

## Research Article

# Online English Teaching System Based on Internet of Things Technology

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In order to better improve students' English performance and adapt to the progress in the age of science and technology faster, the author proposes an online English teaching system method based on Internet of Things technology. The author studies the English SPOC teaching mode and constructs a multimedia teaching system based on the Internet of Things technology, improve the teaching system, and improve and learn the teaching mode, to achieve the improvement of the quality of English teaching. Experimental results show that under the author's method, students' scores on both the written and oral exams are about 10 points higher than those in the traditional teaching method. *Conclusion.* The online English teaching system based on Internet of Things technology can effectively improve students' English performance and allow students to better control their own progress.

## 1. Introduction

Online English teaching is a type of teaching and learning strategy developed with the support of network technology that has created a form of teaching English in college [1]. Now, colleges and universities can follow the schedule and practice teaching English online. However, due to the current situation of teaching English online in college, there are some issues that affect the effective use of English online at home. Therefore, in the new era, English college students are aware of the cost, advantages, and current situation of using English language training online. English language courses are used in colleges and universities, as well as online English courses to help college students learn English and increase the self-confidence of their students and instructions for colleges and universities.

The concept of the Internet of Things was first introduced in 1999 at the International Conference on Mobile Computing and Networking in the United States: "sensory networks are the development of humanity, in the coming years" [2]. Therefore, the concept of the Internet is planned: the use of wireless communication technologies such as RFID (Internet of Things) to connect everything in the

world to the Internet on the basis of the Internet, fully intelligent characters, and the exchange of information products [3]. Combining the importance of many countries and technological advances, new technology research and the Internet of Things created by various information technologies are important.

At present, the teaching of Internet of Things technology relies heavily on theoretical and informational training, which includes the characteristics of Internet of Things teaching methods [4]. The course is based on personal tools, and there is no integration of learning, which does not require students to have a good understanding of the "Internet of Things" technology. Therefore, based on IoT technology, it is possible to improve research on teaching English online, overcome the disadvantages of internet-based learning, and ultimately teach better.

## 2. Literature Review

Today, with the development of "Internet of Things Technology," colleges and universities have begun to develop online English language courses, and the advantages of these standards are as follows.

*2.1. College Students Become Competent.* Follow online English instruction in colleges and universities, encourage college students to become training centers, design online English instruction around college students, play full-time college students, follow online English instruction, and access information content, by practicing. It can be said that the use of online English courses in universities can make college students an integral part of their education. This is a creative approach to the new curriculum to make college students an integral part of classroom learning. The use of online English language training in universities can change the mindset of college students, shift college students from passive learning to informational knowledge, and enable college students to acquire English language knowledge and information.

*2.2. Provide a Wealth of Educational Resources.* The implementation of online teaching of English in colleges and universities provides rich educational resources for English course teaching and broadens the horizons of college students' English knowledge, so that college students can learn English courses well. For example, in response to the lack of cultural information in English language acquisition, the implementation of online English teaching provides rich culture for English teaching, including information on British and American culture and local culture. At the same time, the teaching mode of college English courses based on English online teaching and the information resources in the network platform are rich, in order to meet the diverse and personalized demands of college students in English language learning, so that college students can cultivate the core literacy of English subjects under the support of a lot of information [5]. For example, resources such as micro-courses, microvideos, and MOOCs enrich English education information and provide guarantees for the use of English teaching resources in colleges and universities.

