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Application of Smart Classroom in College English Teaching With Flipped-Classroom Model

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Abstract

With the increasing popularity of "Flipped Classroom", more advanced teaching technology and more sophisticated software are in need. However, the multi-media classroom cannot meet the requirements of the teaching model of Flipped Classroom, where methodology of blended learning, collaborative teaching, as well as digital teaching are advocated. With the further improvement in the aspects of environment, resources, interaction, and technology, Smart Classroom becomes a preferable platform for the teaching model of Flipped Classroom. The application of Smart Classroom in College English teaching obviously exhibits its advantages in optimizing the teaching effects by arousing the interest of students and enhancing the communication.

Key words: Smart Classroom; Flipped-Classroom model; College English teaching

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1. INTRODUCTION

The increasing promotion of Flipped Classroom has gradually revolutionized the traditional teaching structure and teaching mode. Accordingly, it is necessary to change the role of teachers and students in the teaching process, to choose appropriate teaching contents, to create a friendlier teaching environment, to enrich teaching resources, and to make full use of modern teaching media. The continuously developing and widely-used online education platforms are in line with the new teaching needs, but on the contrary to the rapid development of online platforms, the hardware equipment is comparatively backward and outdated. In other words, multimedia classrooms, which are used on a large scale, can no longer reflect the characteristics of Flipped-Classroom model, neither can they meet the requirements of online teaching that not only enriches contents but also enhances communication. Therefore, the courses that emphasize practicality, such as College English, need to be equipped with modern and advanced hardware so that the advantages of Flipped-Classroom teaching model can be reflected.

As a high-end form of multi-media classroom, Smart Classroom (also called as Intelligent Classroom or Future Classroom) not only integrates technologies, such as Internet, cloud computing, database, and the Internet of Things with each other, but also provides an ideal physical space for teaching and learning in order to create a smart learning environment. Compared to multi-media classrooms, Smart Classroom takes advantage of advanced information technology to transform the teaching mode from being "teacher-centered" to being "student-centered", which reflects the essence of the Flipped-Classroom model.

The study on the teaching effects of Smart Classroom shows that it has obvious advantages in motivating students' autonomous learning, arousing their interest, improving their technical skills, and enhancing their communication as well as interaction. It also helps to achieve the satisfactory teaching effects and to further promote the reform of Flipped-Classroom model.

2. DEFICIENCIES OF MULTIMEDIA CLASSROOM

At the current stage, in-class teaching is mainly based on the multimedia classroom. However, with the promotion of Flipped-Classroom model, which is based on the concept of "Internet+", autonomous learning has been more comprehensively implemented in College English teaching. To be exact, it is a teaching mode that combines "online self-learning" with "in-class assessment". Under such condition, the multimedia classroom, clearly, fails to meet the requirements. And the deficiencies can be reflected specifically in the following ways:

• With single function, the equipment of multimedia classroom does not allow multi-level interactive activities. Taking the projector as an example, it only converts the traditional blackboard-writing into slides. Although it improves the efficiency of the classroom, it cannot present the key points for a long time, and teacher cannot explain the thinking process of difficult points in detail, which prevents the students from connecting all the points, hinders their overall grasp of knowledge, and finally affects their understanding of the key information. Meanwhile, the presentation of slides cannot inspire the students' emotional resonance, which blocks the in-class interaction, and teacher may have no chance to understand students in real time so that a positive emotional connection between teacher and students cannot be built.

• With low level of technical intelligence, it is difficult to realize "student-centered" teaching model. Multimedia technology focuses on information output, with the teacher still playing a dominant role and students in a passive learning situation. As a result, it does not allow students to construct a system of knowledge in an immersive learning environment or connect knowledge with their own personal experience, which is the main concept of constructivism theory. In addition, it also fails to stimulate students' subjective initiative, blocking the development of in-class activities. Furthermore, in-class teaching is usually based on the computer console to control all the multimedia equipment, leading to a sense of physical isolation between teacher and students so that the central position of students cannot be realized.

• With the integrated operation system, the multimedia classroom fails to meet the diverse requirements of in-class teaching. Multimedia classroom is generally equipped with control panels to operate all the equipment in the classroom, including computer, projector, microphone, audio amplifier, etc. It seems to be convenient and time-saving, but it neglects the change of environmental details and lacks the appropriate adjustments to specific situations, roughly handling complex learning space and teaching process instead of creating a comfortable and relaxing learning environment for the students. Moreover, when a problem occurs with one piece of the equipment, it often brings about series of problems that may affect the whole teaching process negatively.

