Construction and Practice of Smart English Classroom Based on the Internet of Things in China

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Abstract. With the popularity of Internet of Things (IoT), rapid educational information, digitization, intelligence and ecology are affecting all aspects of teaching and learning. The outbreak of the epidemic in early 2020 has made China's online education show explosive growth, accelerated the formulation and implementation of online education security policies, and greatly improved the ability of teachers, students and teaching managers to apply information technology. The paper explores the theoretical foundations of Smart English Classroom Model based on IoT in terms of the teaching planing, process, production-oriented approach assessment and explains the application of those aspects by collecting and tracking the students' electronic study data in the practice of a particular course of American Literature from teaching goals, specific unit designs, ideological and political elements and teachers and students' feedback and comments. From the data analysis it can be seen that the American Literature course can cultivate the English independent speculative ability, interaction and communication, autonomous and mobile study ability of Chinese college undergraduates, which is of practical significance to the development of teaching theory and practice, to the reform of English teaching, to stimulate students' discourse right and identity consciousness, to improve their creativity and imagination to better meet the requirements and challenges of the new social era of transition and globalization. The study intends to give guidance for instructors and researchers in higher education to grasp the intelligence or digital educational development and utilize smart classroom empowered by intelligent technology to update teaching practice.

Keywords: IoT · English teaching and learning · smart classroom design · Chinese undergraduate education

1 Introduction

1.1 Context of Digital Education in China

In January 2017, the China State Council issued the 13th Five Year Plan for the development of national education, which proposed to explore the establishment and development of "Internet + education" management and service model [1]. In April 2018, the Ministry of Education issued the Action Plan for Educational Informatization 2.0

and the guide to the construction and application of e-learning space. It points out that we should adhere to the core concept of the deep integration of information technology and education and teaching, and build a networked, digital, intelligent, personalized and lifelong education system. We should promote the whole process application of big data, artificial intelligence and other technologies in teaching and management, and use information technology to accelerate the reform of talent training mode and teaching methods. In February 2019, the CPC Central Committee and the State Council issued "2035 of China's educational modernization" [2], which proposed to accelerate the educational reform in the information age: to build an intelligent campus and build an integrated intelligent teaching, management and service platform; to promote the reform of education governance, to accelerate the formation of a modern education management and monitoring system, and promote accurate management and scientific decision-making.

In March 2020, the general office of the Ministry of Education issued the key points of education intelligence and network security in 2020, which stressed that in 2021, we should strengthen the top-level design of education management intelligence and use information means to support the reform of higher education governance system. In 2021, Zhejiang Provincial Department of Education issued the work plan for digital reform in the field of education in Zhejiang Province. By 2025, the cloud network integration system, education big data warehouse system, national digital learning platform and educational intelligent governance system in the education industry will be basically mature, the level of education governance will be significantly improved, the education ecology will be continuously improved, and the digital resources in the education industry will develop healthily, leveraging the modernization of educational governance under the guidance of digital reform has achieved outstanding results. The document points out that by 2022, the digital education standard and standard system and education network security system will be basically completed, the national digital learning platform will be basically completed, the organic combination of school education, family education and social education will be realized, a unified educational intellectual governance system will be preliminarily established, and the auxiliary decision-making support ability will be formed in the layout of educational resources, the construction of teachers, the growth and development of students, and the monitoring of educational ecology.

1.2 Smart English Classroom Model

With the popularity of Internet of Things, rapid educational intelligence, digitization, intelligence and ecology are affecting all aspects of teaching and learning. The outbreak of the epidemic in early 2020 has made China's online education show explosive growth, accelerated the formulation and implementation of online education security policies, and greatly improved the ability of teachers, students and teaching managers to apply information technology. The teaching reform of English is no exception. In order to meet the needs of digital reform, the curriculum design and practice of this course adopt the immersive intelligent classroom education mode based on network platform.

Immersive is a new classroom teaching form based on the Internet, using cloud computing technology, integrating digital technology, mixing cutting-edge technologies such as reality, voice interaction, voice recognition, video analysis and artificial intelligence, and combining the Internet. Immersive online interactive classroom has the functions of

breaking space restrictions, creating face-to-face immersive teaching experience, built-in screen to share teaching content (such as PPT, whiteboard, etc.), real-time message interaction and cooperation. Through the establishment of intelligent communication and integrated multi service video remote interactive service system between teachers and students, high-definition, stable and interesting voice, video and data interaction can be realized. Immersive teaching can increase students' learning fun, improve communication and learning efficiency, and reduce labor and travel costs. Make the teaching content scene, and provide students with immersive, practical and interactive virtual reality teaching environment.