*2.3. Promoting the Study of College Students with Rules to Follow.* The use of online English language programs in colleges and universities supports the learning of college students. Under the auspices of technology, "teaching English" develops online English courses for college students, such as listening to English, reading in English, listening in English, and working in English, to enhance the independence and knowledge of college students. English classes: when college students take online English courses, teachers can obtain online course materials from college students, gain a clear understanding of college students, and develop good curricula and standards for teaching English online and offline. Instructions: in addition, online education for college students has rules to follow, and these courses can be used to plan college student assessments, guide college students, and support the development of college students. However, there are still some difficulties in teaching English online, and the main problem is the inability to guarantee training. It is not possible to confirm the existence of problems affecting online English language teaching in universities and colleges, and as a result, English language programs are being used. The ability to teach

English online in colleges and colleges is weak. Teaching English online at college is one of the most technologically and computer-based courses available, and it is influenced by the personal circumstances of college students and their reluctance to teach English online. Unnecessary classrooms and game situations for college students often affect the performance of online disciplines that "slip" in performance, and the effectiveness of online English teaching in colleges and universities cannot guarantee the effectiveness of online English teaching in colleges and universities.

IoT research is not just about using the early moments of the global IoT wave. It is one of the few countries in the world that has done research before. It has similarities to its international neighbors, and after a long period of hard work, in October 2009, it announced the launch of Tangxin, Mongolia's first Chinese chip. The successful completion of the No. 1 chip is a sign that our country has overcome the vital technology of the Internet of Things and entered the international arena and that some technologies are at a critical stage. China is also one of the few countries in the world to produce one of the national leaders in the development of international standards in the field of sensor networks [6–8].

Based on this research, the author has developed an online English language course based on the Internet of Things technology [9, 10]. For example, in college, the author studies the SPOC format of English art, develops a comprehensive curriculum based on Internet of Things technology, develops measurement tools and standards, teaches English online, improves real-time online English language teaching, and improves teaching quality [11, 12].

### 3. Research Methods

*3.1. The Deconstruction of Traditional College English Teaching by the SPOC Teaching Mode of College English.* "Improving student English" and "improving student knowledge" are the main goals of college English courses. Depending on the curriculum, the required courses and electives are a key component of college-level English courses. When it comes to teaching, most colleges and universities accept the "read, write + audio-visual" mode and use computers and multimedia projection devices to teach in the classroom. However, due to the important "battle" of the education of English students in college, college English classes face many challenges. For example, a large number of students, classroom instructors, and teachers play a key role, and test-oriented instruction is the key. In the long run, the introduction of college English into CET-4 and CET-6 and the increase in CET-4 and CET-6 equivalence have become important standard for measuring the strengths and weaknesses of learning English in college. For college and university teachers, the CET-4 and CET-6 scores are the most important criteria for determining the English language proficiency of college students, interest in English, primary education, and low-value education. We use the concept of reform to reevaluate the English language teaching process in college, based on the inadequacy of traditional English language teaching in college. The word "deconstruction" comes from the philosophical thought of the postmodernist

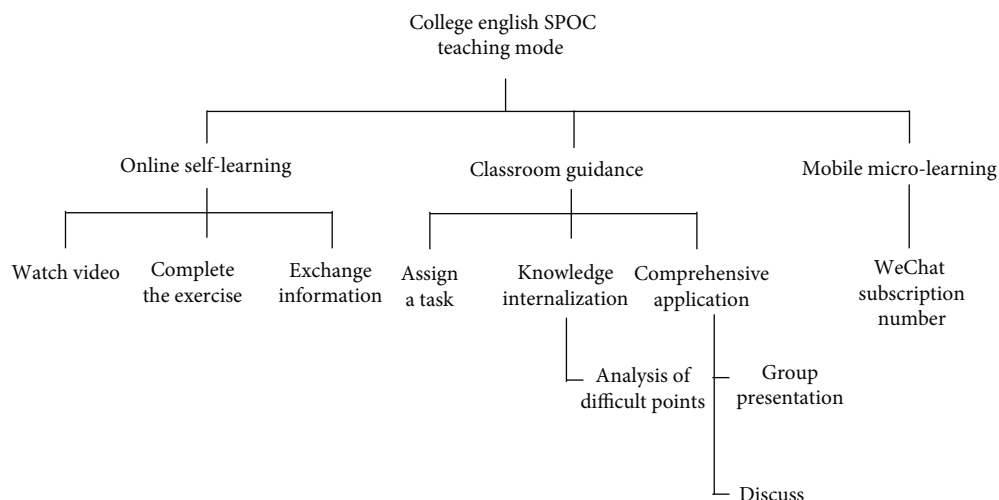


FIGURE 1: College English SPOC teaching mode.

