

# Research on the Application of Internet-Based PAD Teaching System for English Courses

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**Abstract:** This paper based on the computer Internet to construct the PAD teaching system. Then this paper describes the scene, the system structure design, the basic data transmission function and the characteristics of the system. The research shows that the system can embed prompt points in the classroom teaching video, carry out segmentation annotation and corresponding clip processing of the video, and automatically generate analysis reports and diagnosis results according to the relevant PAD class analysis model and diagnostic criteria. At the same time, key words and section teaching video index are established. The system can quickly find the required video, which is conducive to improving teachers' comprehensive skills and English teaching efficiency.

**Keywords:** internet; PAD class; English courses; online teaching system

## 1. Introduction

The information age has changed the way people travel, the way they pay, and opened up a new landscape in education. In recent years, with the rise of Moss and Spooks, a large number of open online courses have been born, providing new ideas for education. Blended teaching is a new product of education under the development of modern information technology. The so-called hybrid teaching is a kind of "online + offline" teaching which combines the advantages of online teaching and traditional teaching. Through the organic combination of the two teaching organization forms, learners' learning can be led from shallow too deep to deep. There are many similarities and characteristics between curriculum teaching and classroom teaching. By integrating the two teaching modes and using teaching platforms such as Chaoxing and Rain Classroom, the paper introduces separate classes on the basis of online PAD teaching model framework, carry out online and offline mixed teaching, and carry out pre-class, in-class and after-class teaching practice<sup>[1]</sup>. At the same time, the paper combines the characteristics of probability theory and mathematical statistics courses to carry out reasonable PAD teaching model, guide and encourage students in Higher Education Institutions to interact in English class. Let the students gradually change from "passive learning" to "active learning", which can not only solve the pain points and difficulties in the traditional English class, but also improve the teaching effect, so as to achieve the purpose of cultivating innovative talents.

## 2. Design the PAD teaching system of joint courses in different classes

### 2.1 System Architecture

The overall architecture of the system consists of video lesson editing tool and online video analysis and diagnosis system<sup>[2]</sup>. The main structure of the system is implemented in B/S structure, in which the video lesson example editing tool has the functions of video editing, prompt point insertion, subtitle addition, video uploading, etc. The specific relationship between the functional modules of the system is shown in Figure 1.

In the interactive environment, N laptops and a server with powerful storage capacity are interconnected to form a LAN. The instructor connects to the projector and the slides will be displayed on the monitor and projector whiteboard. This system is divided into online real-time learning and off-line non-real-time learning.

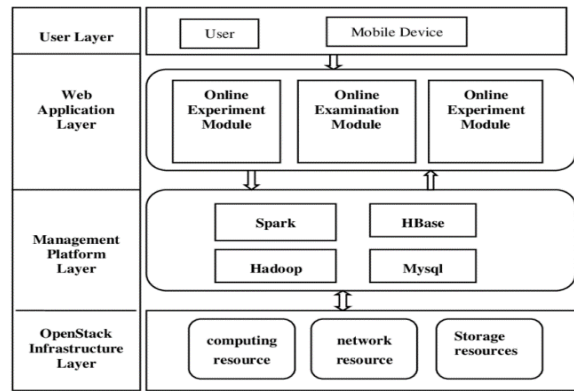


Figure 1: Overall system architecture

1) Online real-time learning

First of all, the teacher prepares to establish the server connection on the server side, and the client enters the user's name and password to connect to the server. The camera on the client side will take the student's profile picture information and send it to the Agent server. If the student is a legitimate user, the student will enter the system; otherwise, the connection will be disconnected. Then the teacher selects the PPT document to open, and the system automatically distributes the PPT document to the client, and presents it to the teacher and the client in the way of presentation view<sup>[3]</sup>. Teachers can control the opening and closing of audio recording, teachers use electronic pen to write on the screen during the lecture, the system displays the track of electronic notes in real time on each client, slides can be turned forward and backward, and store the track of electronic notes; The client can watch the lecture process on its own screen, take notes in text form and submit them to the database. It can also ask the teacher questions through the electronic hand, and the teacher can selectively let the students speak and answer the students' questions. After class, students can consult PPT documents, retrieve notes, and listen to the teacher's lecture recordings and videos.

2) Offline Non-real-time Learning

Students can access the electronic notes on the archive server via the Internet, browse the notes synchronously, listen to the class teacher's voice, and upload their own notes.

2.2 System Functions

The system will complete the overall functional design from six aspects, namely pen processing, microphone processing, video display processing, PPT document processing, pen record synchronous real-time storage processing and pen record retrieval processing (Figure 2).