• With the limited database, the multimedia classroom can't record the learning process. Since Flipped-Classroom model was implemented widely, students have been able to learn independently on the interactive platform and communicate with teacher to ask questions. Nevertheless, the communication is mostly online, while the face-to-face communication in the class is inadequate. On the other hand, the in-class performance of students cannot be recorded in real time. Therefore, there is no effective way to ensure the learning effects. In addition, multimedia classroom cannot collect extensive data on students' performance in the classroom, including their notes, assignments, exercises, quizzes, and so on, so that it is hard to test, assess, diagnose, and analyze the learning process. Besides, the organization being rigid, a lively atmosphere in the classroom cannot be created. The traditional teaching model, which originated from the industrial revolution, mainly aims to implant knowledge and skills to the students. In this way, teacher stands for the authority of the whole learning process, while obedience, discipline, efficiency, and practicality are emphasized for the students. The mechanical arrangement, such as the single organization, the fixed desks and chairs, as well as the strictly limited space, prevents students from various group activities according to their individual differences, and prevents them from large-scale in-class communication. Consequently, it can be said that the multimedia classroom, which can be considered as a traditional teaching model, cannot provide a pleasant, comfortable, free and lively atmosphere for teaching and learning activities, and to certain extent, it also affects students' learning effect negatively.

In general, students and teacher can also communicate on the online platform in multimedia classrooms, but the communication is limited, especially in the classroom, where there is a lack of interaction between teacher and students, and even among students themselves. In other words, the multimedia classroom only transforms the traditional "teacher-implanting" model into "electric-implanting" model, relying on the electronic equipment, rather than reflect the essence of Flipped-Classroom model which requires autonomous learning before the class and reviewing in the class with various interactive activities. As a result, the teaching model of multimedia classroom is still monotonic. Meanwhile, self-study out of class and in-class teaching are isolated from each other. As Lan says, multimedia classroom fails to provide the opportunity for learners to preview the skills to be learned, to provide flexible access to abundant resources for students, and to provide various physical surroundings in accordance with diverse needs of students. On the other hand, traditional multimedia classroom mainly helps to realize the low-level cognitive goals, such as memorizing, comprehension and application, while it fails to meet the new demands for students' ability with the rapid change of times.

3. FLIPPED-CLASSROOM MODEL BASED ON SMART CLASSROOM

In the study of the nature of Flipped-Classroom model, Professor He Kekang identifies two key points: the deep learning outside the classroom and the efficient study in the classroom for the exchange of learning experiences as well as ideas, which can deepen students' understanding of knowledge. In order to effectively meet the essential requirements of Flipped-Classroom model and to fundamentally reform the teaching structure to optimize teaching effects, it is necessary to establish a system that includes five parts named "Showing", "Manageable", "Accessible", "Real-time" and "Interactive" respectively.

3.1 Concept and Characteristics of Smart Classroom

Smart Classroom, highlighting the interaction between human and computer, refers to a convenient, harmonious, intelligent and effective teaching and learning environment based on environmental psychology and educational information technology, supported by intelligent terminals, Internet, cloud service, information technology and various communication technologies. Professor Zhang Yazhen points out that the learning space in Smart Classroom is a combination of physical space and digital space and a combination of local place and long-distance, so it promotes the interaction between people and the learning environment, which effectively facilitates communication, collaboration, sharing, personalized learning, open learning and ubiquitous learning. From the perspective of systematical environment, Professor Huang Ronghuai holds the idea that Smart Classroom is a new type of classroom that optimizes the presentation of teaching content, facilitates the access to learning resources, promotes the interaction in classroom, percepts and manages the learning environment. Therefore, the basic requirements of Smart Classroom include having flexible layout with adjustable seating, being equipped with multiple handheld computer terminals as well as multi-angle projection or electronic whiteboard, and providing easy and fast service of retrieving, analyzing, and presenting information. The different explanations about Smart Classroom reflect its different features and functions in teaching and learning, but its essence lies in the combination of constantly updated information technology and advanced teaching concepts.