philosopher Derrida, “deconstruction.” Dismantling is not about breaking down or disassembling, but about studying, understanding, and rebuilding the structure of the product. Unpacking the traditional teaching methods used in the SPOC curriculum of the English college will not only complete the traditional classroom training but also evaluate and reflect its concepts, procedures, and issues in order to create a new model of the English language school, teaching, supporting English language development, and improving the quality of teaching [13].

**3.2. SPOC Teaching Mode of College English in the Era of “Internet +.”** The purpose of the research on SPOC teaching mode of college English is to deconstruct and reconstruct college English classroom teaching, make up for the insufficiency of traditional classroom teaching, reconstruct students’ English learning process, and innovate effective English learning mode. The SPOC teaching mode of college English includes three core components: “online independent learning,” “classroom guidance,” and “mobile micro-learning”; the frame design is shown in Figure 1.

**3.2.1. Online Self-Learning.** “Online independent learning” means that students watch online course teaching videos before class, complete in-class quizzes and module assignments, and can post for help or communicate with classmates and teachers online in the discussion area of the online course platform. The teaching videos watched by students in online self-study are several microlecture videos about 20 minutes in length, covering background knowledge, structural analysis, article comprehension, difficult sentence analysis, vocabulary learning, and cultural introduction; learning resources are more diversified, three-dimensional, and enriched. During the video viewing process, students can pause, watch back, or watch any knowledge point repeatedly, to realize the efficient transmission of information. Online self-learning enables students to truly become the main body of learning, prepare for language input for participating in classroom guidance, and make

their learning methods more autonomous, active, and interactive. It should be noted that the content of online courses is not a simple process of digitizing paper textbooks. Teaching videos are based on the content of textbooks, combined with the advantages of classroom teaching, and based on the teaching team’s years of teaching experience, a systematic and reasonable integration of learning resources. In addition, using SPOC technology, students’ learning process and learning behavior can be recorded and supervised, which effectively guarantees the integrity of students’ learning. Students will receive appropriate feedback after completing quizzes and module assignments to maintain continuity of student learning. Online learning is not an isolated process, students and teachers can ask questions, answer questions, share learning experiences, and conduct interactive exchanges at any time. The SPOC model gives full play to and extends the teaching of language knowledge in traditional classroom teaching, expands the form and connotation of language learning, and makes the learning process more lively and interesting [14].

**3.2.2. Mobile Microlearning.** In the era of “Internet +,” the Internet is becoming more and more popular, and mobile intelligent terminals such as smart phones and tablet computers allow us to use the Internet to obtain and transmit information anytime, anywhere, and become a new mode of information acquisition [15]. Mobile microlearning is the continuous development of new mobile technology, a microlearning model that facilitates learning with the aid of mobile terminals. The mobile microlearning in this study is a new educational method based on WeChat software and WeChat public platform. WeChat is a multiplatform, multimedia mobile social software launched by Tencent in 2011. It is undeniable that since the launch of WeChat, it has gradually become one of the main means of communication in modern interpersonal communication due to its convenience, simplicity and ease of operation, and multidimensional interactivity. After online

