The Development and Optimization of Digital Blended Learning Mode

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Abstract. With the development of mobile Internet technology, the new network ecology has produced many impacts and challenges to the education industry and teaching mode, and mobile learning, a blended learning mode based on digital platforms, has been introduced into various teaching scenarios. Exploring how to apply the digital learning platform, play the resource integration and penetration function of online and offline blended learning, and maximize the realization of "effective teaching" and "effective learning" is an unavoidable issue in the future exploration and practice of blended learning modes. In recent years, higher education has been trying to introduce digital blended learning platforms into college classrooms. However, how to correctly recognize the essence of blended learning, how to realize the sustainable development of teaching resources, and how to effectively use digital technology to promote knowledge sharing are urgent problems to be solved in the current upsurge of digital blended learning. Through experimental design and case analysis, this study summarizes some difficulties in the development and application of digital blended learning modes, analyzes the reasons, and proposes some optimization strategies on this basis.

Keywords: Blended learning · Digital learning · M-learning · Educational technology

1 Introduction

With the development of fixed Internet to mobile Internet technology, mobile learning is also booming. In 2013, China's online education ushered in another spring. With the development of mobile Internet technology and the popularity of intelligent terminals, especially the application of instant messaging technology such as WeChat in mobile phones, M-learning has become another new learning mode based on E-learning. Mobile learning, also known as M-learning, originated from the "Mobile Education" project in the United States in 2000. It is a new learning method that uses mobile communication

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networks and mobile terminals to meet the needs of learners' autonomous learning and to choose their own learning progress, mode and real-time communication at any time and place. It is a way of learning that combines mobile computing technology with digital learning. According to the 47th Statistical Report on the Development of Internet in China [1]released by the China Internet Network Information Center (CNNIC) in Beijing, as of December 2020, the number of Internet users in China reached 989 million, an increase of 85.4 million compared with March 2020, and the Internet penetration rate reached 70.4%. In 2020, China's Internet industry played an active role in resisting the COVID-19 pandemic and normalizing epidemic prevention and control, making an important contribution to China becoming the only major economy in the world to achieve positive economic growth, breaking through 100 trillion yuan in GDP for the first time, and successfully completing the task of poverty alleviation. For higher education, college students are the main group who use mobile phones to surf the Internet with high frequency, and any technological development is to better realize the essential value of things. How to make full use of the advantages of mobile Internet, improve students' learning efficiency and promote the common progress of teachers and students is important research on the reform of higher education under the background of Internet +. It is also a new trend of digital blended learning mode innovation.

2 Digital Blended Learning: Development, Application and Practice

Regarding the concept of blended learning, researchers mainly believe that blended learning is a learning mode with the development of the Internet. With the development of mobile terminal technology, E-learning is developing toward M-learning. Blended learning is not only a combination of traditional learning and E-Learning but also a gradual development toward M-learning. According to some studies, so-called blended learning combines the advantages of traditional learning with the advantages of E-Learning (He Kekang 2000) [2]. However, "the mixture of different learning environments such as classroom teaching and online learning is not the same as the mixture of teaching media, classroom teaching and virtual classroom or virtual community" (Li Kedong, Zhao Jianhua, 2004) [3]. It is a common problem in the practice of the blended learning mode to simply mix the two forms of online and offline learning, ignoring the blended learning process, interaction and feedback evaluation body (Wen Yun, 2017) [4]. In fact, the design of the blended learning model is the key (Josh Bersin, 2002 [5]). Therefore, a correct understanding of the meaning of blended learning and finding the dilemma of the development of the blended learning mode are the forerunners to balance the innovation of the technological mode and the original goal of education to find a way out for the sustainable development of blended learning.

However, the practical application of mobile learning in university teaching in China has not been widely accepted. To this end, this study promotes cooperation between Z and S universities in South China, using mobile Internet and new media technology, to introduce the digital blended learning platform of "mobile live classroom" into the teaching practice of universities in South China, to integrate online and offline teaching resources and to carry out the practical application and exploration of the new teaching

mode of blended learning in universities. The experiment aims to construct the strategy of the mobile learning community, explore and innovate the new path of the blended learning teaching mode in colleges and universities, and promote the practical innovation and development of the blended learning mode in colleges and universities. Through the digital platform, it explores the difficulties in the application and development of the blended learning mode, explores the reasons, and explores the strategies or new ways out.

