
The Online and Offline Blended Teaching Reform and Exploration of Internet of Things Technology and Application

Jieqiong Han

College of Information Science and Technology, Zhongkai University of Agriculture and Engineering, Guangzhou, China

Email address:

Joan.hjq@163.com

To cite this article:

Jieqiong Han. The Online and Offline Blended Teaching Reform and Exploration of Internet of Things Technology and Application. *Higher Education Research*. Vol. 7, No. 4, 2022, pp. 100-103. doi: 10.11648/j.her.20220704.11

Received: June 6, 2022; **Accepted:** June 24, 2022; **Published:** July 5, 2022

Abstract: In today's informatization, massive digital information has become a major advantage of modern education. Educators need to keep pace with the times and change traditional educational concepts. The professional teachers need to change traditional educational concepts, constantly innovate teaching methods and means, and give full play to the advantages of teaching resources. In the past three years, due to the impact of the epidemic around the world, online and offline hybrid teaching has broken the inherent form of "teacher-centered" traditional teaching. The teacher team makes full use of offline and offline advantageous resources to actively create a "student-centered" flipped classroom. The Internet of Things technology and application course is a core basic course for the Internet of Things engineering major. The faculty team actively carries out teaching research and reform, and carries out online and offline mixed teaching. As a teacher, we must really play the role of a guide and provide personalized, diversified and diversified teaching to students. The lecturer changes teaching methods and means, pays attention to individualized training, stimulates students' interest in independent learning, improves the spirit of innovation and cooperation, cultivates the ability to solve engineering problems, and establishes future study and work goals. Therefore, students' self-learning ability is continuously improved and their professional comprehensive quality is improved.

Keywords: Online Teaching Resources, Blended Teaching, Autonomous Learning Ability Activities

1. Introduction

With the rapid development of science and technology such as Artificial Intelligence, Internet of Things Cloud Computing and Big Data, etc. The society has an increasing demand for emerging professional and technical talents. The Ministry of Education's 2010 college professional setting record or approval result (Gao Jiao [2011] No. 4), approved 27 colleges or universities to set up the "Internet of Things" majors. So far, more than 700 colleges or universities have set up the Internet of Things engineering major in China.

"Internet of Things Technology and Application" is a core course for the Internet of Things engineering major, which will be generally arranged in the third semester of undergraduates. As a professional basic pilot course, through systematic study, students can understand the layered architecture of IoT technology, the core key technologies of each layer, and the typical application fields of IoT technology. Classics can have a

comprehensive and objective awareness of the profession of Internet of Things Engineering. Thus, it is helpful for students to make study plans and professional development plans.

2. Traditional Teaching Methods

The traditional offline teaching method mainly adopts the "face-to-face" teaching method. That is, the form in which the teacher teaches and the students to listen. This model emphasizes that teachers are the main body of teaching activities [1], who lead and dominate the entire teaching activities, and who are the "protagonists" of the teaching process. Students are objects and passively participate in teaching activities. Students lack enthusiasm and initiative in learning. The interaction is not strong between teachers and students in classroom teaching, the teaching effect is not ideal. The traditional teaching method severely limits the development of students' ability to explore and autonomous

learning independently.

The course of "Internet of Things Technology and Application" is a highly abstract and strictly logical, which is determined to be more difficult to learn. The traditional teaching mode cannot stimulate the initiative and innovation of students, which is difficult to mobilize the learning interest and passion for learning. The learning effect and teaching quality cannot be guaranteed [2].

3. Online Teaching Method

Since 2020, the outbreak of New Type Corona-virus has been out broken in the world [3]. As the first tier coastal city in China, Guangdong Province is also a dangerous province imported from outside China. Due to the development of the epidemic, the all kinds of education department can not be reopened on time. The Ministry of Education of China issued a notice -"suspending classes but not stop learning", calling on colleges and universities to actively carry out online teaching. Online teaching realizes resource sharing, complementary advantages and comprehensive coverage. This method can meet the learning needs of students in remote rural areas without network or weak signal, which can coordinate the active role of key teachers and all teachers. The teaching team organizes outstanding backbone teachers to record related course knowledge points, online learning resources, and online Q&A and guidance. There are also some disadvantage with online learning, such as, first of all, the hardware and software are not complete, and the learning effect is not ideal; Secondly, teachers are not good at supervising the whole teaching process, who cannot fully understand the learning status and effects of students; finally, the evaluation standards for online learning teaching are single and incomplete.

After nearly two years of teaching practice, the teaching team has done a lot of analysis and comparison. After fully realizing the advantages and disadvantages of online teaching and offline teaching, the teaching team actively carried out online and offline blended teaching to achieve complementary advantages.

4. Blended Teaching Methods

Internet of Things technology and application is the core course of their majors for the students majoring in Internet of Things engineering, which is strong theoretical and practical application; In order to continuously improve the enthusiasm and initiative of students' learning, the teaching team introduces the online learning platform into the teaching of professional courses. The introduced e-learning platform is called Wisdom Tree.

