Study on the Integrative Practice of University Teaching Space and Information Platform——Taking Xi’an Eurasia University as an Example

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Abstract. With the advancement of teaching reform in colleges and universities, the application of information technology in the teaching design and teaching process has become increasingly widespread. In addition to the applications of various software platforms and resources in the teaching process, more and more hardware-based smart classrooms and smart space are also being applied in the new round of teaching space transformation. What this thesis mainly studies is how to realize the integration of the universities’ teaching space and the teaching information platform, so as to further promote the reform and development of teaching mode. Based on the practical case of Xi’an Eurasia University, the study finds that in the process of teaching space transformation, informatization has enabled the connection between physical space and system platform, improving the efficiency and learning experience.

Keywords. Teaching space; learning platform; smart classroom; space management.

1. Introduction

The innovation of information technology continuously promotes the change and development of the industry. And the informatization of colleges and universities has also entered a new era of intelligence. From traditional multimedia classrooms, wired and wireless network coverage and other infrastructure construction, the realization of digital campuses that enable one-stop service and unified identity authentication, to current MOOCs, online learning platforms, and other information-based platforms that transform teaching models, informatization in college teaching is becoming increasingly important.

At the same time, the impacts and changes of classrooms and other learning spaces brought by informatization also exist. Students can take the initiative to learn through various types of information terminals [1]. As teaching and learning are not limited to the classroom, therefore, there is an urgent need to transform all kinds of public teaching spaces in schools.

(1) The traditional multimedia classrooms cannot satisfy the informatization experience of contemporary students.

Since the traditional teaching model is mainly unidirectional, the design and the construction of classrooms are relatively fixed and unitary [2], with limited information devices, making it hard to allow grouping and interactions of students, communications with teachers, as well as the information acquisition. At present, college students are basically dominated by those who were born after 2000, their
demands for information technology is higher. Therefore, the classroom should also be adapted to the needs of these students [3].

(2) The utilization rate of classroom space is not high, and the spatial data information cannot be obtained in real time [4].

As for the public teaching space of universities, in addition to the needs of having classes and taking exams, students are increasingly demanding more classroom space for self-study, observation, discussion, and other activities. Students often spend a large amount of time in finding the available space. The inability to access such data is an important reason. But with the help of information tools and technologies, this requirement can be easily achieved.

(3) Most of the current smart classrooms and teaching models have not been fully integrated.

The advancement of technology has promoted the change of the perception on higher education. Colleges and universities have actively promoted the construction of smart classrooms, and applied new technologies and new devices to the reconstruction and construction of smart classrooms, which has played a certain role in promoting the exploration of teaching methods [5]. However, there is still a trend of focusing on the construction rather than the utilization, which is mainly presented in the accumulated devices and resources that have not been integrated with the actual teaching modes and teaching platforms, making many smart classrooms isolated display space only.

2. The Analysis of Current Situation

2.1. The Research Foundation

As a private institution, Xi'an Eurasia University has attempted to innovate and explore higher education, and incorporated informatization into one of its strategy in promoting the integration of informatization and education. In 2018, the College became the first batch of National Excellent Pilot Units of Education Informatization, with the pilot title of “The Exploration and Reform of Education and Teaching Model under the Background of Informationization”.

The school took the lead in trying to apply the Tronclass system to blended learning. Tronclass is an online interactive learning platform based on cloud computing technology, which breaks through the traditional teaching model and focuses on students, teachers, and teaching affairs (table 1). By using the information technology to improve teaching quality and inspire students’ enthusiasm, it has realized functions like courseware sharing, assignments, tests, scores management, and so on. In addition, it also includes multiple teaching modes such as course recording and broadcasting, smart classroom, data analysis, and enables teaching methods such as MOOC, SPOC, flipped classroom and blended learning.

At present, the teachers of the University have widely used online teaching platforms such as TronClass in their work. As of January 2019, more than 900 full-time and part-time teachers of the University have been using this platform to carry out network-assisted teaching. The number of online application courses per semester exceeds 1,000, with annual visit volume exceeding 60 million times. According to the CCSS questionnaire, the interaction between students and teachers of the University is significantly higher than that of local colleges and universities. And students’ autonomous learning ability and learning dedication have been improved observably. The student-centered online learning platform not only fulfills the teaching auxiliary function in the teaching and learning processes, but also integrates with the school affairs information system. From the perspective of college operation and learning management, it enables the multi-faceted connections of operation flow, and data.