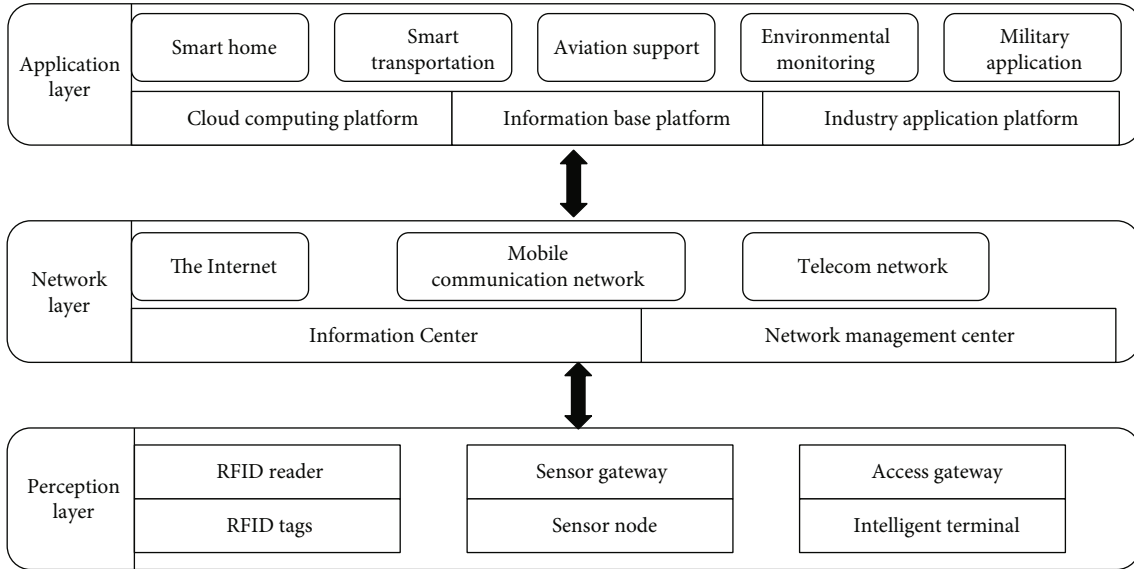


FIGURE 2: IoT architecture diagram.

self-learning and classroom guidance, teachers use WeChat personal clients and WeChat public platforms to push multimodal learning resources that integrate text, pictures, sounds, and videos to students. Before class, teachers can use the QR code generation software and generate a QR code for the course learning materials for students to download at any time. After class, teachers and students use WeChat groups to exchange learning content to achieve multiple interactions between teachers and students and between students. Teachers and students can also use the circle of friends to share learning resources. Mobile microlearning is an experience and expansion of online self-learning and classroom guidance, and it is also a useful supplement to it. Compared with the one-way knowledge transfer mode of traditional classroom teaching, mobile microlearning, with its mobility and immediacy, has created a new multidimensional interactive learning platform. In addition, rich learning resources and timely communication and feedback strengthen the breadth and depth of students' knowledge internalization, which greatly promotes students' understanding and consolidation of the knowledge they have learned. Vivid pictures, video materials, etc. bring visual and auditory multisensory experience, which helps to stimulate students' interest in learning and improve learning efficiency.

**3.3. Principles of IoT Technology.** The basic architecture of the Internet of Things can be represented from the bottom up as the perception layer, the network layer, and the application layer, as shown in Figure 2. The IoT formula is shown in

$$(\text{NSID} - \text{IOT}) + (\text{NB} - \text{IOT}) + (\text{OID} - \text{IOT}) = \frac{\text{IOE}}{\text{IOE}} * N = \text{IOT}. \quad (1)$$

Perception layer: it mainly completes the process of

information collection and uploading the collected information, that is, in order to collect the information of "things" anytime and anywhere through information sensing devices such as RFID, bar code, GPS, and infrared sensor, upload it to the upper end, and make preparations for information transmission [16].

Network layer: it mainly completes the all-round transmission of information, which plays a linking role in the entire Internet of Things. It is to integrate various access devices with existing networks with different transmission properties and communication protocols, such as the Internet and mobile communication networks, and upload the information collected by the perception layer to the upper layer through network nodes in real time and accurately [17].

Application layer: it mainly completes various practical applications such as intelligent identification, positioning tracking, monitoring, and management. It is to perform computational processing and scientific decision-making on the information collected by the perception layer. Accurately and intelligently realize services for customers from all walks of life [18].