Based on the reform of Flipped-Classroom model, Zhejiang University of Finance and Economics initially established Alpha Smart Classroom, which integrates online interactive platform, mobile learning, resource sharing, etc. Being implemented in the teaching of College English, Alpha Smart Classroom has illustrated its advantages in four aspects: physical environment, resource sharing, interactive communication and content presentation:

• Physical environment: In Alpha Smart Classroom, desks and chairs can be moved flexibly according to the needs of in-class activities, which is convenient for students to complete various tasks together. In the meantime, the intelligent sensing system can automatically adjust the temperature, humidity and light in the classroom and reduce noise to ensure the ideal mixing effect in the classroom and provide a perfect classroom environment for teaching and learning.

• Resource sharing: Teacher uploads courseware, supplementary materials, video links, in-class records and other materials to the online platform, and students can download them for online learning according to their own ability and actual needs. Meanwhile, students can also share learning resources with teacher's permission in order to share and co-construct online resources. In addition, on the online teaching platform, micro-lesson videos, exercise, and testing database are also provided, through which students can conduct self-tests. On the other hand, the whole process of study is automatically recorded and saved on the platform, which generates learning database for students to make self-assessment and for teacher to formatively evaluate the performance and ability of students.

• Interactive communication: In the classroom, teacher can use relevant software in Smart Classroom to conduct on-site attendance checking, online voting, time-limited quiz and other activities to mobilize the in-class atmosphere, stimulate learning enthusiasm and collect real-time feedback, which effectively enhances the teacher-student, student-student and human-computer interaction. After class, discussions, online quizzes and group tasks can be conducted on the online platform to stimulate the communication between teacher and students. On the other hand, according to Colvin and other experts, multi-screen display can reduce cognitive load and improve learners' performance, compared with single screen in traditional multimedia classroom. Moreover, the multi-screen display in Smart Classroom can present diverse resources from various perspectives, which also improves students' interest and promotes the in-class interaction.

• Content presentation: The interactive electronic whiteboard in Smart Classroom illustrates both the advantages of blackboard and those of multimedia projection, which not only gives teacher the freedom to present the teaching content flexibly but also helps teacher to explain key points in detail. Additionally, the real-time video records the in-class activities through sensitive image recognition technology and automatically adjusts the perspective to capture the overall environment and the close-up of the screen. The records can be stored on the platform, which forms a teaching database for students to review the knowledge after class and for teacher to reflect on the teaching effects.

3.2 Operation and Advantages of Smart Classroom

Alpha Smart Classroom has been used in the teaching of College English, revolutionizing the whole teaching process, improving the teaching mode of Flipped Classroom based on multimedia classroom, highlighting the advantages of Smart Classroom and bringing clear positive impacts.

The Flipped Classroom model based on Smart Classroom is student-centered, which makes it possible for students to use the resources on the online platform according to their actual ability outside the classroom. And teacher can use modern teaching equipment and software to organize various activities in the classroom to help students deeply understand the knowledge acquired by self-study, and answer the questions on key points to strengthen the learning effect. In one word, Smart Classroom closely integrates extracurricular self-learning with in-class teaching so that teaching and learning are no longer isolated behaviors which are limited to time and space, but are interconnected as a whole. It can be said that Smart Classroom has shown its obvious advantages in practice, which can be summarized as follows:

• Smart Classroom provides abundant learning resources. The online platform equipped by Smart Classroom not only includes a wide range of audio, video, text and image materials for self-study, but also sets up a database of testing for students to make self-assessment. At the same time, teacher can access extra-curricular materials in accordance with the teaching needs, flexibly adjust the teaching content to meet the actual needs of students, stimulate emotional resonance and create a positive learning atmosphere, so that teacher can optimize the effectiveness of in-class teaching and improve teaching efficiency.

• Smart Classroom provides comfortable environment. Zandvliet and Franser have pointed out that the physical environment of a classroom has a significant impact on the psychological environment of it, and also plays an important auxiliary role in improving students' academic performance. Therefore, it is necessary to take advantage of technology to improve the physical environment of the classroom, to meet the learning needs of new type of learners and to enhance the learning experience. In general, the intelligent sensing system in Smart Classroom creates a comfortable environment.

• Smart Classroom provides flexible spatial layout. In the traditional classroom layout, desks and chairs are fixed and unmovable, which severely restricts students' interaction in the classroom, indirectly resulting in a fact that the class is teacher-centered and students are passive learners. Smart Classroom, on the contrary, has broken the stereotypical layout. There, the movable desks and chairs are provided to support diverse in-class activities, enabling students to discuss freely in the classroom.

