Online and Offline Blended Teaching Practice of Artificial Intelligence Technology-Assisted Smart English Teaching System

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Abstract: *In order to keep in line with international standards and maintain academic advancement and innovation, Chinese college students basically continue to study college English. Therefore, this paper aimed to improve the application of the computer-aided teaching system in English teaching based on artificial intelligence technology, which made the computer-aided teaching system better applied in the mixed teaching of English online and offline. The online-offline blended teaching practice aims to supplement the traditional classroom where the learning content is rigid and the classroom vitality is not high. In this paper, the computer-aided system was applied to the visual teaching of the offline classroom. Through the systematic design of teaching courseware and teaching arrangement, the system urged students to conduct online independent learning, which stimulated students' enthusiasm for online independent learning. Taking the college English class led by a teacher of a university in Anhui, China as an example, this paper conducted a practical research on online and offline blended teaching. Through rich teaching experience and full teaching enthusiasm, Teacher A has applied artificial intelligence technology-assisted smart English teaching system to the classes he manages. Judging from the evaluations of students randomly selected from the class, Teacher A's online and offline mixed class teaching made 90% of the students thought that the English class was more interesting. It also made 90% of the students thought that their speaking ability has been improved. This shows that the online and offline blended teaching of the smart English teaching system assisted by artificial intelligence technology can significantly improve the English learning enthusiasm of college students, which can be considered in the teaching of college English.*

Keywords: *Artificial Intelligence Technology, Computer-aided Teaching System, Online and Offline Mixed Teaching, English Teaching for College Students*

1. Introduction

Since the dawn of human civilization, humans have communicated and learned through what they see. Visualization has long been an important way for humans to learn and perceive things. Human beings urgently need to seek new ways to improve the efficiency of knowledge acquisition to cope with the shortcomings of traditional education and learning methods. In the field of education and teaching, visual information widely exists in textbooks, teaching materials and Internet media educational resources in various forms such as videos and pictures. Educators disseminate knowledge to learners through multimedia educational media such as television, video playback equipment, and computers. With the widespread dissemination of visual information, knowledge visualization has become an important research topic in the field of education and teaching. It plays a role in the understanding of visual communication for teachers and learners. New teaching methods and learning models are adopted to make demands. After the Chinese government first proposed "Internet +" in its work report in 2015, information and communication technology and various industries have rapidly formed a trend of integration and innovation. Therefore, artificial intelligence technology assists the integration of smart English teaching system into English classrooms, which is necessary to conduct research on the practice of online and offline hybrid teaching mode.

Since the widespread application of the Internet, online and offline blended teaching has been applied in various disciplines. There are many studies on it. In order to actively explore the English teaching method in the "Internet +" era, Miao Y explored the teaching effect of online and offline mixed teaching English courses. It was found that the online and offline mixed teaching method was

very popular among students [1]. With the support of computer technology, Long J studied the mixed teaching mode of pathology teaching in medical school [2]. Wang X analyzed the outstanding problems exposed since the practice of blended learning. The effectiveness of the blended learning practice strategy was tested through empirical research [3]. Wu X took the "College English" course as an example to discuss the relationship between blended teaching and ideological and political teaching, and analyze the teaching method of blended teaching. It was divided into two parts to put forward suggestions for the reform of the evaluation system [4]. Based on deep learning theory, Jing X combined with Small Private Online Course (SPOC) to provide a new model and method for English teaching [5]. It can be found that their research on blended teaching covers all stages and disciplines. The content of the research is very comprehensive. However, in terms of teaching methods, SPOC, flipped classroom, etc. are used for practice. There is no targeted and self-designed online and offline hybrid teaching mode.

The application of computer-aided teaching system is still in the development stage. There are also many applications of computer-aided teaching systems in English teaching. Tan P discussed a multi-module English evaluation and teaching system, which focused on designing an online evaluation system throughout the semester [6]. Jing D used Visual Basic 6.0 to make computer-aided teaching courseware, which greatly improved the efficiency of classroom and courseware production [7]. Guo Q designed an online learning system that integrated functions such as reading, pronunciation, task motivation and participation, story retelling, group cohesion, and classroom management, which has provided great help in English teaching [8]. According to the characteristics of language transfer in the English learning process of minority students, Hong N paid attention to the arrangement of teaching content based on ethnic language habits, language cognitive psychology and ethnic culture. A set of teaching strategies suitable for local minority students was developed [9]. Wang L designed the power electronics course using English immersion teaching method. It aimed to introduce advanced foreign academic knowledge into China, so that students and teachers had an international perspective and English-oriented power electronics logic and critical thinking [10]. However, their research is more about applying computer-aided systems to classroom evaluation and homework correction, test paper testing, etc. The system is not really applied to offline classroom teaching.

The innovations of this paper are as follows: in the aspect of experimental research, this paper selects a single university teacher as the object, and his teaching method is deeply studied. Such a perspective is rarely involved in previous studies. This paper avoids students' evaluation, but focuses on the analysis of teachers' own understanding and research on its feasibility.

