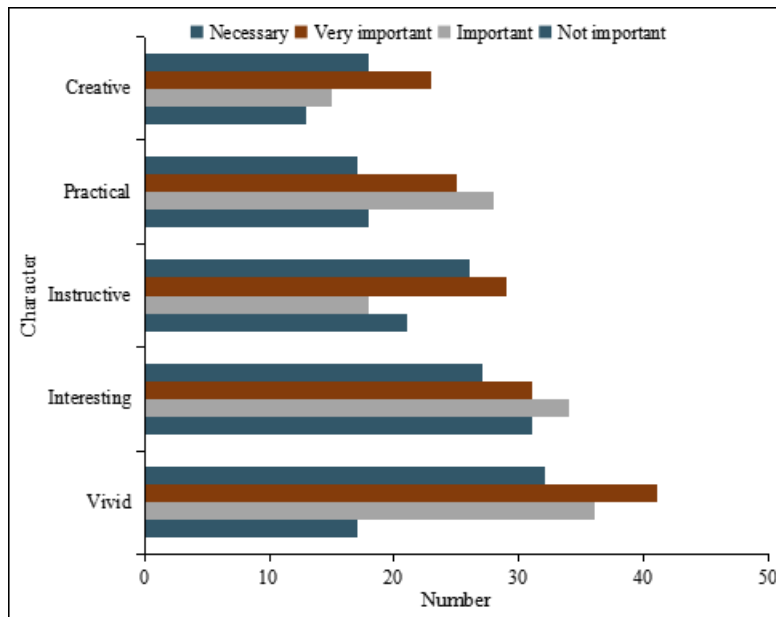


Figure 8: Classroom development of intelligent English teaching.

4.2. Reform of College English Teaching Ideas

The investigation found that in terms of learning methods, the college English learning of these four college English majors mainly relies on teachers' classroom teaching, and the habit and ability of autonomous learning need to be further improved. The instrumental motivation of English majors is obviously stronger than the integrative motivation in learning motivation. In terms of learning needs, students want to improve their English communication skills, followed by language grammar and vocabulary knowledge and basic English skills, in other words, English listening, speaking, reading and writing, and translation skills. To demonstrate the application effects of intelligent embedded sensors in these aspects, the first is the evaluation of learning needs, learning motivation and learning ability. The results are shown in Figure 9.

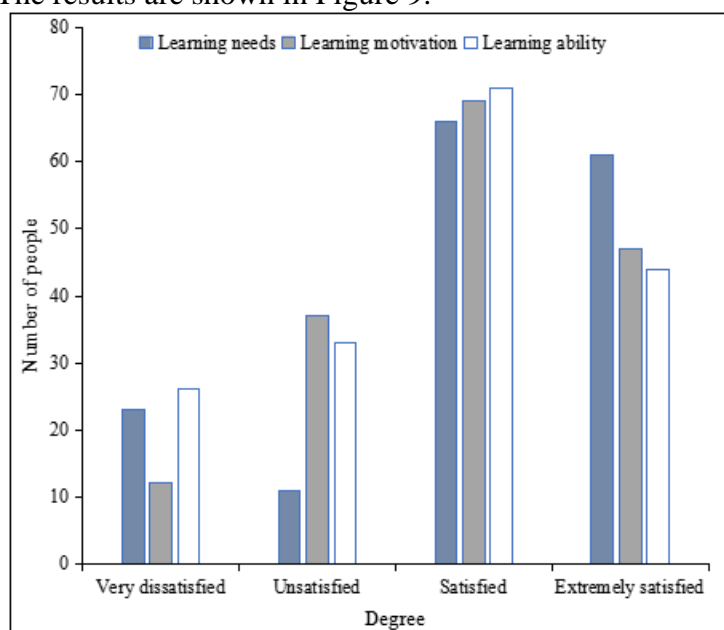


Figure 9: Different learning needs of students

From the perspective of applied talents, college English teaching reform should put forward practical and feasible measures to meet the actual needs of students. Humanistic learning theory advocates a free-style student-centered teaching concept, based on freedom, emphasizing the role of student-centeredness in learning values, attitudes, and emotions.

4.3. Content of College English Teaching Courses

College English teaching should focus on output, optimize input, strengthen the quantity and quality of language input, focus on the training of applied talents with different university English teaching contents, make full use of the Internet, adopt teaching models such as MOOC and flipped courses in order to enrich the resources and ways for students to learn independently, to make the purpose of language acquisition come true, and to increase the ability of autonomous learning. Verification from the learning application parameters, the result is shown in Figure 10.