3 An Experimental Case of Digital Blended Learning

3.1 Research Method

3.1.1 Experimental Method and Case Study Method

To explore the practical path of the blended learning teaching mode, we apply the mobile live teaching platform to the teaching reform practice of Business Ethics by combining an experimental method with a case study and formulate and implement the blended learning teaching design based on the mobile learning community strategy. According to the specific conditions of teaching resources, teachers and students in the teaching unit, through cross-school cooperation, the digital mobile teaching platform of "Mobile Live Teaching Studio" was introduced into colleges and universities for the first time, and experiments were carried out in Z School of Management. To monitor and master the application and experiment of the digital platform and further improve the design of the digital blended learning teaching mode proposed in this study, the study also selected two professional classes to participate in the experimental comparison and participated in the whole process of curriculum teaching design, transformation, guidance, application and summary.

The application of the teaching mode design of this study in the course teaching design is compiled into the "Case Teaching Design of Business Ethics-Innovation and Reform of Blended Learning Teaching Mode", and the rich media e-book results are published. The digital mobile teaching platform can effectively integrate the mobile phone live classroom, teaching courseware, teaching design and other learning resources of the course, which is not only an online teaching resource of blended learning teaching design but also a three-dimensional presentation of the blended learning teaching mode. This blended teaching experiment has also been reported by a magazine sponsored by the Ministry of Education of China [6], which also provides a reference for this paper to discuss the evaluation of the blended learning effect of data-enabled universities based on mobile live classroom strategies.

3.2 Instructional Design of a Blended Learning Course Using "Mobile Live": The Case of Business Ethics

3.2.1 Preclass Hybrid Design: How Do Digital Platforms Improve Students' Preclass Learning and Classroom Efficiency?

How to give full play to the advantages of mobile Internet to promote students' preclass learning to improve the efficiency of classroom learning is the primary issue in the reform

and innovation of the blended learning mode. To this end, this course publishes course materials for extracurricular learning through the digital mobile platform, such as cases and related issues required for teaching, to help students read and think through mobile phones so that mobile online learning content and classroom teaching are designed to complement each other. Through the digital mobile platform, students can learn from each other and support and solve doubts online, and through the learning community built by the mobile learning platform, they can be encouraged and supported to participate more actively in preclass and after-class learning, thus reducing the time spent reading cases, instilling links and discussing in classroom case teaching. At the same time, teachers publish mobile phone live links of face-to-face classes before class so that students can forward the live links to Wechat Friends Circle to collect parents' praise, arouse parents' attention to students' learning, urge students to better complete their homework before class, and prepare for better classroom performance.

3.2.2 Blended Teaching in Class: How Can Digital Live Broadcasts Improve Students' Participation in Class?

Students' participation in the classroom has always been a concern in the reform of university teaching. Mobile terminal teaching platform for multiple subjects to participate in teaching to build a convenient platform for communication, how can this platform be used to fully mobilize multiple subjects to improve classroom efficiency? On the one hand, this course carefully designs discussion questions around teaching cases to guide students to think, sets up online and offline simultaneous discussion or debate links, allows students to discuss with their classmates during the discussion time, and expresses their opinions synchronously on the mobile phone live broadcasting platform to realize the full expression of all students. Teachers can also give timely and targeted guidance to the opinions or doubts expressed on the platform to build a classroom with full "conversation" with students, highlighting the autonomous status of students in classroom learning. On the other hand, in view of the classroom discussion, students can continue to express their opinions or ask questions after class so that teachers can break through the time and space constraints to grasp students' ideological trends, give timely feedback, and stimulate students' enthusiasm for reflection after class.

3.2.3 Hybrid Extension After Class: How Can Knowledge Learning Be Extended Digitally?

How can classroom teaching be extended to extracurricular activities, make the classroom an introduction to stimulate students nothinking, and then extend it after class to improve the quality of teaching? Through the mobile phone live broadcasting platform, the classroom will be extended to the extracurricular so that nonrepeatable classroom teaching activities can become teaching resources in different teaching situations through live broadcasting. For teaching classes, live classes can be used as review materials after class, which can be consolidated and improved by watching live videos. At the same time, it can also make comments and ask questions on the live broadcasting platform, provide a classroom situational communication platform for the interaction between

teachers and students after class, break the time and space constraints, and conveniently extend classroom teaching to extracurricular activities.