The core of new teaching modes such as hybrid teaching and immersive online interactive classroom is to clarify the student-centered teaching concept and emphasize the important role of situation with the help of digital, networked and intelligent teaching environments such as online teaching platform, virtual classroom and VR classroom as "blended learning" [3]. Based on the online teaching platform, reconstruct the course content teaching system, re-engineer the teaching process and build online autonomous learning resources, Design classroom teaching activities. Use big data, learning analysis and other technologies to implement learning situation diagnosis and analysis and intelligent push of resources, and innovate students' learning evaluation system. Students' autonomous learning, personalized learning, mobile learning, inquiry learning in class and extended learning after class run through the whole teaching process.

2   Theoretical Foundations

2.1   Interactive Teaching Model Based on Network Teaching Platform

Teachers and students are the two main bodies of teaching. Taking teachers' teaching as the center and students' learning as the center are the two basic modes of teaching. It is not to say that the teacher centered teaching mode must be bad, but the learning centered teaching mode is a better choice to realize the College English golden course, because English reading and understanding, thinking and exploration, expression and communication are students' subjective behavior, which can be achieved only through students' autonomous learning, and the learning centered teaching mode is more conducive to give full play to students' learning autonomy. The so-called learning centered teaching refers to the teaching form that takes students' learning activities as the center or noumenon of the whole classroom teaching process. Learning centered teaching theory holds that teaching can only be used as a condition (means) to cause and promote students' active and effective learning, but not as the noumenon (purpose) of the teaching process. In the teaching process, teachers should let students complete the learning process independently and independently as much as possible.

To build a learning centered teaching model, we should make great efforts in teaching content, teaching design, teaching process and so on. First, we should change from teaching materials to learning materials. Textbooks are arranged according to the logic of teaching and serve teachers' teaching. Learning materials are arranged according to the logic of learning and serve students' learning. Only by transforming teaching materials into learning materials can students use these materials independently, carry out

subjective reading and understanding, thinking and exploration, expression and communication, and carry out self-regulated learning in the real sense. The second is to transform teaching design into learning design. Teaching design highlights the logic of teachers' teaching and learning design highlights the logic of students' learning. We should use the logic of students' learning to organize teaching content, design teaching process and arrange teaching elements to serve students' learning. Third, from learning to teaching to teaching to learning. In the classroom where learning follows teaching, no matter how much space and power teachers give students, they are essentially learning centered. The learning centered classroom is teaching following learning. Teachers actively pay attention to students' learning status, give timely, appropriate and appropriate guidance and help when students need it, optimize but do not forcibly interfere with students' learning logic. Students' learning is free, complete and full, and the teaching process is a learning center in a complete sense.

From a vertical perspective, English writing and understanding, thinking and exploration, expression and communication include three basic links: language input, transformation and output, which have internal consistency and coherence. The three complement and promote each other. Topic Task-based College English teaching process can organically connect and combine the three, so that students can experience a complete learning process. From a horizontal perspective, College English teaching, as a language practice, naturally contains various elements of language practice. Language construction and application, cultural cognition and understanding, thinking transformation and promotion are integrated into language teaching practice in a certain way. The thematic task-based teaching process organically integrates language, culture and thinking into the thematic task by setting up the thematic task with rich cultural implication and thinking function, so that the process of language construction and application can become the process of cultural cognition and understanding, thinking transformation and improvement, and realize the organic formation of students' English literacy. From the perspective of depth, the thematic task-based teaching process connects students' various learning behaviors with themes. Students constantly interpret the meaning, construct the concept and realize the value of the English text around the learning theme, explore and excavate the internal meaning of the English text layer by layer, form a layer by layer deepening learning resume, and move from shallow learning to deep learning.

2.2   Teaching Process Based on Output Oriented Method

From a vertical perspective, English writing and understanding, thinking and exploration, expression and communication include three basic links: language input, transformation and output, which have internal consistency and coherence. The three complement and promote each other. Topic Task-based College English teaching process can organically connect and combine the three, so that students can experience a complete learning process. From a horizontal perspective, College English teaching, as a language practice, naturally contains various elements of language practice. Language construction and application, cultural cognition and understanding, thinking transformation and promotion are integrated into language teaching practice in a certain way. The thematic task-based teaching process organically integrates language, culture and thinking into the thematic task by setting up the thematic task with rich cultural implication and

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The first is to establish a clear and meaningful learning theme. Teachers should take teaching materials as the basic content, contact and combine other curriculum resources to extract a clear learning theme, so that students' learning can be carried out and deepened around this theme. The second is to clarify the main task and basic process of theme exploration. Teachers should clarify the main tasks that students need to do to complete the theme tasks, and give appropriate guidance to the basic process of students to complete these tasks, so that students can effectively complete their learning tasks. Third, we should establish a reasonable and effective cooperative learning mechanism. Thematic task-based learning can be completed by students independently or cooperatively. Teachers should establish a certain cooperative learning mechanism, such as setting up a learning group, establishing a learning help and guidance mechanism, forming a learning process of combining independent learning and cooperative learning, and helping students successfully complete the task of theme exploration.