2. Blended Teaching Practice

2.1 AI-assisted English Teaching

According to the "2020 Global Digital Report", China's social media users have reached 1.04 billion. Informal language learning based on social media is becoming more common [11]. The "China MOOC Action Declaration" issued by the 2019 China MOOC Conference has clarified that online education and MOOC construction, use and learning have grown from scratch, from weak to strong. It contributes to China to run a fairer and higher quality higher education [12]. In the visual world, people need to understand, interpret and create visual information. The ability to interpret visual information content and text has become a basic literacy in the digital age of the 21st century. The way of foreign language learning has been quietly changed under the impetus of information technology. Through mobile learning, ubiquitous learning, smart learning and other new learning methods, learners are showing the trend of autonomous, exploratory, collaborative, fragmented and personalized learning. Language teaching supported by technology is accompanied by the development of information technology. It promotes the change of foreign language teaching needs and concepts, and promotes the continuous innovation of teaching content presentation methods for foreign language teachers in colleges and universities. As a key user of information technology in a technological and cultural environment, college English teachers' belief in the integration of foreign language courses and information technology in college English teaching, acceptance, thinking change attitude are directly reflected in their classroom teaching practice. Only by conducting research on foreign language teachers and their micro-classrooms, can the reform of traditional teaching methods and the improvement of college English teaching quality be effectively promoted [13]. Figure 1 is a simple schematic diagram of computer-assisted English teaching. Among them, the left is the software platform. On the right is the actual teaching application, which is associated by the Internet or a local
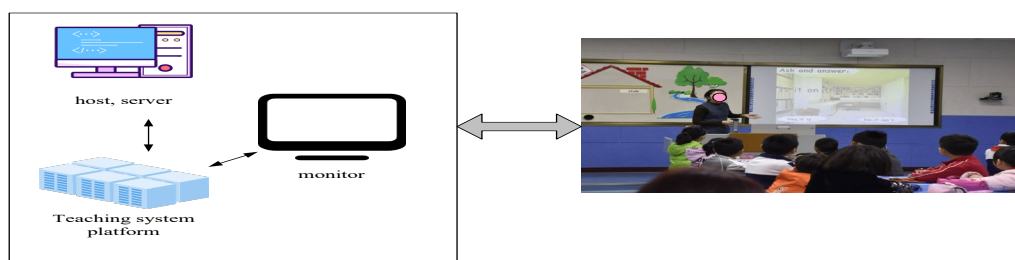
area network.

Figure 1: Computer-assisted English teaching

Computer-aided teaching system plays an important role in the new teaching mode. Especially in the environment where the new crown pneumonia epidemic has not yet been controlled, by using the advantages of distance teaching and online teaching of computers, coupled with the intelligent development of the system, these can bring changes to students' learning [14]. For the English teaching auxiliary system, most of them are integrated with the school's educational administration system. Some stronger schools have developed English-assisted teaching systems independently. There are also auxiliary systems developed by multimedia teachers based on English audio-visual. In general, the educational environment of colleges and universities is becoming more and more perfect. Each school has more or less its own English-assisted teaching system. The artificial intelligence technology-assisted smart English teaching system is a comprehensive platform that integrates online resources, classroom teaching, online assignments, online examinations, etc., which is of great significance to both students and teachers, as shown in Figure 2.
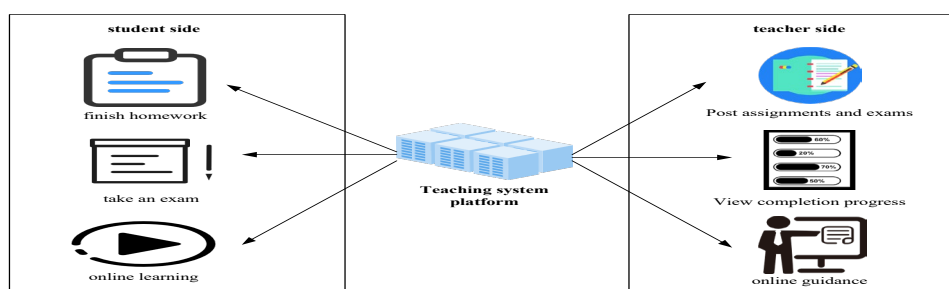

Figure 2: The application of computer-aided teaching system in college English teaching

2.2 English Visual Teaching

Knowledge is an objective and independent existence. Its properties, relationships and structure are known. Learning is the process of transferring knowledge from teachers to learners. Knowledge is built through meaningful learning. The learning process is stimulated when the learner intentionally associates (new) information with his own existing knowledge and incorporates it [15]. In the era of text printing, people's acquisition of knowledge is mainly based on direct experience and text reading. Technological development and media innovation promote the transformation of modern society from the traditional text printing culture to the visual communication culture containing rich graphic information. Visual graphics are conducive to stimulating people's associations and thinking, which can promote the exchange of information and ideas between people. Visual symbols and representation codes in teaching resources are intuitive and vivid in content. With the support of multimedia information technology, the teaching resources are visualized and transformed into visual knowledge that is easy for learners to understand and master, which is helpful for learners to understand relevant knowledge and educators to disseminate knowledge [16]. In the teaching of college English, the main types of visualization are shown in Figure 3.

In this paper, the use of the teaching system is judged whether visual design is carried out in the English teaching process. Because teachers need to prepare lessons, the visual content applied in teachers' teaching is produced from the computer English teaching assistant system. Therefore, the degree of visualization in the teaching process represents the degree to which teachers use auxiliary teaching equipment in teaching [17].
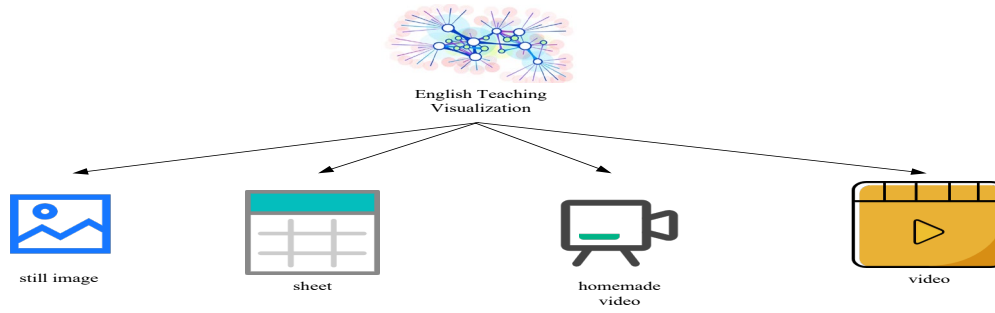
Figure 3: Types of English teaching visualization content