Online network resource learning breaks the time and space limitations of learning, which students can participate more in the whole teaching process, experience all aspects of teaching. During the offline teaching, teachers mainly teach the difficulties of the course and answer the problems encountered by students in the learning process.

Blended teaching enables students to truly become the main

body of learning, which can Stimulate and cultivate students' interest and passion for learning. Blended teaching changes the form from imparting knowledge to cultivating ability, so as to speed up the cultivation of professional talents [4].

To a certain extent, the online-offline blended teaching mode enriches the teaching form and stimulates students' interest in learning; Under the special circumstances of the epidemic, online teaching not only continues offline teaching, but can also supplement offline teaching. Through the learning of online teaching resources, students can learn relevant knowledge points and key difficulties in advance, which can better promote the efficiency, effect and quality of professional teaching. Blended teaching has changed the traditional single teaching form, making the educational space wider and broadening the educational field.

4.1. Construction of Online Micro-course Resources

The members of the project team are all teachers who are fighting in the front line of teaching, with at least 14 years of teaching experience. The team members are composed of professors, associate professors, lecturers, and engineers. The members graduated from different universities in the country and have different professional and technical backgrounds. On the one hand, the faculty team undertakes relevant professional courses for the Internet of Things engineering; on the other hand, they actively spend their spare time to actively carry out teaching research and teaching reform.

Team members have completed nearly 60 micro-lecture teaching video resources, with a cumulative duration of 440 minutes. The course resource has been opened on the Wisdom Tree online learning platform for four semesters. At present, 10 higher vocational colleges and universities are using the resource, and the cumulative number of students has reached nearly 1,000 [5].

4.2. Online and Offline Teaching Process

4.2.1. Preview Before Class

With the development of modern information technology and network, the state attaches great importance to the impact of information technology on the development of education. The state has promulgated the "Education Information 2.0 Action Plan", which can promote the construction of educational information. How to make up for traditional courses by using the information education platform? [6] The teacher-led teaching mode has been transformed into a student-centered self-learning mode to improve the teaching effect of the course, which has become the focus research of teaching reform in colleges or universities.

The team makes full use of modern information technology and professional education for deep integration. Professional teachers actively use the Internet to achieve online access to all course-related teaching resources, Including course syllabus, course teaching plan, course multimedia courseware, video teaching resources, chapter quiz, question bank, etc. These teaching resources are mainly for students to preview before class or review after class.

The teacher will divide all students into several groups before class, the best group members are about 5 students. Teachers put forward preview requirements and related problems according to teaching objectives. Students are required to conduct collaborative discussions on pre-class issues, collected and analyzed data. Building a knowledge system through online platforms and online resources to improve students' comprehension ability [7, 8].

4.2.2. Learning in Class

According to the preview, group members make summaries and speeches, or ask relevant difficult problem. Students complete the internalization process of knowledge through inquiry-based discussion speeches. Teachers reasonably set targeted tasks according to the goals. These tasks are the form and center for the course's content, which can carry out teacher-student and student-student interaction. During the whole teaching process, teaching activities focus on classroom teaching organization and management [9].

In content design, teachers should pay attention to interest transfer and knowledge expansion. Teachers choose diversified teaching resources to guide students to think about the relationship between knowledge points. Teachers design courses and specific activities around deep learning, which can promote students to deep study. Make students become the subjects and masters of the classroom. Teachers play only a guiding role in classroom teaching. Students should change from passive recipients in traditional classrooms to active learners in today's classrooms [10].

4.2.3. Review After Class

Offline group discussion can enhance teamwork ability. Stimulate and cultivate students' interest during studying process from nature, life and society. Our purpose is to make students change from the "learning" full-stop classroom to the "learning" thinking question mark classroom.

Before class, students learn course knowledge points independently. In class, students partially integrate and apply fragmented knowledge points by solving practical problems. After class, students summarize knowledge and integrate fragmented knowledge by asking questions. The method of "zero deposit and whole withdrawal" enables students not only to clearly understand the course knowledge, but also to build their own course system, thus significantly improving the achievement of course goals [11].

4.3. Course Learning Evaluation System

According to the talent training plan, the "Internet of Things Technology and Application" course has a total of 48 class hours and 3 credits, including 32 class hours for theory and 16 class hours for experimentation. This course is as a compulsory course in the syllabus [12].

The assessment method [13] of this course is examination class, and the assessment result adopts a five-level system, namely excellent, good, medium, pass, and fail. The comprehensive grade of this course is composed of three parts: offline course grade (25%) + online network teaching resource

learning (15%) + course report grade (60%). The offline performance is mainly composed of: attendance score (20%) + cutting-edge technology report (20%) + scene report (20%) + experimental score (40%). The learning performance of the online network teaching platform is mainly given by the teacher A according to the student's online learning progress. The experimental results were graded by teacher B. The assessment of the experiment focuses on the procedural assessment, and part of the experimental process has set up a Q&A link and a live demonstration link. In this way, teachers can understand students' design ideas and processes, thus give objective, fair and reasonable experimental grades. Improve students' practical ability, and the effect of learning quality is significantly enhanced [14].