• Smart Classroom facilitates objective evaluation system. The real-time video records students' performance in the classroom through audio signal acquisition system and camera tracking and positioning system. Furthermore, the records are stored in the online platform, which is possible for teachers to make objective and comprehensive evaluation about the students' performance in the whole learning process. Meanwhile, students' self-study activities outside the classroom, such as online study and online test, are monitored so that teacher can take them into account and assess the true level of students.

• Smart Classroom provides advanced display equipment. The multi-screen display and the electronic whiteboard work together to present different aspects of the same topic at the same time, which not only helps teacher to effectively display the mind-map, but also guides students to comprehensively understand knowledge from multiple perspectives. What's more important, the multi-screen display can synchronize the in-classroom activities, such as on-site voting, random sampling and questionnaires without affecting the overall presentation of the teaching content, which helps students conduct mutual evaluation and self-assessment.

• Smart Classroom accumulates data systematically. Students' independent learning effects and in-class performance are recorded truthfully. And the data can be processed so that teacher can track, analyze and diagnose the students' learning ability comprehensively to build up a systematical learning file for students, which provides a solid database for teacher to timely identify students' confusion, make formative assessment, adopt targeted guidance and carry out differentiated teaching methods.

3.3 Practice and Results of Smart Classroom

Alpha Smart Classroom is the exact sample, reflecting the structure and function of smart technology, particularly in the four aspects: Comprehensive Sensor, Seamless Intercommunication, Personalized Service and Self-Organization, which illustrates how advanced technology can contribute to the effectiveness of teaching and learning. The three-years teaching practice of College English has vividly demonstrated the positive effects of Smart Classroom. Taking the teaching of Unit 5 "What is Language?" in Volume 3, *College English* as an example, the following Table shows the specific steps of the "flipped" teaching based on Alpha Smart Classroom:

Table 1
Specific steps of teaching Unit 5 "What is Language?"

Table 1-a: Self-study before the class

The platform	Study resources	Study content
Blackboard	Listening and speaking exercise	Getting familiar with accent and dialect
	Reading materials	Knowing about the differences between American English and British English
Zhejiang Institutions of Higher Learning Online Open Course Sharing Platform	Micro-lesson videos	Obtaining the knowledge about language and the skills of learning English
	Online exercise and test	Deepening the understanding of knowledge