**3.3.1. Key Technologies of the Internet of Things.** It corresponds to the basic framework of the Internet of Things. Its technical system includes perception layer technology, network layer technology, application layer technology, and public technology, as shown in Figure 3. The perception layer technology mainly includes sensor technology, automatic identification technology, wireless transmission technology, middleware technology, ad hoc network technology, and collaborative information collection technology. Network layer technologies include mobile communication network technology, Internet technology, next-generation bearer network technology, and M2M wireless access technology. The application layer technology mainly includes the support platform sublayer (public

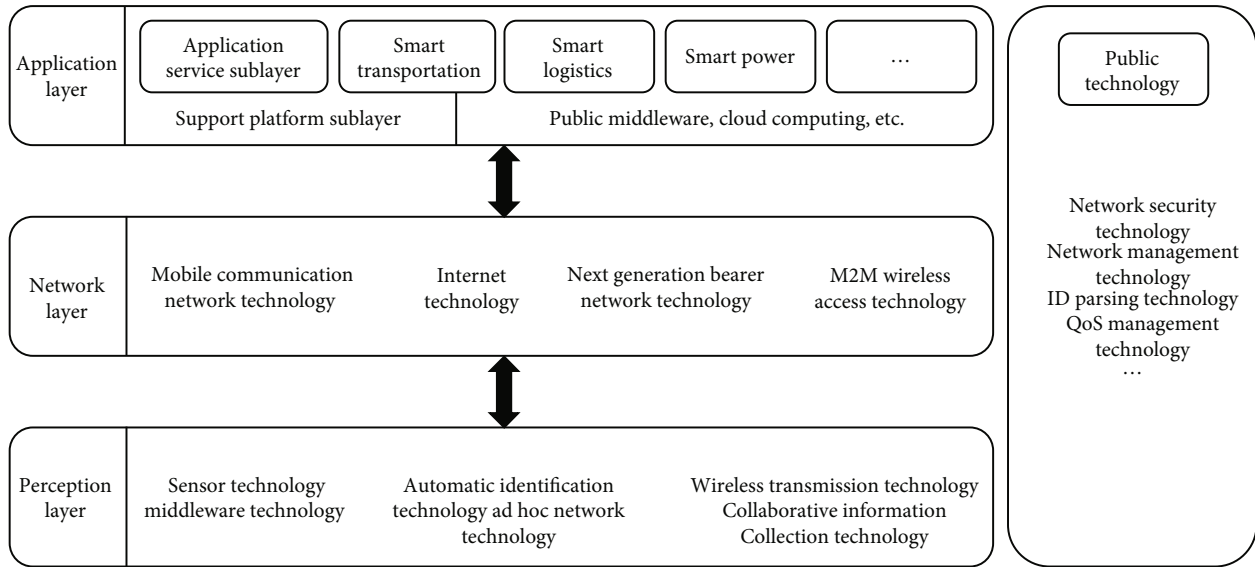


FIGURE 3: IoT technology.

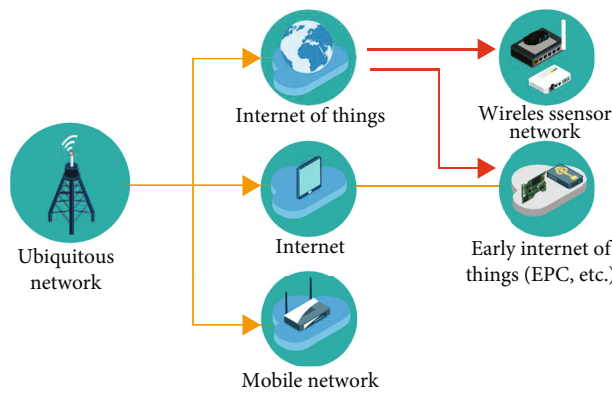


FIGURE 4: The relationship between IoT, sensor network, and ubiquitous network.

middleware, cloud computing, etc.) and the application service sublayer (industry applications such as intelligent transportation, intelligent logistics, and intelligent power). Common technologies refer to technologies related to each layer throughout the entire IoT technology architecture, including IoT security technologies, network management technologies, identification and resolution technologies, and QoS management technologies [19, 20].