2.3 Multiple Evaluation Based on Students' Performances

Result oriented or outcome-based teaching evaluation is a kind of authenticity evaluation, which points to the authenticity task. Authenticity evaluation should include at least one authenticity task. In authenticity evaluation, students apply information in a way that can show their understanding level and show their ability to control their existing knowledge and ability. The result oriented teaching evaluation accurately points to the subject task-based learning process of students, so that the teaching evaluation can effectively reflect the real development of students. Result oriented teaching evaluation is a kind of learning evaluation. Learning evaluation enables students to become the main body of evaluation activities, carry out self-evaluation and peer evaluation of learning activities, reflect, monitor and adjust their learning process at any time, and obtain effective feedback in the evaluation process.

In the perspective of learning evaluation, results and evaluation are mutually visible. Evaluation makes results visible, and results also make evaluation visible. Result oriented evaluation is an evaluation that points to the development of literacy. What a person successfully completes shows that he has the quality to complete the task. In general, the completion of achievements means the formation of literacy. The implementation of achievement oriented evaluation in College English smart courses focuses on the development of students' English literacy. The implementation of achievement oriented teaching evaluation is to take teaching evaluation as the core of College English golden course, so as to guide other links of teaching. To some extent, English reading and understanding, thinking and exploration are mainly implicit psychological activities, which are difficult to observe and evaluate, while English expression and communication have

obvious external activities. Moreover, the content of expression and communication, as the result of students' English learning, carries and marks the process and quality of students' English reading and understanding, thinking and exploration.

Therefore, the teaching evaluation focusing on the expression and communication of English learning achievements makes learning visible, and successfully leads English reading and understanding, thinking and exploration. The first is to make students' learning form an appropriate form of results and effectively contain students' learning process and results in the results; Second, we should establish an evaluation framework that has traction on the learning process and announce it to students in advance, so as to give effective play to the role of teaching evaluation in guiding the learning process; Third, we should reasonably design the evaluation link, make the teaching evaluation not only relatively independent of the learning process, but also appropriately embedded in the learning process, and give full play to the main role of students' evaluation, so that the evaluation can effectively promote learning.

3 American Literature Course

3.1 Overview of the Course

Selected Reading of American Literature History and Works is a specialized knowledge course for third year English majors. It is an optional course. 32 class hours and 2 credits in total. This course is a unity of historical materials, philosophical thoughts and literary theories of American literature, including the background of the times, cultural characteristics, literary trends and representative writers and works in various stages of the development of American literature, so as to improve students' English literacy and humanistic quality, enhance students' understanding of American literature and culture, and at the same time compare with Chinese traditional culture, Characterized by challenging "cultural theme speculative learning task", it has the characteristics of knowledge, thinking and humanity [5].

3.2 Teaching Objectives

- The course always adheres to the fundamental task of "teaching, cultivating, and cultivating", based on the development of students, knowledge guidance combined with value guidance, and the teaching process focuses on guiding students to learn knowledge, temper their minds, and cultivate their character. The course focuses on the cultivation of students' high-level thinking, focusing on cultivating students' abilities, including autonomous learning ability, intercultural communication ability, literary and historical appreciation ability, literary criticism ability, comprehensive induction ability, expression and communication ability and teamwork ability.
- Literary knowledge enables students to understand the basic theories, schools, representative writers and works of English literature, understand the development history and cutting-edge trends of American literature, and become familiar with Chinese and Western literary and cultural classics.

- Literary literacy enables students to understand the feelings and values reflected in American literature through the interpretation of literary works and literary criticism in the course of discussion, analysis and even questioning, so as to improve their literary literacy.
- Literary criticism enables students to have local cultural awareness and cross-cultural communication ability, enable students to compare the cultural connotation in American and Chinese literary works, evaluate and explain some cultural phenomena and emotional attitudes, and form their own cultural stand, cultural attitude and cultural identification ability.
- Course teaching objective 4: cultural character enables students to have a deeper humanistic connotation and scientific spirit of advocating truth.

