An Innovative Method for Digital Media Education Based on Mobile Internet Technology

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Abstract—The progress and popularization of the mobile Internet herald the age of Internet plus education. With the deepening of education reform, China raises new requirements on the key competencies of students. Focusing on the cultivation of these competencies, this paper develops an innovative method for digital media education based on mobile Internet technology. After surveying the current learning state of students majoring in digital media, the authors proposed a blended teaching model with digital media based on mobile Internet technology. There are four parts of the model, namely, frontend analysis, online autonomous learning, offline teaching, and after-class online evaluation. The design of each part was described in details. Then, the proposed model was applied to the Poster Design course of digital media major. Comparative analysis shows that the model promotes students' learning efficiency, and their key competencies, and receives high recognition from the students. This research provides new impetus to the innovation of digital media education based on mobile Internet technology.

1 Introduction

With the continuous advancement and deepening of education and teaching reform in China, colleges and universities are attaching greater importance to the cultivation of students' key competencies. However, the traditional teaching model is no longer able to meet the needs of educational objectives at this stage. In this context, the reform of education and teaching in colleges and universities is imperative. Many experts and scholars are exploring teaching models that are in line with the development trend of the times and the educational objectives regarding students' key competencies.

The widespread application of the mobile Internet technology in the field of education brings a new opportunity for the innovation of education and teaching models. The blended teaching model is a student-centered model that absorbs the advantages of both traditional and online teaching and combines teaching and tutoring [1]. The research on blended teaching started in the 1990s. The earliest research mainly fo-

cused on the basic theories such as the concepts and models of blended learning [2]. Later, the research shifted to blended learning strategies and integration with disciplines [3]. With the advent of the "Internet+" era, blended learning has received more attention. The research in foreign countries on blended learning mainly involves four aspects: the design and application of blended teaching courses, learning support for the blended teaching process, construction of blended teaching models and evaluation on blended teaching [4]. In recent years, domestic education experts and scholars have also paid more attention to blended teaching. At present, domestic research on blended teaching mainly focuses on the practice of blended teaching, design of blended teaching and its integration with courses [5].

After sorting and analyzing related literatures and surveying the current learning state of students majoring in digital media, this paper proposed a blended teaching model for the digital media course based on mobile Internet technology for the purpose of developing the key competencies of students. In this paper, the detailed design of the model was provided, and through teaching experiments, the effectiveness of the proposed model was proved.

2   Survey on the Current Learning State of Students Majoring in Digital Media

In order to design an education and teaching method based on mobile Internet technology that is more in line with the characteristics and learning needs of students, a random questionnaire survey was carried out among the students majoring in digital media from freshmen to senior students in a college, to investigate and analyze their learning motivations, habits and acceptance of online learning. A total of 203 questionnaires were distributed, and 187 valid questionnaires were recovered, with a validity rate of 92.1%. The following results were obtained from the statistics of the questionnaires:

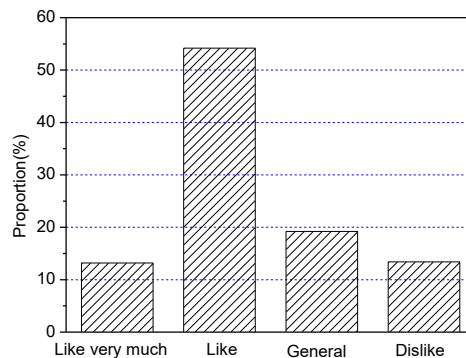### 2.1   Popularity of the digital media major among students

Fig. 1. Popularity of the digital media major among students

According to the questionnaire survey, 67.4% of the students like or very much like the digital media major. These students applied for this major because they liked it, so they have some learning motivations. 19.2% of the students are neutral towards this major, and 13.4% dislike it. Some of these students did not take digital media as their first choice in the application, but were transferred to this major, and some others applied for it blindly without knowing what this major was about and its job orientation, so these students have relatively weaker learning motivations (Figure 1).
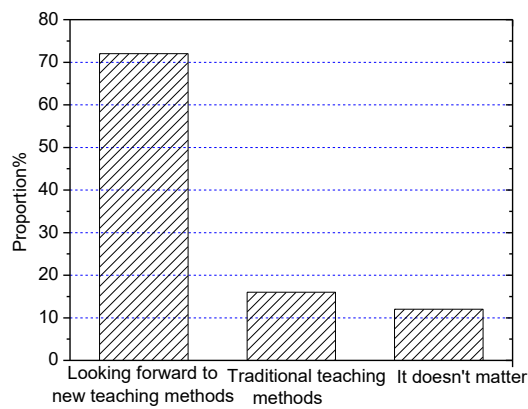
2.2 Students' expectations for teaching methods