2.3 Artificial Intelligence Personalized Recommendation Algorithm

In the artificial intelligence technology-assisted smart English teaching system, it is overkill for the system to be used simply as an online video platform or a job posting platform. Therefore, combined with the resource advantages in the smart teaching system, a personalized recommendation algorithm based on artificial intelligence is designed. This enables teachers to quickly and accurately obtain the resources they want in the process of using, which is to prepare for the English classroom. For students, video resources such as spoken English, reading, and grammar can be recommended [18].

Using the learner L for training [19], the classification formula of the sample and the corresponding combination is obtained:

$$[(x_1, h_T(x_1)), \cdots, (x_m, h_T(x_m))] \in [X \times V]^m \tag{1}$$

Among them, X is the sample space. According to the selected random distribution P(x), the sample set can be obtained:

$$X = \{x_1, x_2, \cdots, x_m\} \tag{2}$$

The training result of the learner is:

$$h_t(x_t) \in V \tag{3}$$

V is the set of classifications, which means that the samples are divided into n categories. The simplest case is divided into two categories [20]:

$$V = \{0,1\} \tag{4}$$

Algorithm $\{A_m\}$ is constructed to conform to student learning rules, which can also be expressed as a mapping of concept space C. All outputs of the algorithm are assumed to be $H(T, x)$. $H_m(T, x)$ is an assumption under the target concept T [21]:

$$H_m(T, x) = A_m[(x_1, h_T(x_1)), \cdots, (x_m, h_T(x_m))] \tag{5}$$

Haar Features

Haar features include four categories, as shown in Figure 4, which are edge features, linear features, point features and diagonal features.

As can be seen from Figure 4, all features are composed of different numbers of rectangles. Therefore, it can be used to represent the behavioral characteristics of students, which can be expressed by the formula:

$$feature_j = \sum_i w_i \cdot \mathrm{Re}\,ctSum(r_i); i \in 1, \cdots, N \tag{6}$$

Among them, w_i represents the weight. $\mathrm{Re}\,ctSum(r_i)$ represents the white area in the feature template. N represents the total number.
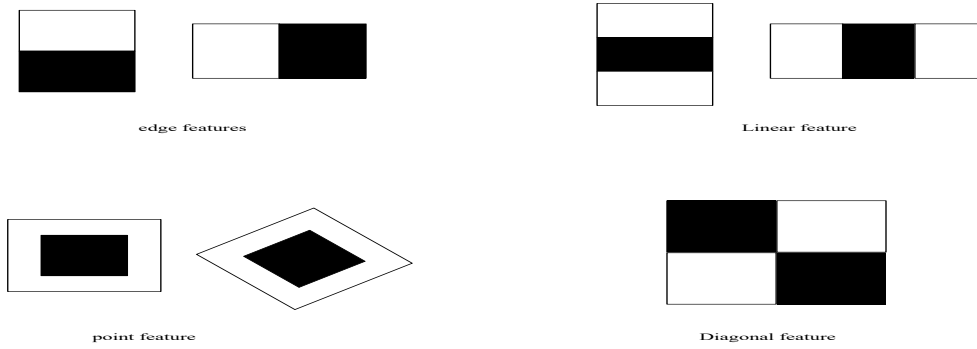
Figure 4: Example of a feature template

A feature can also be represented by an integral graph. The individual behavior of students is represented as a point (x, y) in the image, and the integral image of this point is:

$$ii(x, y) = \sum_{x' \leq x, y' \leq y} i(x', y') \tag{7}$$

$i(x', y')$ is expressed as the gray value of the point. To get the feature map of all student groups, it can be calculated according to the following formulas:

$$S(x, y) = s(x, y - 1) + i(x, y) \tag{8}$$

$$ii(x, y) = ii(x, y - 1) + s(x, y) \tag{9}$$

Among them, S(x,y) represents the sum of all pixels and has the following characteristics:

$$s(x, -1) = 0 \tag{10}$$

$$ii(x, y) = 0 \tag{11}$$

To better explain the calculation principle, it is assumed that the integral graph is shown in Figure 5.
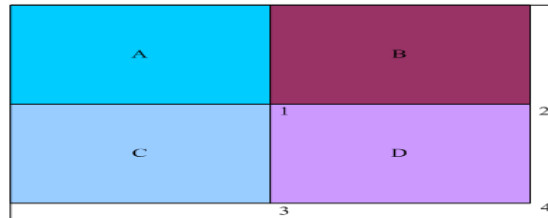