3.3   Graduation Requirements

- Implement the thought of socialism with Chinese characteristics for a new era, form ideological, political, theoretical and emotional identification with socialism with Chinese characteristics, establish a correct view of history, country and culture in teaching and educating people, and strengthen confidence in the path, theory, system and culture of socialism with Chinese characteristics.
- Have a sound personality and a positive spirit, have strong emotional regulation and self-control ability, and be able to respond positively; Mastering certain knowledge of nature, humanities and social sciences, inheriting the excellent traditional Chinese culture, and possessing cultural heritage, scientific spirit and aesthetic ability; The language and behavior meet the requirements of teachers' etiquette and the requirements of educational and teaching scenes.
- Master the knowledge of American literature and history, have the ability to interpret and appreciate literature, and judge the history of American literature and social culture. At the same time, further understand and analyze the connotation of Chinese culture, and understand China's national conditions.

4   Design and Results

Teachers and students are the two main bodies of teaching. The two basic modes of teaching are teachers' teaching centered and students' learning centered. It is not to say that the teacher centered teaching mode is necessarily bad, but the learning centered teaching mode is a better choice to realize the golden course of college English writing, because English reading and understanding, thinking and exploration, expression and communication are students' subjective behaviors, which can only be achieved through students' independent learning, while the learning centered teaching mode is more conducive to giving play to students' learning autonomy. The so-called learning centered teaching refers to the teaching form that takes students' learning activities as the center or noumenon of the whole classroom teaching process. The learning centered teaching theory believes that teaching can only be used as a condition (means) to stimulate and promote students' active and effective learning, rather than as the noumenon (purpose) of the teaching process. In the teaching process, teachers should try their best to let students independently and independently complete the learning process. To construct a

learning centered teaching model, efforts should be made in teaching content, teaching design and teaching process.

4.1 Design Core Concepts

a) Use of learning materials: We should change from textbooks to learning materials. Textbooks are arranged according to the logic of teaching and serve teachers' teaching; Learning materials are arranged according to the logic of learning and serve students' learning. Only by turning textbooks into learning materials can students independently use these materials to read and understand, think and explore, express and communicate with each other in a subjective way, and carry out independent learning in a real sense.

b) Transformation of instruction design to learning design: The teaching design highlights the logic of teachers' teaching and the learning design highlights the logic of students' learning. The logic of students' learning should be used to organize the teaching content, design the teaching process and arrange the teaching elements to serve the students-centred learning.

c) Change of the teachers' roles: In the classroom where learning follows teaching, no matter how much space and power teachers give students, they are essentially learning centered. The learning centered classroom is teaching and learning. Teachers actively pay attention to students' learning conditions, give timely, appropriate and appropriate guidance and help when students need it, optimize but not forcibly interfere with students' learning logic. Students' learning is free, complete and full, and the teaching process is the learning center in a full sense.

4.2 Results of Application of BOPPPS

This course should focus on the development of students, and change the traditional mode of curriculum centered teaching in colleges and universities in the past. This course is centered on students and teacher-student interaction to improve students' participation in order to improve students' autonomous learning ability. The BOPPPS teaching mode designed by IWS of the University of British Columbia will be further improved, and the teaching content will be adjusted. Part of the teaching content will be completed online and let the students learn by themselves. The teacher will determine whether the students have completed the learning of relevant content through the pre class test. The core and main contents are put in the classroom teaching, and students are organized to participate in and interact with in-depth learning. This course will also make full use of modern teaching technology and network teaching platform; In addition, this course is also combined with students' practice to carry out poetry, novel reading, drama performance, watching movies, literature review and other practical activities. In a word, the specific results are as follows:

1) **Course optimization**

The course team will continue to explore the hybrid teaching method combining online and offline, make full use of the online online learning platform, improve the online

resources of the course and ensure students' mobile learning needs and personalized learning needs.

a) *Blended classroom of learning materials:* Deeply change the teaching concept of team teachers, and establish a teaching guiding ideology as the students' development as the centre suitable for the national education development situation. One way is to update the both online and offline earning materials.

b) *Participatory experience for students:* The optimization of curriculum content, foreign language teaching oriented by systematic cultural content and speculative ability rather than simple language knowledge and skills, can effectively improve students' knowledge structure and make the students participate more on online learning platforms and forums.

c) *Integrated ecological teaching:* The optimization of teaching mode, with the help of modern information technology, has established an integrated ecological teaching of teaching, learning and evaluation supported by big data, promoting teaching and learning through evaluation, which makes the learning more ecological and sustainable.

d) *Mobile learning:* Optimize teaching methods, vigorously promote smart teaching, create a borderless interactive classroom, and achieve real-time interaction between students, teachers and students to break the learning barriers of time and space.

e) *Ideological and political content:* Integrate ideological and political content and stimulate learning motivation. Learning is not only to obtain knowledge and get good grades, but also to improve learning ability and reserve for future all around development to cultivate the national pride and confidence and take the responsibility of common prosperity of human beings in the world.