The specific requirements for the course report are as follows: According to the content of the course, students select a specific industry to analyze the application status of the Internet of Things technology at home and abroad. The students analyzed the case in detail, its architecture, applied perception technology, communication, security and supporting technology. On the basis of sufficient research, students are required to write a professional paper more than 2,500 words.

5. Conclusion

Blended teaching has changed the traditional dilemma of "difficult courses, few hours, many questions, and few answers", which Improve the quality and effect of offline learning. It has changed the traditional teaching thinking of "emphasizing theory and ignoring practice", which focus on the transformation of theory and practice, and strengthen practice. The experimental part is driven by projects to improve students' practical ability and self-learning ability. Before class, teachers share forward-looking and scientific course online teaching resources, which can enable students to make full use of teamwork skills and improve self-learning ability. Blended teaching changes the traditional teaching process, pays attention to the participation in the teaching process, and mobilizes the majority of students to play an active role in the entire teaching process of the course [15].

Acknowledgements

This paper was supported by the Education and teaching research and reform project of online open curriculum alliance of colleges and universities in Dawan District, Guangdong, Hong Kong and Macao in 2021 (Grant NO. WGKMII006). This paper was supported by the Computer Basic Education Teaching Research Project of the National Computer Basic Education Research Association of Higher Education Institutions (Grant NO. 2022-AFCEC-632).

References

- [1] Chen Wuyuan, Cao Honglei. Implementation Status and Thinking of Online Teaching in "Double First-Class" Colleges and Universities [J]. Education Science, 2020. 36 (2): 24-30.

- [2] Shen Hongxing, Hao Dakui, Jiang Jingjing. Thoughts on online teaching practice during the period of "suspending classes but not learning" and online teaching reform after the epidemic: Taking Shanghai Jiaotong University as an example [J]. *Modern Educational Technology*, 2020. 30 (5): 11-18.
- [3] Li Kehan, Liu Yao, Xie Jinxu, etc. Discussion on the online teaching mode under the new crown pneumonia epidemic [J]. *China Medical Education Technology*, 2020. 34 (3): 264-266.
- [4] Yang Yuxiang, Huang Jiye, Wu Zhanxiong. The design of the implementation plan of the online and offline mixed teaching mode [J]. *Curriculum Education Research*, 2015 (5): 3-4.
- [5] Xu Quan, Zhou Yang, Zhang Yingyuan. Exploration of online and offline blended teaching combined with flipped classroom [J]. *Science and Education Forum*, 2020 (10): 30-31.
- [6] Gong Wei-jun, Wu Jungian, Fan Bin, etc. Problem-oriented in-depth blended teaching reform and research: Taking the course "Computer Network" as an example [J]. *China Education Information*, 2020 (17): 93-96.
- [7] Tong Xiaoli, Liu Hong, Li Jizhou. Exploration and practice of problem-oriented teaching model [J]. *Science Education Journal*, 2019 (8): 41-42.
- [8] Rasheed Abubakar Rasheed, Amirrudin Kamsin, Nor Aniza Abdullah. Challenges in the online component of blended learning: A systematic review [J]. *Computers & Education*, 2020, 144 (C).
- [9] Juan-Francisco Ortega-Morán, Blas Pagador, Juan Maestre-Antequera et al. Validation of the online theoretical module of a minimally invasive surgery blended learning course for nurses: A quantitative research study [J]. *Nurse Education Today*, 2020, 89 (republish).
- [10] Alabdulkarim Lamyia University health sciences students rating for a blended learning course framework [J]. *Saudi Journal of Biological Sciences*, 2021, 28 (9).
- [11] Azizi Seyyed Mohsen, Roozbahani Nasrin, Khatony Alireza. Factors affecting the acceptance of blended learning in medical education: application of UTAUT2 model [J]. *BMC Medical Education*, 2020, 20 (1).
- [12] Janet Mannheimer Zydney, Zachary Warner, Lauren Angel-one. Learning through experience: Using design based research to redesign protocols for blended synchronous learning environments [J]. *Computers & Education*, 2020, 143 (C).
- [13] Joanne E. Porter, Michael S. Barbagallo, Blake Peck et al. The academic experiences of transitioning to blended online and digital nursing curriculum [J]. *Nurse Education Today*, 2020, 87 (C).
- [14] Jebraeily Mohamad, Pirnejad Habibollah, Feizi Aram et al. Evaluation of blended medical education from lecturers' and students' viewpoint: a qualitative study in a developing country [J]. *BMC Medical Education*, 2020, 20 (1).
- [15] Peinazo-Morales Manuel, Aparicio-Martínez Pilar, Rebel-Macías María Dolores et al. Characterization of biodiesel using virtual laboratories integrating social networks and web app following a ubiquitous- and blended-learning [J]. *Journal of Cleaner Production*, 2019, 215.

Biography

Jieqiong Han is an associate professor in computer science and technology, Zhongkai University of Agriculture and Engineering, China. She received the M.D. in computer application technology from Guangdong University of technology. Her main research direction is intelligent control, intelligent mobile robot and application of Internet of Things technology. She has already obtained nearly 20 utility model patents and more than 100 computer patents and software copyrights. She guided her students to more than 120 computer science competitions.