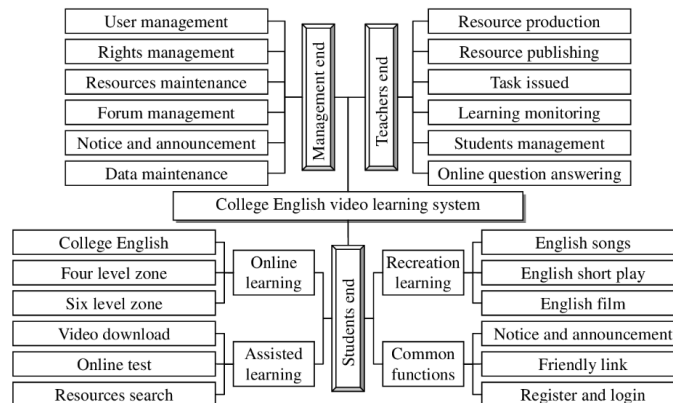


Figure 2: Function of online teaching system

3) Note processing

It includes pen input processing and pen storage processing. The input events of electronic pen include pen movement, pen stroke and pen lift. It is stipulated that when the pen moves, it is to draw a line, and the stroke and lift the pen once is PPT to turn the page backward, while the stroke and lift the

pen twice is PPT to turn the page forward<sup>[4]</sup>. When drawing lines in the teacher side, the student side displays the blackboard content synchronously in real time. Pen record storage processing is to store the pen track together with the corresponding slide number in time for later retrieval. The types of notes include teachers' notes, students' notes and students' questions.

#### *4) Microphone Processing*

Including microphone array audio input processing and audio storage processing. Position and switch the microphone timely according to the usage of the microphone array, and save the audio information corresponding to the pen record. According to the video information captured by the camera, the video file stream of the scene is displayed in the corresponding position on the screen in real time, and the mark is set to save it accordingly with the pen record.

#### *5) Processing PPT Documents*

Including PPT document display processing and PPT document distribution processing. When the PPT document is opened, it will be displayed in a full-screen way. At this time, teachers can make blackboard writing on the slides<sup>[5]</sup>. When the teacher opens the PPT document, the system automatically distributes the PPT document to the connected client and displays it in full screen mode on the client.

#### *6) Image head video processing*

Through the image head to identify the user's face features, judge whether the user is a legitimate user, if so, the face image is intercepted and displayed.

#### *7) Pen Record synchronization real-time storage Processing*

Consider the number of slides as the timeline, and each slide corresponds to a set of data, including: current time, slide number, teacher's pen notes, teacher's audio, teacher's video, student's shared notes, student's questions, etc. This information is stored synchronously in real time in the database.

### **3. Key system technologies**

#### ***3.1 Human-computer interaction technology***

Human-computer interaction technology refers to the technology that realizes the dialogue between human and computer in an effective way through computer input and output equipment. It includes the machine through the output or display equipment to provide a lot of information and prompt requests, people through the input device to the machine input information and prompt requests, people through the input device to the machine input information, answer questions. Human-computer interaction technology is one of the important contents of computer user interface design. In recent years, the research of multi-channel human-computer interaction has attracted more and more attention. It enables the computer to go beyond the stage of graphical user interface, improve the efficiency of information capture and perception<sup>[6]</sup>. Multi-channel information capture mainly involves voice, video, keyboard, handwriting and other multi-channel information acquisition, interactive index, etc. With its advantages in terms of expression, mobility and ease of use, digital ink and pen-based computing is one of the most exciting human-computer interaction technologies, which can help users communicate with any computing device at anytime, anywhere. By using advanced digital ink and pen computing technology, the pen can become an important interactive device for desktop computers, tablets and PDAs, rather than just a traditional method of word input. In order to ensure the friendliness of human-computer interaction, pen-type input devices, such as writing pad, handwriting screen, mobile pen input device, electronic whiteboard, Tablet Pc and Anoto pen are used as the main note-taking tools in the shared note-taking system.

#### ***3.2 Media data collection, storage and transmission technology***

Media data usually refers to audio and video data. Media data acquisition usually means that analog signals are sampled to generate digital signals, which are reproduced or stored on digital media after computer processing. Due to the performance differences of collection devices and compatibility issues, as well as the huge amount of data in multimedia, collection tasks are generally heavy and occupy a lot of system resources, which is not easy to process<sup>[7]</sup>. However, Direct Show processing reduces the difficulty of collection. Using Direct Show technology, it is a member of DirectX. Direct Show is an

open application framework developed by Microsoft and a set of programming interfaces based on COM. DirectShow performs complex data transmission, integrates hardware differences, and ensures audio and video synchronization for efficient multimedia data processing. And by combining DirectShow with network technology, you can easily stream audio and video.