3.2.4 Facilitating Blended Learning by Digitalization: Sharing Out-Of-Class Practical Teaching Achievements with "Mobile Live"

In the traditional practice teaching process of university courses, students' practice investigation process and practice results can only be shown to teachers and classmates through the classroom. However, due to the lack of convenient feedback and sharing channels, students' practical achievements generally lack sharing, participation and evaluation outside the school, and sharing is one-way. The study shows that the mobile phone live classroom, as a mobile terminal teaching platform, has built a convenient communication platform for the realization of multiple participation in the teaching process. Therefore, the blended learning mode of digital mobile platform intervention can find answers to the following questions: first, how can the digital mobile platform be used to share practical teaching results in the mobile live classroom? The second is how to realize the participation and evaluation of multiple subjects in and out of class, collect feedback on students' mixed learning results, and improve students' enthusiasm for extracurricular learning. Third, how can the goal of blended learning, in which multiple subjects inside and outside the school participate in the process of student training, be promoted?

In this experiment, students are divided into groups, questionnaires and interviews are designed around relevant business ethics issues or themes, and each group contacts an enterprise to carry out practical activities such as investigation and interviews to deepen students' understanding of the research issues, contents and practical value of business ethics, and the results of social investigation practice and reporting process are carried out. Feedback on the practice results of the group cooperation was provided to the parents and the enterprises interviewed. Before the report, parents and enterprises interviewed by the survey will pay attention to the report of students' achievements by allowing students to forward the report live link to the preclass activities of collecting praise in the circle of friends. The report of students' curriculum practice survey results will be broadcast live through mobile phones in class. Teachers can organize students to comment in the process of listening to the report. On the one hand, it provides a platform for students to express their opinions and doubts and facilitates teachers to understand students' doubts in real time, aiming at improving students' enthusiasm to share and reflect on other people's achievements and improving the efficiency of college students' classroom reporting. On the other hand, it can provide communication, supervision and feedback platforms for parents and enterprises to understand students' learning effectiveness and help improve students' enthusiasm to carry out curriculum practice activities.

4 Problems and Rethink

4.1 Problems of Digital Blended Learning

The experimental study found that the blended learning experiment focused on the reform of teaching mode in colleges and universities, which had not been changed and impacted for a long time, and the mode and effect of teacher-student learning interaction had not

changed much, while this study introduced digital blended learning based on "Internet + education". It is a hybrid learning path that can provide online and offline synchronous teaching and interaction, in-class and out-of-class, anytime and anywhere.

However, through the experiment, it is found that, on the one hand, no matter how carefully the corresponding curriculum content and mode reform are designed, students are enthusiastic about current participation, but their willingness to share knowledge after class is not high, and there are more concerns; on the other hand, even though the novelty, attractiveness and interest of the teaching design are highly evaluated, the number and frequency of students' reflections after class continue to be low. After digital platform intervention, the blended learning mode has received more technical support, the content and carrier have become richer, more interesting and convenient, and the participants' classroom enthusiasm and interaction are warm, but it is difficult to extend this enthusiasm after class, and the extension of blended learning is difficult to sustain. How to understand, study and explain the difficulties faced by these digital blended learning practices is an important issue worthy of reflection.

4.2 Participants' Attention Allocation: A Rethink on Digital Blended Learning

First, participants' cognitive bias toward digital blended learning will have an impact on their willingness to continue to participate. The reform and path exploration of blended learning teaching mode in colleges and universities based on mobile learning community strategy focuses more on the change of blended learning mode to the classroom. This digital blended learning mode has attracted much attention in an instant. However, the deep-seated and more far-reaching practical goals brought about by digital blended learning, such as knowledge sharing, external evaluation, after-school learning and feedback, may be covered up by more eye-catching technical and operational behaviors because of their time-consuming and slow effect. Therefore, participants in blended learning are often motivated more by the freshness and excitement brought by model innovation, and the focus of participants' attention is the current pleasure brought by the change in the classroom model rather than the learning resources and sustainable utility brought by the digital blended model.

Second, the diversity of the digital blended learning mode can easily lead to a swing in participants' concentration. Because the digital blended learning mode has the characteristics of abundant resource information, rich presentation forms and novel technology, the attention of participants is constantly attracted and transformed by different elements. Therefore, even if the classroom mode or content can attract the attention of participants in a short time, it cannot be expected that they can continue to focus or fix on it. As the main participants, students are more likely to turn their attention to new things, and the after-school participation of digital blended learning will decline with the decline of participants' attention, so even though the digital platform provides participation channels and learning resources for the after-school extension of blended learning, its utilization rate is not high.