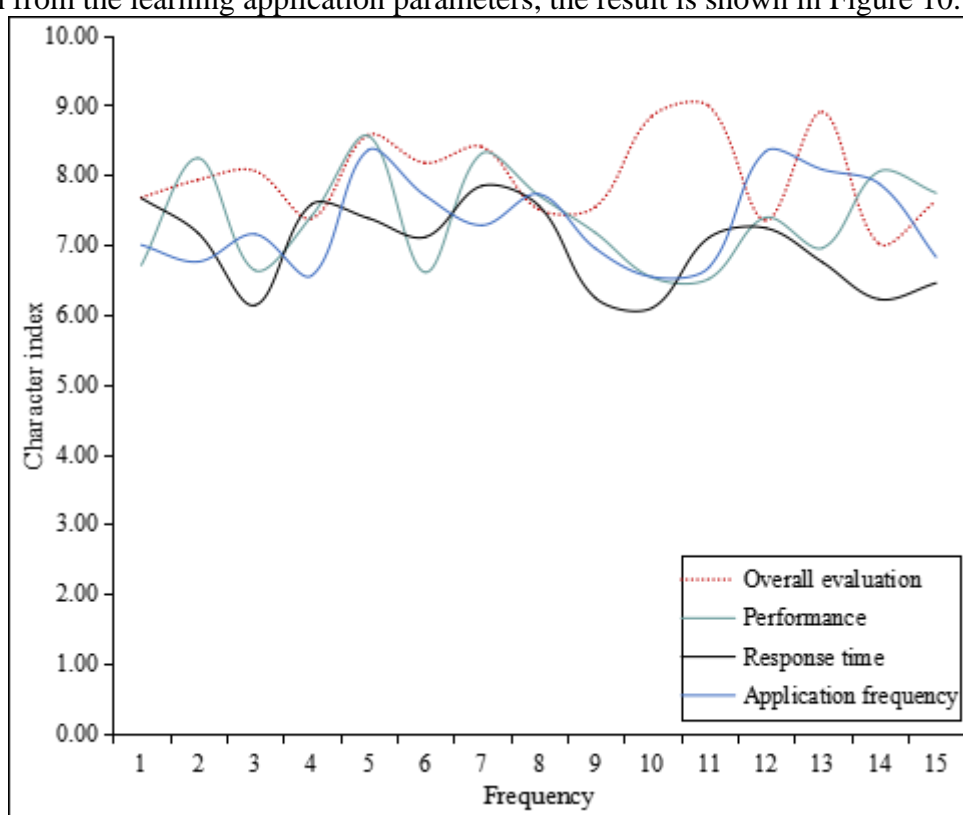


Figure 10: Application related parameters of different teaching methods.

Under the premise of ensuring the quality of language input, universities should increase students' language output opportunities, design and arrange language output activities in the process of writing textbooks; in classroom teaching, conduct debates, group discussions and other activities reasonably, encourage more students to talk and write, and timely feedback, effectively improve students' communicative ability, and fully reflect the humanistic characteristics and tool characteristics of language information output. In order to achieve a balance between input and output in university English teaching, it is imperative to strengthen the cultivation of students' abilities of using English as a tool. On the basis of fully mastering the students' language skills and physical and mental development characteristics, optimizing input and paying attention to output can effectively improve the English proficiency of college students.

5. Conclusion

With the expansion of the field and space of human detection, the types of electronic information that people need to obtain are increasing, the speed of information transmission needs to be accelerated, and information processing capabilities are enhanced. Therefore, corresponding information acquisition technology-sensor technology must be kept up. The needs of information development. Generally, the teaching content of college English can be divided into three parts: general, specific and cross-cultural communication English. This study investigated the current situation of college English curriculum through questionnaire surveys and interviews. Research shows that students say that the current college English curriculum is basically satisfactory, and the demand for professional English, academic English and other courses continues to grow. They hope that the school can offer relevant English courses. University English teaching policies and strategies should be guided by the "Guiding Principles of College English Teaching", combined with the current actual situation, comprehensively promote college English teaching reform, build a characteristic college English curriculum system with emphasis on key training of applied talents, and effectively improve students' English level quality of college English teaching. By cultivating students' writing and translation skills, mastering students' language skills and physical and mental development characteristics, optimizing input and focusing on output, we can effectively improve college students' English proficiency, which has important guiding significance for the innovation of college English teaching. However, this research also has some shortcomings. Due to the limitations of research conditions and time, the construction of college English curriculum system and teaching mode proposed in this study cannot use the method of dynamic tracking research to investigate the changes before and after the reform of college English teaching.

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