### **3.3 Data Storage Technology**

In order to effectively store and index the audio, video and electronic notes of College English classes, it is necessary to use the popular MPEG7 as the basis for data storage. MPEG7 is a multimedia information description interface. The MPEG7 standard focuses on the description and definition of audio and video content, and defines the content of audio and video with clear data structure and syntax. The information defined by the MPEG7 format can be efficiently searched, filtered, and defined for desired audio and video materials. The MPEG7 standard provides a clear hierarchical syntax to define audio and video names, storage, usage, structure description, link and interaction of various controls, and uses XML as the basis of the syntax. MPEG7 supports both real-time and non-real-time use. MPEG7 is very convenient for audio and video retrieval. MPEG7 describes efficient transmission and storage mechanisms, and allows synchronization between content and description. It defines the structure and standard interface of the terminal. MPEG7's Description Definition Language (DDL) allows for the creation of new descriptions as well as the extension and modification of existing descriptions. The XML language was chosen as the basis for DDL.

## **4. System implementation**

### **4.1 Dynamic generation of quantitative analysis interface**

The user selects the video for quantitative analysis, and the program creates an XML file for the video after import, and can control the play, pause and stop of the video. When the user clicks "Teach, instruct, criticize" and other buttons to make segment evaluation on the video during the playing process, the program will insert the playing period of the video together with the user's evaluation into the XML file. Finally, when the user clicks "Generate analysis report". The program will call an HTML file using JavaScript to read the data in the previously generated XML file and display it to the user.

### **4.2 Dynamic HTML Reports**

Create a file to save the data, read the file when the program runs, dynamically generate HTML code based on the file data content and then display the specific content in the program window through CHTMLVIEW.

## **5. Experimental analysis**

### **5.1 Experimental subjects**

Ninety-nine vocational college students who attended the *Basic English* courses were selected as the research objects. Among them, 59 students in Grade 2021 who implemented regular online teaching were selected as the control group, with 38 males and 21 females. The experimental group included 40 students of Grade 2022, 21 male and 19 female, who were enrolled in the online mode combined with PAD Class. There was no significant difference in the general information between the two groups ( $P > 0.05$ ).

### **5.2 Methods**

The control group received regular instruction. According to the teaching syllabus and teaching plan, complete the online teaching according to the conventional teaching mode, including 72min of teaching by teachers, 8min of students' questions, teachers' questions and summaries, a total of 80min. The experimental group adopted the blended PAD classroom teaching mode<sup>[8]</sup>. The design of teaching module is carried out by referring to the offline classroom teaching model combined with PAD. Among them, PAD teaching designed two teaching cases with core teaching objectives as the core; The time ratio between classroom teaching presentation and students' assimilation and discussion was 2:1:1, including 5min of teaching cases designed based on PAD teaching concept and 35min of teaching time

for reading materials. Students were divided into 6 groups according to the original group of the class. The time of assimilation, assimilation and discussion was 25min. The time of students' group summary and report was 2min/per group, for a total of 12min. Teachers answer questions and summarize for 3 minutes. The whole teaching process is 2 class hours, 80 minutes in total.

### 5.3 Results

#### 1) Comparison of theory test scores between the two groups

The theoretical test score of the experimental group was  $(82.71 \pm 3.54)$  points, and that of the control group was  $(70.19 \pm 4.50)$  points. The difference between the two groups was statistically significant ( $t=14.760, P=0.000$ ).

#### 2) Students' evaluation of teachers

Score the student evaluation scale. In the one-to-one evaluation of the teacher, students of Grade 2021 need to complete 59 teaching evaluation scales, and actually complete 35 teaching evaluation scales, with a participation rate of 59.32%. Students of Grade 2022 are required to complete a total of 40 teaching evaluation scales for one-to-one evaluation of the teacher, and actually complete 30 scales, with a participation rate of 75.00%. The effective teaching evaluation score of the two groups was  $97.43 \pm 4.07$  points in the experimental group and  $93.89 \pm 6.47$  points in the control group. The difference between the two groups was statistically significant ( $t=2.682, P=0.010$ ). Through in-depth exploration of the teaching theory of separate classroom combined with PAD in classroom teaching and combining personal experience in online teaching, this study designs and integrates the online teaching module of separate classroom combined with PAD and puts it into teaching practice. The improvement of online teaching effect was indirectly reflected through the examination results of college English courses for students of Grade 2022. At the same time, the student teaching evaluation system also shows the improvement of students' teaching evaluation score, which once again verifies the feasibility of the integrated online teaching model combined with PAD classes, which is consistent with the teaching practice effect of other subjects.

## 6. Conclusion

This study explores the teaching theory of PAD in classroom teaching and combines personal experience in online teaching. The design is integrated into the online teaching module and put into teaching practice. The improvement of online teaching effect was indirectly reflected through the examination results of English courses for students of Grade 2022. At the same time, the student teaching evaluation system also shows the improvement of students' teaching evaluation score, which once again verifies the feasibility of integrated online teaching mode of divided classes, which is consistent with the teaching practice effect of other subjects.

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