2) **Analysis Report on the Achievement of the Course Objectives**

a) *Overall objectives of course teaching*

The curriculum has always adhered to the fundamental task of "teaching and educating people, establishing morality and cultivating people, and casting soul and educating people", based on the development of students, knowledge guidance combined with value guidance, and the teaching process focuses on guiding students to learn knowledge, temper their minds, and cultivate their character. The course focuses on the cultivation of students' high-level thinking and focuses on cultivating students' abilities, including autonomous learning ability, intercultural communication ability, literary and historical appreciation ability, literary criticism ability, comprehensive induction ability, expression and communication ability and team cooperation ability. From the data analysis of the three classes, we can see that the total achievement value is $76.69 + 80.575 + 81.04/3 = 79.44\%$.

b) *Analysis of degree of achievement*

The teaching objective 1 of the course is to make students understand the basic theories, schools, representative writers and works of English literature, understand the development history and frontier trends of American literature, and be familiar with Chinese and Western literary and cultural classics. From the analysis of the degree of achievement, the degree of achievement of literary common sense is $72.00 + 73.45 + 85.59/3 = 77.01\%$, which is basically the same as that of literary criticism.

Course teaching objective 2: literary literacy enables students to understand the emotions and values reflected in American literature through discussion, analysis and

even questioning through the interpretation of literary works and literary criticism, so as to improve students' literary literacy. $83.25 + 83.95 + 79.87/3 = 82.36\%$。 From the perspective of degree of achievement, the degree of achievement of literary literacy is the highest.

The teaching objective of the course 3: literary criticism enables students to have local cultural awareness and cross-cultural communication ability, enable students to compare the cultural connotation in American and Chinese literary works, evaluate and explain some cultural phenomena and emotional attitudes, and form their own cultural position, cultural attitude and cultural identification ability. $72.75 + 80.95 + 79.87/3 = 77.86\%$.

The teaching objective of the course is 4: the educational sentiment enables students to have a deeper humanistic connotation and a scientific spirit of advocating truth. From the analysis of the degree of achievement of $78.75 + 83.95 + 75.64/3 = 79.45\%$, this goal is basically consistent with other goals at about 80%.

3) **Students' Evaluation on the Achievement of the Course Objectives**

In the evaluation of students' teaching, "concentrate on teaching and educating people and clear course objectives", The scores of "learning ambition and learning achievement" and "the overall evaluation of the teaching level of the in-depth teachers of this course" are generally high [4]. It can be seen that the members of this course group can design and carry out teaching activities with the student development as the center and the course goal as the direction when teaching. This will continue to be maintained, and further strengthen the use of online websites to achieve better teaching results (See Table 1).

Table 1. Achievementment of Course Objectives

Course objectives	Sample number: 102\Achievement level					
	Completely achieved	Basically achieved	Partly achieved	Basically not achieved	Not achieved at all	Percent (%)
Sub-objective 1: general knowledge of literature	80	20	2			94
Sub-objective 2: literary literacy	81	19	1			95
Sub-objective 3: literary review	79	15	7	1		90
Sub-objective 4: educational sentiment	80	22	0			92

5   Conclusion

In the course of teaching, this course group applies "skill based" and "response based" literary teaching methods and teaching theories suitable for non-English native speakers, such as language analysis or stylistic analysis, to improve students' understanding and analysis ability of literary works, and carries out multimedia teaching of American Literature, especially using online smart classes as a supplement [6]. In teaching, we should pay attention to arousing students' enthusiasm and initiative in learning American literature courses, cultivating their innovative spirit and ability in the process of imperceptible influence, and strive to achieve the best teaching effect with less class hours. Through the flexible use of various advanced teaching methods, it has realized the transformation from traditional teaching methods such as explanation, indoctrination and one-way to task, functional, situational, communicative, interactive, autonomous, exploratory, cooperative, performance and discussion teaching methods, effectively mobilized the enthusiasm and participation of students in learning this course, and promoted students to think positively, Stimulate their potential, and pay attention to the investigation of students' knowledge application ability.

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