3.3.2. *The Relationship between the Internet of Things, Sensor Networks, and Ubiquitous Networks.* As the name suggests, sensor network is a network composed of sensors, which is a narrow understanding of sensor network. This type of network uses the perception modules of various sensors to collect information on environmental factors. Transmission is carried out through self-organizing networks, but this type of network is only good at collecting signals and is weaker than identifying objects. If you want to achieve network transmission, you also need to use other network access methods and modules. With the development of science

and technology, people’s ability to understand things has improved; today, the generalized sensor network is not only the main task of information collection and processing. It can also realize the interconnection between subjects. The Internet of Things has more information collection methods than the narrow sensor network, and the access network is more flexible than the general sensor network, and the information processing capability is far stronger than the narrow and broad sensor network. It can be said that the sensor network is one of the links in the realization of the Internet of Things ubiquitous network. According to the ITU-TY2002 recommendation, it refers to a network that enables authorized individuals or devices to access services and communicate as quickly as possible when needed; in short, the ubiquitous network is the integration of various existing sensor networks, the Internet of Things, the Internet, and telecommunication networks; it integrates perception, identification, calculation, control, extensive connection, and deep communication to realize 4A (Anytime, Anywhere, Anyone, Anything) interconnected communication.

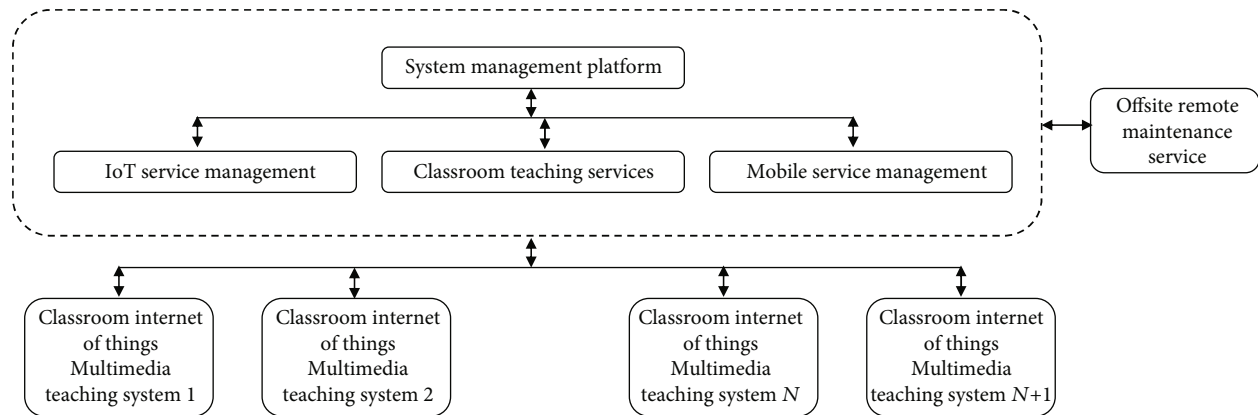


FIGURE 5: The structure of multimedia teaching system based on Internet of Things technology.

There are differences and connections among the Internet of Things, sensor networks, and ubiquitous networks, as shown in Figure 4.

### 3.4. Design of Multimedia Teaching System Based on Internet of Things Technology

**3.4.1. System Architecture.** The multimedia teaching system based on Internet of Things technology consists of two parts: hardware part and software part. As we all know, most of the current application systems are hardware systems with single-chip technology as the core. However, a system consisting only of hardware can only be a bare system or a system whose functions are not maximized and optimized for application. Therefore, the multimedia teaching system based on the Internet of Things technology is the integration of computer technology, network technology, digital signal processing technology, data sensing and acquisition technology, automatic control technology, and intelligent technology. The specific structure is shown in Figure 5.