Figure 5: Integral graph area calculation

$\sum(A), \sum(B), \sum(C), \sum(D)$ corresponds to the pixel values in A, B, C, and D in Figure 5, respectively, then:

$$II_1 = \sum A \tag{12}$$

$$II_2 = \sum A + \sum B \tag{13}$$

$$II_3 = \sum A + \sum B + \sum C \tag{14}$$

$$II_4 = \sum A + \sum B + \sum C + \sum D \tag{15}$$

To find the grayscale sum of region D, it can be calculated as:

$$\sum(D) = II_4 + II_1 - (II_2 + II_3) \tag{16}$$

Finally, the required features are classified to achieve the effect of personalized recommendation. Here, the classifier is used for training, and the Harr features are given weights:

$$w_{t+1,i} = w_{t,i}\beta_t^{1-e_i} \tag{17}$$

Among them, e_i is a weak classifier, and β is a weight adjustment coefficient. Then the weights are normalized:

$$q_{t,i} = \frac{w_{t,j}}{\sum_{j=1}^{n} w_{t,j}} \tag{18}$$

Finally a strong classifier is formed:

$$g(x) = \begin{cases} 1, \sum_{t=1}^{T} a_t h_t(x) \geq \frac{1}{2}\sum_{t=1}^{T} a_t \\ 0, else \end{cases} \tag{19}$$

Among them, $h_t(x)$ is the smallest classifier:

$$a_t = \log\frac{1}{\beta_t} \tag{20}$$

3. Offline Blended Teaching Practice

This paper applies the English teaching system of artificial intelligence technology to college English teaching. Taking "College English 2" as an example, this paper analyzes the specific organizational form and function of visual teaching practice based on teachers' understanding of the new teaching model. In the case analysis, the English teacher A teacher of a university in Anhui, China is selected as the object. The implementation of the online and offline blended teaching practice of the artificial intelligence technology-assisted smart English teaching system is understood by interviews and lectures in the classroom. The implementation effect is analyzed.

3.1 Selection and Overview of Subjects

This paper obtained a sample of potential research subjects through pilot data collection. The research subjects were further communicated (network and field visits) to explain the specific matters of the research and related requirements. Due to the heavy teaching tasks, limited time for interviews and cooperation among some teachers, only 8 teachers were willing to continue to cooperate and participate in the research. This paper further put forward the request to enter the teaching site of the research object, follow the lectures and record the classroom teaching process in the form of video recording. 5 out of 8 teachers expressed concerns about the complete presentation of their teaching process arrangements and courseware design, so they opted out of the study. After repeated confirmation, screening and comparison, Teacher A was finally selected to conduct in-depth research on typical cases. The basic information of teacher A is shown in Table 1.

Table 1: Basic information of teacher A

serial number	information	Mr. A
1	gender	male
2	age	35 years old
3	Education	Postgraduate
4	job title	lecturer
5	Overseas study experience	Have
6	technical expertise	video making

3.2 Data Analysis

The analysis of classroom observation data mainly adopts the content analysis method. The rationale is that the classroom observations in this paper are mainly collected by means of videography and simultaneous recording. The specific practice process and form of knowledge visualization in

object classroom teaching are recorded and studied. That is, what kind of visual representation type the research object presents and explains which type of foreign language knowledge is recorded and studied in the teaching reality in which the research object is located, so as to understand the characteristics of the research object's knowledge visualization teaching practice and teachers' teaching method. Classroom observation record data involves the types and quantities of different visual representations used by the research subjects, and the time it takes to carry foreign language knowledge. The data contains a large amount of complex information such as texts, words, pictures, videos and so on. Content analysis, as a coding manipulation and data interpretation method, allows the researcher to examine the frequency, type, relevance, and deficiencies of data units in detail for a particular printed or media material (in various forms such as written documents, photographs, films, videos, and audio tapes). Explicit data from which underlying meanings can be inferred are generated. Patterns, themes, concepts, assumptions, and meanings in the data are systematically combed and interpreted.

This article integrates the data collected in the form of video recording and classroom observation records. The classroom observation data are transcribed into electronic text data according to the time sequence of each research subject's practice of visualizing college English knowledge. Through the steps of defining the sampling range, defining the observation category, defining the recording unit, and analyzing the frequency and time of the unit, the visual representation samples, types, and quantities involved in the teaching process, as well as the type and time of foreign language knowledge corresponding to the presentation and explanation are classified and counted. At the same time, the unstructured data is classified and encoded from the dimensions of the specific manifestation of knowledge visualization, the characteristics of knowledge visualization practice, and the characteristics of knowledge visualization teachers' teaching methods. The basic analysis framework and steps are shown in Figure 6.
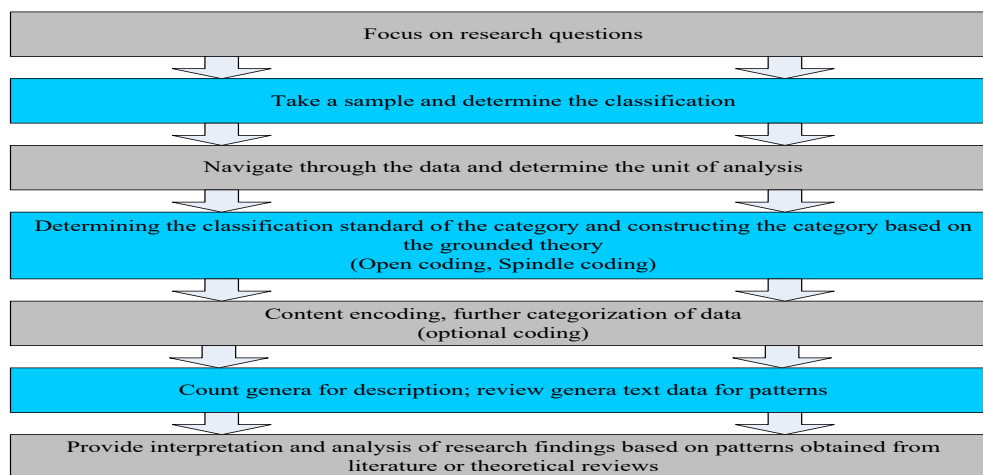