On this basis, how to integrate with the teaching environment and realize the seamless docking of space, platform and data is an important goal to promote the transformation of teaching space.

2.2. The Demand Analysis

(1) Using information means and technology to improve the efficiency in the use of space and service experience.

In terms of space usage, adjust the forms and functions of the existing teaching space, integrate information technology means, and improve the usage rate of public classrooms, or transform them into classrooms that can be adapted to different scenes, to achieve the most efficient usage of space.
Table 1. The function of Tronclass system in teaching process.

| Teachers                  | Before the class | During the class | After the class |
|---------------------------|------------------|------------------|-----------------|
|                           | Preparing lessons Easily | (iLesson) Normal Recording Interactive Teaching Giving Quizzes Group Learning Roll Call with Radar (Toolbox) | Homework Management Online Correcting Mobile Phone Correcting Academic Peer Review Performance Management Discussion and Q & A Answering Questions Online Group Discussion Analysis of Students Learning |
|                           | Micro-Lesson Recording Tailoring Video Courseware Online Test Selection Online Testing Teaching Resource Library Real Time Delivery of Announcements |                           |                             |

| Students                  | Learning Mobile Learning Breakthrough Learning Access Learning Resources Anytime, Anywhere Real-Time Reminder | Group Learning and Discussion Answer Analysis Classroom Interaction Instant Feedback | Interactive Discussion Answering Questions Online Group Discussion Resource Sharing within the Group Immediate Testing and commenting Summary of Performances Quiz Analysis |
|---------------------------|---------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Teaching Affairs          | Course Management by Faculties Statistical Analysis Based on Big Data Real Time Tracking of Teaching Situation |                                             |                                                               |

In terms of service experience, contemporary college students grow up simultaneously with the development of the Internet. Their response to the information society is more acute. And their learning, entertainment, and social models are quite different from those of former college students. Therefore, the changes in the classroom should be able to adapt to their pursuit of new things, new experiences, and meet their needs for information transmission efficiency and interactions.

(2) Connecting with the teaching information platform to support the teaching models in different scenarios.

With the changes of social environment and students’ needs, the teaching models of colleges and universities are also constantly evolving. And the more diverse teaching means and methods have brought changes to the traditional classroom behavior of teachers and students, putting forward new requirements for teaching space. For example, the long-distance double-division class, online teaching recording, broadcasting and other methods cannot be realized in the traditional classrooms, and cannot meet the needs of teacher-student interaction. Therefore, it is necessary to use information technology to break the limitation of time and space, provide more flexible teaching space for promoting students’ imagination and creativity, and enable the teaching space to support the reform and development of teaching models.

3. The Implementation Plans

On the basis of the current teaching information platform of Xi’an Eurasia University, the actual needs have been fully considered in the process of teaching space transformation. According to the three aspects of space management service, teaching scene support and data analysis, the support and application of information technology to space transformation are demonstrated.

3.1. Space Management Services

Through the system, the information management, sharing and services of each classroom, meeting room and other spaces can be realized. Through the data docking with the other existing systems of the
University, the space schedule can be displayed synchronously. Teachers and students can make space inquiries and reservations through the system page or mobile app. The space reservation information needs to be approved by the person in charge. Various person will be responsible for the appointment approval of different spaces. The smart space management terminal can achieve access control, and provide the methods to open a door with One-Card swiping as well as mobile app. What’s more, the access control authority is a combination of access control authority setting and space reservation information, which can realize two ways of opening with fixed authority and space usage authority.

Multiple attendance check-in methods are provided. Teachers and students can complete the check-in by swiping cards at the space management terminal, or realize the non-perception check-in through the cameras inside the classroom. Docking with Tronclass, the University’s existing learning platform synchronizes the sign-in data in real time, so that the teacher can confirm the attendance at the end of the course.

Users can apply for the equipment maintenance, security and other services at any time through the mobile phone App and the service function of the terminal. The corresponding service management personnel can dispatch the service and arrange specific personnel to handle it. After the arrival of processing personnel, the person will confirm the time from the beginning to the completion of the service. Users can evaluate and give feedbacks about the service results later.