Finally, the behavior choice dilemma of digital blended learning, the lack of motivation and motivation to use the platform to participate in learning or resource utilization after class, will inevitably lead to an exponential decline in the enthusiasm of online interaction between teachers and students after class. This is an interlocking behavioral

choice dilemma. Simon (1985) found that there is a huge "attention bottleneck" in human processing information itself: "only one or a few things can be paid attention to at the same time". For participants, the digital hybrid reform of a course is only a small aspect of learning and even thousands of events in life, which can only affect the hybrid learning behavior in a very short time, no matter how the digital platform tools are upgraded, lack of reasonable process design, process guidance and after-school supervision mechanism. It is difficult to transform the short-term behavior choices of participants into the motivation of blended learning, and it is also difficult to develop the habit of conscious participation.

5 The Development and Path Optimization of Digital Blended Learning Mode

Based on the problems in the application of digital blended learning found in this study, we can add some additional requirements in the process design of digital blended learning and summarize the optimization strategies from the aspects of learning guidance and motivation, process design and supervision, feedback of blended learning and habit formation.

5.1 "Motivation-Personalized Coaching" Optimization Strategy

The traditional teaching mode of colleges and universities often limits the interaction between teachers and students to the classroom, but based on the development of "Internet +" technology, the concept of a mobile learning community provides a solution for the extension of teacher-student teaching interaction. The future platform design can give more consideration to some interactive functions extended after class and set up more functional sections serving teaching and after class so that the teaching reform can not only serve the classroom but also provide channels and platforms for teaching assistants to contact teachers and students after class.

5.2 "Plan-Monitoring-Feedback" Optimization Strategy

Application of mobile intelligent classroom management and interactive applications to optimize course management and teaching interaction. Online learning and interaction inside and outside the classroom are important parts of the blended learning teaching mode, and in the practice of the blended learning teaching mode in this study, we found that the lack of supervision and management of students' extracurricular online learning has a direct impact on the effect of classroom interaction. Therefore, to further improve students' enthusiasm for extracurricular learning and classroom participation, we apply mobile intelligent course management and classroom interaction to the practice of the blended learning teaching mode on the basis of previous research to improve students' extracurricular learning, ensure the quality of classroom learning, optimize course management, and improve students' participation and interaction inside and outside the classroom.

5.3 Group Collaboration Display Feedback Optimization Strategy

After opening up a new path for the reform of the mixed teaching mode, more teachers and students can understand the beneficial help of technology embedding based on "Internet +" to the teaching mechanism and adapt to the new interactive mode, which will help to promote such teaching interaction across time and space constraints in the future. Future function optimization needs to focus on the process design of group learning, teamwork, results display and learning summary and feedback to realize the combination of offline classroom and online learning processes and postcounseling so that the results of teaching reform can be more widely applied.

6 Summary

Digital blended learning modes range from reform and innovation to gradual application and promotion in the future. First, a series of bureaucratic rules, such as reform objectives and requirements, should be positioned correctly. The digital platform is only a carrier of the blended learning mode. We should affirm that this technology carrier has brought great benefits to the blended learning mode, technical means, knowledge interest and dissemination efficiency. However, we should not ignore the experience and feelings of the multiple participants in blended learning, such as teachers, students, parents and teaching administrators, because of this explicit utilitarianism. The ultimate goal of blended learning reform and innovation should be how to promote the development of education in terms of convenience, diversification, interaction and sustainable recycling. In the future, how to extend learning resources from the classroom to after-school and how to promote knowledge co-construction and sharing among multiple participants in blended learning are still issues that need our continuous attention and are worthy of study.

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References

1. Website of the Central People's Government of the People's Republic of China: http://www.gov.cn/xinwen/2021-02/03/content_5584518.htm
2. He Kekang, Li Kedong, Xie Youru, et al. Theoretical Research on the "Dominant-Subject" Teaching Model [J]. Audio-Visual Education Research, 2002, (2): 3-9.
3. Li Kedong, Zhao Jianhua. The principle and application model of blended learning. Audio-Visual Education Research. 2004 (7): 1-6.
4. Wen Yun. Analysis of the Path to Improve the Effectiveness of Blended Learning in Open University Based on SPOC [J]. Continuing Education Research, 2017 (8), 87-90.

5. Purnima Valiathan. Blended Learning Models [DB/OL]: www.learningcircuits.org/2002//2020-03-01.
6. Tao Chun. Mobile Phone Live Classroom, It Is Important to Grasp the Word "Grassroots" -- An Interview with Xu Xiaoyi, Dean of Network Education College of South China Normal University [J]. China Education Network. 2017 (5): 17-19.