#### 3.4.2. Hardware System Composition

- (1) System management center: the main hardware is a computer, a display device, and a data processing server
- (2) Support system network: it is completed by the original teaching classroom network, and a wireless (WIFI) network is formed
- (3) Classroom Internet of Things multimedia teaching system
- (1) Multimedia teaching system equipment

Classroom multimedia teaching system equipment consists of computer, wired and wireless pickup equipment, audio amplification equipment, video and audio signal switching equipment, display equipment, and signal source playback equipment. Each media device is embedded with TCP/IP communication interface and protocol and device function data detection and acquisition module.

- (2) The classroom teaching recording system is mainly classroom teaching recording and broadcasting equipment, such as cameras, video and audio signal digital processors, recording and broadcasting servers, and storage devices. With the development of education, informatization, individualization, and autonomous learning have become more prominent in teaching and learning; digital teaching resources will be the key construction work of each school in the future; therefore, the Internet of Things multimedia teaching system is not only an information-based teaching system but also a teaching resource production system

- (3) Multimedia equipment network switching system

The multimedia equipment network switching system is mainly composed of two parts:

- (i) General network switching and routing equipment, and each classroom completes the internal subnet
- (ii) The internal wireless WIFI network completes the link of the system wireless access equipment, such as mobile operation control, wireless pickup, and wireless amplification and other equipment interconnection

- (4) Mobile management system

The mobile management system is mainly composed of mobile terminal devices, such as iPad, mobile tablet, portable tablet terminal, and smart phone.

The author selects the university experimental class and the control class as the experimental objects and tests the reliability of the English online teaching system by comparing the teaching results.

## 4. Results and Discussion

After nearly one semester of experimentation of the online English teaching system based on Internet of Things technology, under the premise that the teaching

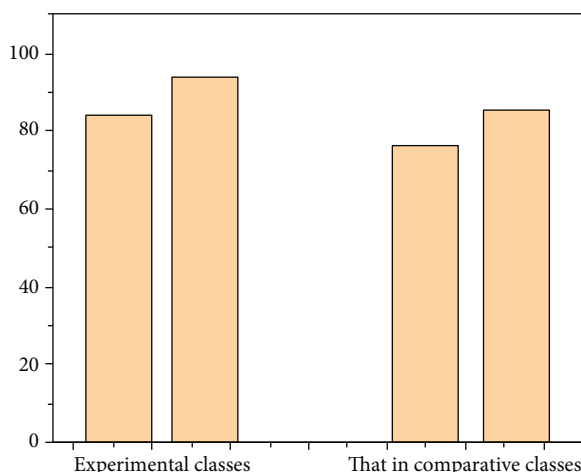


FIGURE 6: Statistical chart of the oral and written test data of the experimental class and the control class.

hours of the experimental class and the control class are equal, we conducted the same written test and oral test for the two classes at the end of the semester; the test results are shown in image 6.

From Figure 6, we can see that, under the author's method, the results of the written test and the oral test in the experimental class are about 10 points higher than the control, which shows that the use of the author's method is of great help in improving students' English performance.

## 5. Conclusion

In today's era, with the development of Internet of Things technology, colleges and universities have begun to develop online English teaching models; the author proposes a method of English online teaching system based on Internet of Things technology. This method analyzes the English SPOC teaching mode and constructs a multimedia teaching system based on Internet of Things technology, to improve students' awareness of Internet of Things technology, so as to improve students' English performance. The experimental results show that under the author's method, the students' scores in the written and oral tests are about 10 points higher than those in the traditional teaching method; it shows that adopting the author's method is of great help to the improvement of students' English achievement. The online English teaching system based on the Internet of Things technology has great application potential and development space.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

The author declares that there are no conflicts of interest.

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