Figure 6: Data content analysis framework and steps

As far as sampling is concerned, the transcribed text of all knowledge visualization teaching practice observations of each research object is the sampling scope. In terms of observation categories, it mainly analyzes the amount of various types of visual representations used in the practice of knowledge visualization of the research object, and the time spent in teaching different types of foreign language knowledge carried by various visual representations. In terms of recording unit, three units are mainly used: unit/frame, minute and percentage. According to the determined observation category, the unit of marking the number of visual representations used is unit/frame. The unit of time used to teach different types of foreign language knowledge carried by various visual representations is minutes. The number of specific types of visual representations used and the proportion of time spent in foreign language knowledge carried by this type of visual representations are expressed as percentages. The number of different types of visual representations used by the research subjects in classroom teaching, the time spent in teaching different types of foreign language knowledge carried by various visual representations, and the proportion of the two are the true presentation of their classroom teaching behavior. It is the objective and explicit representation of what the research object thinks about the knowledge visualization teaching practice. It also specifically shows his personal emphasis and tendencies in the use of visual representations of knowledge visualization and foreign language knowledge teaching.

3.3 Teacher A's Teaching Process

(1) Self-study feedback before class

As a teaching mode with the rise of micro-lectures, flipped classroom replaces traditional classroom teachers' knowledge explanations with teaching videos/courseware before class. It is self-learning by students before class. Teachers guide exchanges and discussions in class to deepen the understanding and application of knowledge. According to the theme and content of the teaching unit, teachers select teaching materials with reasonable form, moderate difficulty and strong thematic nature for design and integration. By using the characteristics of video material content focus, vivid presentation, real situation, accurate expression, audio and video synchronization, repeated viewing, etc., it helps students to have an in-depth understanding of teaching key points in the process of independent learning. It also helps students develop the awareness of pre-class preview and self-study, so as to improve the ability of self-exploration, problem-finding and problem-solving. In this process, teachers should not only carefully design and plan the teaching content, not blindly copy the content of the teaching materials, but also design the teaching process as a whole. Therefore, the teaching activities are always fully expanded around the teaching objectives.

In the first lesson, Teacher A first gave a special explanation and reinforcement to the word reading problems and micro-class learning videos arranged before the class. He first used the "English Vocabulary and Sentence Stress" network teaching video resources to "watch-interpret-analyze-practice" the phenomenon of "stress" which is more prominent in students' word reading before class. Another instructional video resource was provided after class for self-study. These two teaching video resources were recorded by foreign professional language teachers/institutions. The content knowledge was explained in an "authentic" way by means of original sound presentation, content explanation, text synchronization, and subtitle assistance. While watching the video, students should not only perform listening recognition of the knowledge points narrated by the lecturer, but also quickly understand the text information in the video combined with the narration. The use of Chinese and English subtitles has reduced the difficulty of students' understanding to a certain extent. Secondly, Teacher A prompted and summarized the content of the personal topic interview micro-class video resources distributed before class. Through the interviewees' narratives, the concept of "the Odyssey Years", the theme of this unit, was proposed. The stage was divided into guidance and discussion, which realized the introduction of background knowledge and the establishment of learning priorities. On the basis of this discussion, he conducted a classroom dictation test on the word learning of the students before class. Then, starting from the division of age stages in Chinese culture, he made a comparative analysis and explanation of the division of modern life stages in the West in the previous video material by means of timeline diagrams, ancient Chinese cartoon characters, and the combination of Chinese and English texts. By arranging the ages in ascending order on the time axis, and displaying and summarizing the main titles corresponding to Chinese culture aged 0-90, Teacher A not only expanded the content knowledge, but also guided students to consolidate and inherit the language and culture of the motherland. He further used the classics of Confucius' "The Analects of Confucius" to discuss English translation, which led students to pay attention to the influence of in-depth understanding and learning of cultural background on translation during the process of converting between two languages.

(2) Internalization is explained in class

On the basis of the topic guidance, content expansion and students' word reading feedback in the pre-class self-study unit in the previous class, Teacher A used the "image and text correspondence" exercise to guide students to expand the practice of the division of life stages in the interview video of "the Odyssey Years" in the first lesson and the division of age stages in Chinese culture. He used the graphic category column list form. In the PPT with the theme of "Human Life Cycle", students were required to match the character graphics with the English text descriptions of titles and age groups. Students were also required to sort the images and titles of people from small to large according to age group. In this exercise, it involved the identification of visual graphic representations, the reading of English words/phrases, and the formation of time-line concepts. From the perspective of teaching design, it was the consolidation and reinforcement of the teaching content of the previous class. Students formed the thinking and improvement of inherent knowledge in interesting exercises.

He then used the animated instructional video "Eight Stages of Development by Erik Erikson" to guide students through a developmental psychology perspective. The eight stages of "Psychosocial Theory of Development" were quickly understood. Students were asked to discuss and retell what they saw in small groups after viewing. According to classroom observation data, students have a strong

interest in the "theoretical learning" with moderate speech speed under the multiple information interaction of hand-drawn animation, text assistance, English commentary, and Chinese and English subtitle prompts. Although the video was only played once, most students were able to successfully discuss and communicate with their group of students after watching the video. In the question-and-answer session after the students' discussion, Teacher A guided the students to recall and summarize the key features of the main content in the teaching video material. After that, he reconstructed the video content with the "loop diagram" drawn on the PPT. Eight stages were set as closed loops of cyclical development. Students were visually guided to convert multi-dimensional text (written text and oral text) knowledge into complex graphic text that is easy to extract and remember, so as to deepen the understanding of the essential characteristics of human beings and the reciprocity of life cycle. After the explanation, he quickly replayed the video in the form of jumping and pausing to form the consolidation and internalization of the content.