Fig. 2. Students' expectations for teaching methods
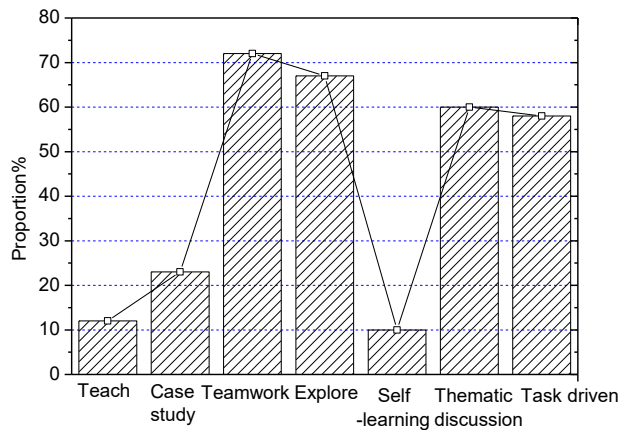

Fig. 3. Students' preferences for various teaching methods

Through the survey, it is found that currently, the prevailing teaching method adopted by teachers in digital media major is lecturing, which most students find boring, so they often play with their mobile phones and even sleep in the class. Figure

2 shows the survey results of students' expectations for teaching methods. It can be seen that 12% of the students do not care about what teaching methods should be adopted, that 16% hope that teachers will adopt the traditional teaching method, and that more than 70% expect teachers to adopt new teaching methods. Figure 3 shows the survey results of students' preferences for various teaching methods. It can be seen that students have a low preference towards lecturing, autonomous learning and case study, but prefer team work, inquiry learning, thematic discussion and task-driven teaching more.

2.3 Students' purposes of using the Internet and mobile phones

Figure 4 shows students' purposes of using the Internet and mobile phones. It can be found that chatting, playing games, watching movies and TV shows are the main purposes for which students surf the Internet, and that only 6% of the students study on the Internet. This group of students mainly search on Baidu and other websites for the answers to the questions they cannot solve. Other students indicated that the reason why they did not study by using computers and mobile phones is that the learning resources were very scarce on the Internet and that they did not know what to learn.
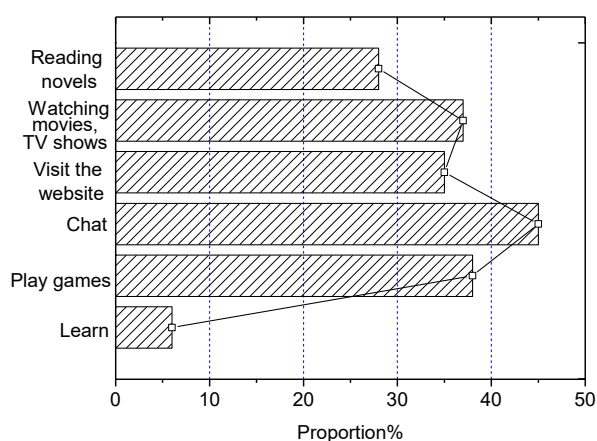

Fig. 4. Students' purposes of using the Internet and mobile phones

2.4 Students' interest in online learning

Figure 5 shows the survey results of whether students are interested in online learning. Per the figure, most of the students are interested in online learning; only 6% are not interested, as they are afraid that online learning will occupy their spare time and increase their academic burden; some others think that it is just another form of learning and that is has no effect in improving the quality and efficiency of learning.

Through the above survey and analysis, it can be seen that most students have a strong interest in digital media and very much hope that teachers will adopt some

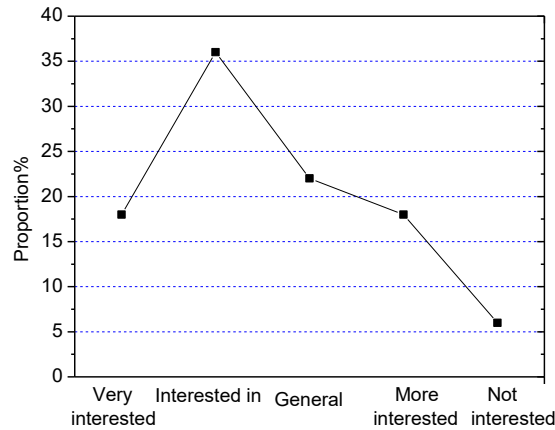innovative education and teaching methods, and that they are also quite interested in online learning.