3.2. Teaching Scene Support

Based on the transformation of multimedia classroom, using network devices, supplemented by electronic whiteboard, high-definition tracking camera, audio processing equipment, etc., to build the smart classroom teaching environment, and synchronously transmit multi-channel video signals of on-site classroom teaching to the network, thus forming the real-time interactions among classrooms and network, network and network. As live online interactive teaching is realized, teachers and students can interact instantly through the media. Teachers can answer questions and offer guidance immediately, which greatly improve students’ learning efficiency. Realizing the whole network real-time interactive communication system could make inviting the experts and famous teachers from other famous universities and enterprises, carrying out the “face-to-face” teaching between teachers and students through the network, breaking through the limitation of time and space possible, thus breaking the limitation of time and space. In addition, the teaching process is mainly the multi-video interactive live broadcast, which enables students to not only listen to the teacher’s lectures in real time, watch the teacher’s blackboard writing, conduct live questioning and interaction, but also save the video and watch it repeatedly later. What’s more, the functions of open class on campus network, long-distance teaching guidance, long-distance online group class, and mobile interactive learning by means of mobile phone, PAD, computer can also be realized.

By synchronizing with the school’s existing course timetables and importing the timetables into the system, timed automatic recording can be achieved according to the time and place information of the timetables with no need for manual control. The class videos are automatically recorded and broadcasted in 1080 P in real time. Teachers have no perceptual experience. After the class, teachers can edit the class videos and edit the videos corresponding to the course timetable for less than 5 minutes. In terms of the recorded coursewares, students and teachers can study and watch on the Tronclass system after class.

Through the connection of the system with video recording and security equipment in the classroom, it can realize the remote patrol duty, exam inspection and other services of the educational administration management personnel, and can also conduct the remote patrol on the class activities through the back end.

3.3. Data Analysis Display

The data including the space use, the environment detection data inside the space, as well as the course data (course information, check-in rate, teachers’ information, absentees), space service data, and energy use in real time, and the overall space related data of the workshops in the south area will be collected and displayed by the system.
The use of teaching space and daily utilization rate are analyzed and displayed by classification statistics. Displaying the detailed location and spatial layout of each space, as well as the three-dimensional image of the space. What’s more, it can manifest the class information, check-in rate, class teacher and absent students information of each space, and synchronize with Tronclass and the teaching affairs system.

4. The Practical Effect
During the implementation of the overall plan for the renovation of block a and block b in the west teaching area of Xi’an Eurasia University, more than 80 public classrooms are built to support classes, self-study, seminars, conferences and other scenarios. Facilities and equipment are deployed in the teaching space. And the support for space management and teaching models is achieved through the information system. The space transformation provides teachers and students with a healthy, comfortable, open and happy teaching space. The smart classroom changes with the upgrading needs of teaching, self-study, group discussion and meetings. Within less than a year, teachers and students made more than 5200 appointments through the system, greatly improving the efficiency of space use.

In terms of the application of teaching scenes, double-division class and automatic recording and broadcasting have become conventional applications on a large scale. After being online, many schools such as Finance, Accounting and Logistics have launched the teaching mode of “Large Lectures and Small Classes”. Dozens of classes joined the online interactive lectures through live video broadcast at the same time, breaking geographical limitations and sharing high-quality teacher resources, which advanced the improvement of teaching quality. Within half a year after the normal recording function was launched, the daily average automatic storage capacity has exceeded 100 G. The maximum number of live broadcast by teachers is 41 times. And the maximum number of single course viewing is 84 times. Teachers and students have praised the application of normal recording, because it provides the support for students’ after-class learning.

5. Conclusion
Through the practical research on the transformation of teaching space in colleges and universities, we have fully understood the application effect of information technology in supporting space management, experience improvement, teaching scene interaction and other aspects, which is worth promoting as a way of public teaching space transformation. In the process of implementation, it is very important to give full consideration to the actual demand, to avoid expanding the concept of smart classrooms. It is inadvisable to copy the practices of others and build a space only with accumulated devices. By making the best use of everything and paying attention to the full integration of environment, devices, systems, data and teaching models, information technology is able to provide strong support for the transformation of public teaching space.

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