Subsequently, Teacher A integrated the eight stages in the above video in the form of a timeline. Combined with the characters and age stages in the exercises corresponding to the pictures and texts of "Human Life Cycle", the content of the exercises is adapted to the stages of the "social psychological development theory". Thus, the "explosion graphic" highlights that the stage in the middle of Adolescence/Teenager and Adult is exactly "the Odyssey Years" described in this unit. As a result, he realized the detection, guidance, expansion, comparison, reinforcement and application of foreign language knowledge based on unit teaching topics through visual representations such as animated videos, graphic charts, and drawn images. Under the relatively limited "loading" of language knowledge, background knowledge and cultural knowledge in textbooks, Teacher A designed, integrated and mined teaching content and curriculum resources. This encouraged students to study beyond the text in the textbook. Using language knowledge as a bridge, he broadened his horizons to explore other knowledge related to the subject of unit teaching, so as to improve his overall understanding of things. Finally, he interpreted the core vocabulary "Odyssey" of this unit with a novel "radial network node graph". From the relationship and extended interpretation of the word, students can clarify the exact meaning of this unit and the concept proposer of "the Odyssey Years", which in turn stimulates students to choose lexical interpretation. In the process of defining and clarifying concepts, a consciousness of inquiry from the outside to the inside and from the shallow to the deep is formed.

(3) Consolidation and improvement after class

After the 1st and 2nd lessons, the after-school learning content assigned by Teacher A to the students is mainly: "English Vocabulary and Sentence Stress" teaching video resources; review of important person/event information in personal impression and drafting of life plan according to the eight stages of "social psychological development theory"; extracurricular readings extend thinking exercises; the study of language knowledge points related to the textbook of this unit. Judging from the arrangement of learning tasks after class, Teacher A organically linked the three aspects of self-study before class, in-class explanation and after-class consolidation. This has formed students to study the teaching content independently before class. Under the teacher's feedback, extended discussion and analysis and interpretation in class, students would continue to consolidate and strengthen after class. The continuous input and output of teaching objectives and teaching content were realized, which maintained the coherence and consistency of the teaching process.

3.4 Usage of Smart System

Judging from the knowledge visualization practice in the teaching of comprehensive college English courses in the first and second lessons, Teacher A used the teaching video material (filming video and animation video) as a micro-lecture video teaching medium before, during and after class. He conducted audio-visual comprehensive input respectively on basic knowledge of language such as phonetics and vocabulary, and pragmatic knowledge of discourse, strategies and functions. Combined with graphic charts and static image visual representations, the method of step-by-step output was refined, expanded, and discussed. In the two courses, the number of visual representations and the proportion of time spent in their knowledge visualization practice are shown in Figure 7. As shown in Figure 7A, the type, quantity and proportion of visual representation used in the pre-class self-study feedback session were mainly video recordings (micro-lecture videos and students' personal recording videos). The visual representation of internalization and post-class consolidation and improvement in the class covered animation videos, filmed videos, and still images (age division, cultural comparison, image-text correspondence, and word cloud diagram and concept definition). As shown in Figure 7B, static pictures were mainly used in the classroom.

In the knowledge visualization practice of college English comprehensive course teaching in the 5th and 6th lessons, through the micro-lecture video teaching medium that uses teaching video materials (video recording) before, during and after class, Teacher A gave special lectures and consolidated the pragmatic knowledge involving discourse, strategies and functions in the students' paragraph reading. Under the premise of students' thinking on reading materials and questions before class, he guided students to reconstruct knowledge and generate opinions based on individual experience knowledge and factual knowledge, stimulated by visual graphics. Taking this as a starting point, students were guided to explore problem-solving mechanisms with "academic" theoretical learning thinking, which urged students to acquire methods and critical thinking in classroom learning and discussion. In these two classes, the number of visual representations and the proportion of time spent in teacher A's knowledge visualization practice are shown in Figure 8. As shown in Figure 8A, the type, quantity, and proportion of visual representations used in the pre-class self-study feedback session were mainly video recordings (micro-lecture videos and students' personal recording videos). The visual representations of the internalization and post-class consolidation and improvement in the class were mainly video recording, graphic charts (lists, hierarchical structure diagrams) and static images (drawing images-comparison of age group characteristics). As shown in Figure 8B, tables and pictures were mainly used in the classroom.
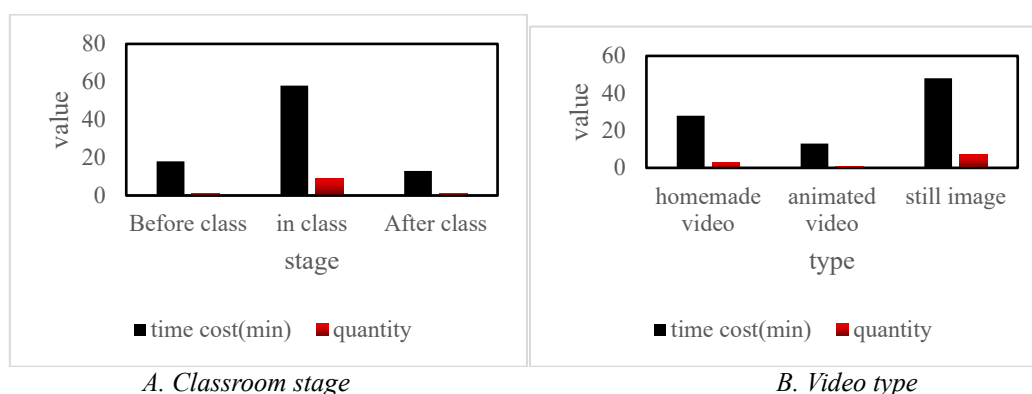