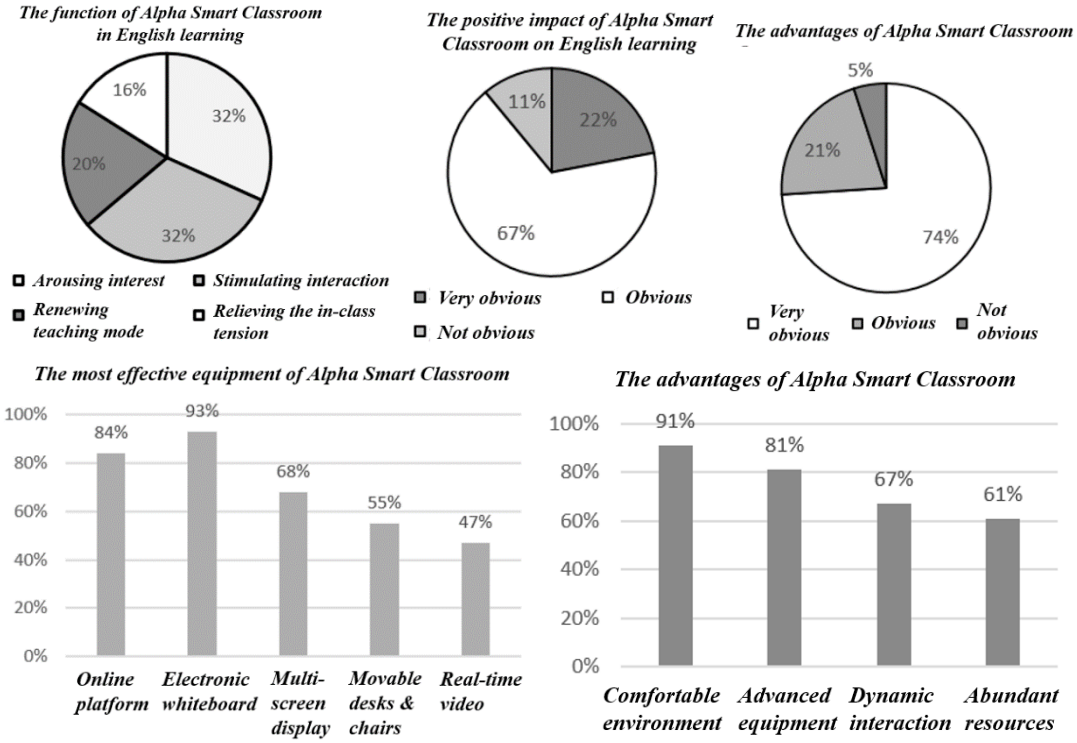
Table 1-b: In-class teaching

Equipment	Teaching activity	Learning activity	Objective
Electronic whiteboard	Review the content of micro-lesson video	Group discussion	To arouse students' interest
	Explain the key points and difficulties	Summarize the main ideas	To exchange and share leaning experiences
Multi-screen display	Compare American English with British English	Role-play	To cooperate as a group and deepen the understating
	Make a presentation	Group discussion	To stimulate interaction and make mutual evaluation
Superstar learning APP	Make an on-site voting	Voting	To know the teaching effect dynamically
	Organize Q&A activity	Answering questions	To check the learning effects and resolve the questions
Movable desks and chairs	Hold a class discussion	Discussing together	To stimulate communication among students

It can be seen from the Table that Alpha Smart Classroom, meeting the requirements of Flipped Classroom model, breaks the time and space limits of teaching, combines extracurricular activities with in-class activities, helps students acquire knowledge independently, and closely integrates advanced technology with teaching. In other words, with the advanced information technology, the cognitive load of teacher and students can be effectively reduced, and the efficiency of teaching and learning can be significantly improved; with the advanced analysis technology, learning process of students can be tracked and diagnosed intelligently, and adaptive and personalized learning can be achieved; with all-round support, the student-oriented learning methods can be developed; with real-time sensing, capturing and analyzing equipment, intelligent management of the classroom environment can be realized. In this way, the optimal combination and the efficient interaction of human, technology, equipment, resources, and environment can be achieved, and an open and integrated learning ecology can be created, which obviously give sufficient support to effective ubiquitous learning.

In the study of learning experience in Smart Classroom, Professor Hu Yongbin and Professor Huang Ronghuai have summarized the key elements as information technology, learning space and pedagogy. To be more specific, they further explain that learning space includes physical environment and seating layout in the classroom; information technology contains three aspects: device access, resource access and content presentation; pedagogy can be divided into four sub-dimensions: human-human interaction, human-computer interaction, teaching activities and learning support.

It has been proved in real practice that the learning atmosphere created by Alpha Smart Classroom has achieved ideal results in all aspects. A questionnaire survey of 1,278 students who have studied College English through Alpha Smart Classroom showed that the new teaching mode was effective in arousing students' interest and enthusiasm, and it had a positive impact on their English learning. The details can be seen in the following figures:



Figures: The results of the questionnaire survey

Apparently, the results from the questionnaire show that the vast majority of students are satisfied with the new teaching mode of Alpha Smart Classroom and are more willing to study English in this new mode with advanced technology.

CONCLUSION

According to the theory that advocates the deep integration of information technology and curriculum education, the integration of information technology and curriculum is to create an information-based teaching environment by effectively integrating information technology into the whole teaching process of various subjects, and to apply a new teaching and learning method characterized by autonomy, inquiry and cooperation which can both highlight the leading role of teachers and fully reflect the nature of being student-centered and give full play to the students' initiative, enthusiasm and creativity. Therefore, the traditional teacher-centered teaching mode has been revolutionized and has been transformed into a student-centered teaching mode.

The practice of Zhejiang University of Finance and Economics has proved that in the teaching of College English, Smart Classroom, which combines advanced information technology with teaching concepts, truly reflects the essence of Flipped Classroom model. By effectively arousing students' interest and enthusiasm, mobilizing their motivation and stimulating their participation in learning English, Smart Classroom creates a smart learning environment where the exact learning situations can be perceived, the learners' characteristics can be identified, the appropriate learning resources as well as convenient interactive tools can be provided, the learning process can be automatically recorded, and the learning outcomes can be evaluated objectively. To sum up, the application of Smart Classroom not only meets the requirements of Flipped Classroom model, but also promotes students' understanding and construction of knowledge, which ultimately improves students' practical and technical skills and ensures that students can achieve high-level cognitive goals.

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