A. Classroom stage   *B. Video type*

Figure 7: The number of visual representations and the proportion of time spent in the teaching content of the first and second lessons

Figure 9 shows the number of visual representations used and the proportion of time spent on the visual representation corresponding to the 8 teaching hours of Unit 3 of Teacher A's "College English 2". It can be seen that Teacher A's knowledge visualization teaching practice mainly focuses on explaining the internalization part in weekly classes, as shown in Figure 9A. Teacher A's class had 1 video as an introduction before class. After class, 1-2 pictures were used for review and consolidation. The main visual teaching practice was concentrated in the middle part, as shown in Figure 9B. Consistent with the amount of visualization teaching practice, the time spent on visual representations was concentrated in the mid-class portion.
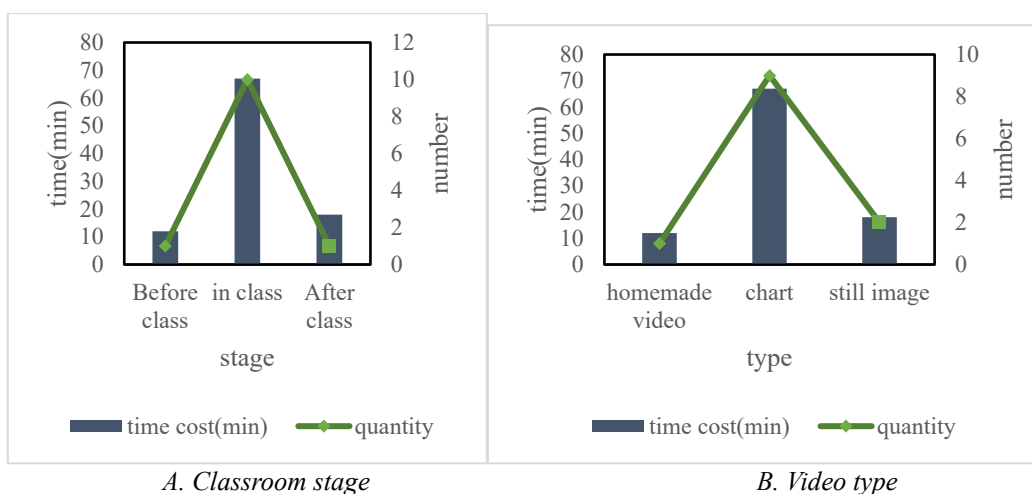

A. Classroom stage   *B. Video type*

Figure 8: The number of visual representations and the proportion of time spent in the teaching content of lessons 5 and 6
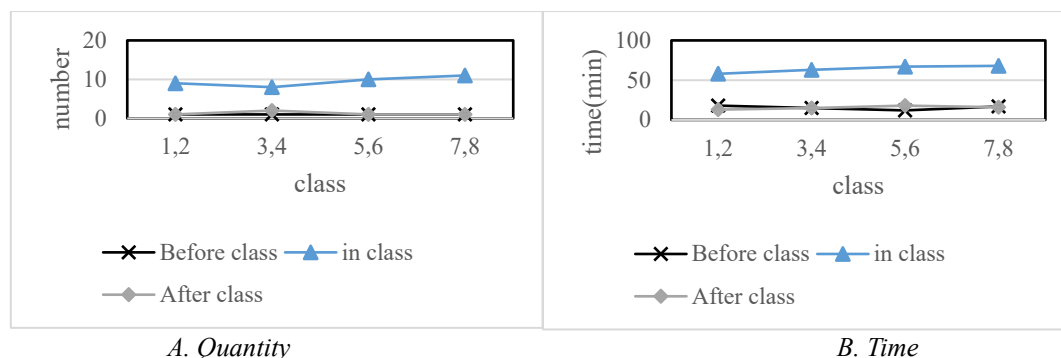
A. Quantity   B. Time

Figure 9: The number and duration of visual representations in different class hours

3.5 Teaching Evaluation Situation

Due to the fear that more students have to deal with the problem or follow the trend in the questionnaire survey of the whole class, in order to ensure the reliability of the teaching evaluation, this paper adopted the sampling method. 10 students from Teacher A's class were randomly selected to conduct a questionnaire survey. The situation of the 10 students is shown in Table 2, in which the numbers are arranged in the order of selection.

Table 2: Basic information of students

Numbering	Mid-term results (100 points scale)	Attendance rate
1	80	100%
2	76	100%
3	53	100%
4	83	100%
5	61	100%
6	63	100%
7	75	100%
8	80	100%
9	93	100%
10	61	100%

In order to ensure the quality, only five questions were selected for evaluation, and a 5-level scoring method was adopted. The levels from 1 to 5 represent the degree of recognition, and the points are given according to the level. The specific questionnaires are shown in Table 3.

Table 3: Questionnaire

The questionnaire is very simple, It is hoped that it can take 2 minutes to fill in patiently, and the questionnaire data is only used for thesis research. Among them, levels 1-5 are the degree of recognition, and level 5 is the most recognized. Tick the options. Thanks for your cooperation						
basic situation	I love learning English (x1)	1	2	3	4	5
	I will take the initiative to learn English online (x2)	1	2	3	4	5
Classroom evaluation	The class made me more interested (Y1)	1	2	3	4	5
	Classroom improves my English grades (Y2)	1	2	3	4	5
	Classroom improves my speaking ability (Y3)	1	2	3	4	5

The survey results are shown in Figure 10.

As shown in Figure 10A, for the love of English, 1 of the 10 students gave 1 point, and 2 students gave 2 points. It shows that 30% of the students are bored with English and have no interest in learning English. There were 5 students who gave 3 points, accounting for 50%. It shows that most of the students still have a cold attitude towards English, and they are not interested and not refuse. Each of the students gave 4 and 5 points to the students. As shown in Figure 10B, 6 students gave 4 points and 3 students gave 5 points for the answer that the classroom made English more interesting. 90% of the students thought that Teacher A's class made them more interested in English. The 10 classmates responded very differently to the question about how the classroom improved my grades. Some gave 1 point, some gave 5 points. This is mainly because the learning of English is not achieved overnight. This requires a longer process to reflect, and one test alone cannot tell whether the performance has improved or not. 90% of the students who gave 4 and 5 points in the answers about the improvement of

their speaking ability in the classroom. This shows that Teacher A's class can well stimulate students to practice oral English, which can greatly improve students' oral English ability.

One highest score and one lowest score were removed from the returned questionnaires, and the average score of each question was calculated, as shown in Table 4.
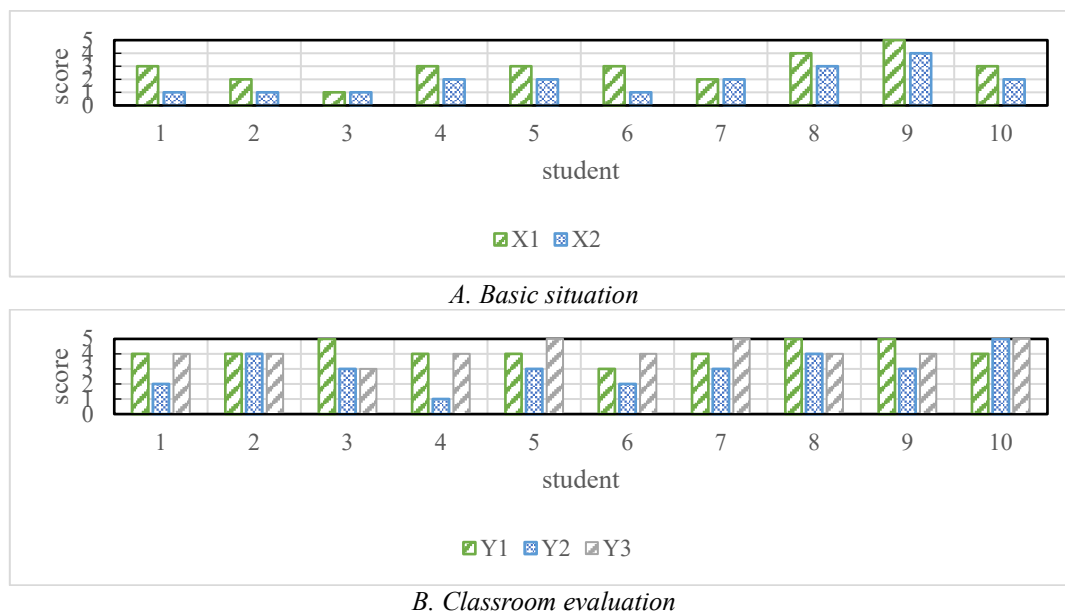

A. Basic situation

B. Classroom evaluation

Figure 10: Questionnaire survey results

Table 4: Average student evaluations

	question	Score
basic situation	X1	2.875
	X2	1.75
Classroom evaluation	Y1	4.25
	Y2	3
	Y3	4.25

From Table 4, it can be clearly found that the scores for X1 and X2 were both lower than 3, which showed that the current attitude of college students to English learning was not very positive. For classroom evaluation, both Y1 and Y3 were above 3 points. It showed that Teacher A's class stimulated the vitality of the students, which made them more interested in learning English. This is mainly due to the use of the auxiliary English teaching system in Teacher A's classroom, which caught the interest of the students during the introduction of the classroom. In addition, Teacher A also made some novel videos, which improved the students' attention in the classroom.

4. Conclusions

Through the experimental research on teacher A's teaching, it can be found that, in general, Teacher A's personal teacher teaching method (pedagogy) is embodied in the following three-week unit teaching practice in the flipped classroom teaching mode, which is divided into three parts: before class, during class and after class. Self-study feedback before class is used to arrange micro-class (video/courseware) learning tasks. Students are required to record words, paragraph readings and point-of-view videos. The feedback of students' problems in their learning is obtained. Targeted curriculum design and resource integration are carried out to realize autonomous learning guidance and related problem detection. The internalization of the in-class explanations is based on the pre-class learning feedback, which is based on the special video teaching materials of video and animation videos. The language learning problems reflected by the students are answered centrally and audio-visual synchronous training is carried out. Different teaching goals are set in each week's in-class explanation. Graphical charts and static image visual representations are used to guide students to practice "inquiry-based learning" based on inspiration, interaction and discussion, which is from background knowledge, theme deepening to application practice, with a learning path of "discovering problems - analyzing problems - solving problems". Consolidation after class further improves the

connection between the knowledge system taught before class and explained in class. After class, online synchronous exercises and supplementary learning resources (video/text) are used to realize the understanding and internalization of pre-order teaching.

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