Fig. 5. Students' interest in online learning

3 Research on the Blended Teaching Model for Digital Media Based on Mobile Internet Technology

3.1 Design of the blended teaching model based on mobile Internet technology

The blended teaching model based on mobile Internet technology can provide students with a combined virtual and real learning environment, rich teaching resources, and a learning platform for online communications and discussions. It fully reflects the "learner-centered" education concept and is in line with the objective of "developing students' key competencies" advocated in the current education and teaching reform in China [6]. Therefore, based on the results of the questionnaire survey among students majoring in digital media, a blended teaching model was designed based on mobile Internet technology for the purpose of developing the key competencies of students.

Frontend analysis" Frontend analysis mainly consists of four parts, as shown in Figure 6.
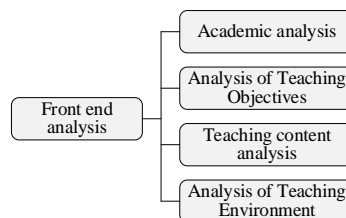

Fig. 6. Main components of front-end analysis

Learning situation analysis refers to the analysis and understanding of learners' personalities, learning abilities and habits and other basic conditions before the teaching activities, so that teachers can teach in accordance with students' needs and design teaching activities according to the characteristics of students and the teaching content [7].

Teaching objective analysis refers to the objectives that need to be reached after each class set by the teachers according to the talent cultivation goals and the course teaching goals, like what knowledge, abilities and competencies that students should have obtained and mastered. Teaching activities should be designed closely around the teaching objectives, and what is more, the teaching objectives are also an important reference in teaching evaluations [8].

Teaching content analysis is to determine the main knowledge points to be taught, clarify the key content and difficulties and consider the interrelations between knowledge points, so as to allow students to establish their own knowledge structure system and master basic knowledge and professional skills [9].

Teaching environment analysis is mainly to check whether the teaching environment is equipped with multimedia projection equipment and computer rooms that are required by teachers. In blended learning, students should have network computer labs and mobile terminal devices like mobile phones to conduct online learning after class [10].

Design of teaching activities

Pre-class online autonomous learning
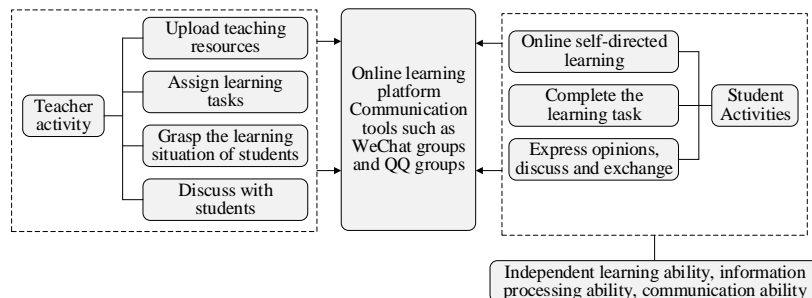
Fig. 7. Framework of online autonomous learning before class

After the frontend analysis, teachers should, based on the learning situation, teaching objectives and teaching content, prepare targeted learning resources for students, such as recording video clips, making Powerpoint files, designing online test questions, posting curriculum links related to the teaching content and providing expansive learning resources like texts and videos, and also upload the teaching materials to the online learning platform of the school, so that students can conduct online autonomous learning before class anytime and anywhere during their spare time and complete relevant learning tasks and online tests assigned by teachers. Students may also ask questions about the learning content, share their innovative thoughts, and communicate with teachers and other students via online communication platforms or

social networks like WeChat groups and QQ groups, and on the other hand, teachers may also learn about the students' learning status and receive online test feedbacks through the online teaching platform, and at the same time, by using various communication tools, understand what students are thinking, especially those who are unwilling to express themselves in class, so that they can design and carry out more targeted classroom teaching activities. Figure 7 shows the framework of the online autonomous learning before class [11].

Offline teaching" Offline teaching is the traditional classroom teaching, but considering the characteristics of the digital media major, most basic courses and specialized courses will involve the learning and operation of related software, so offline teaching actually includes two parts: face-to-face and computer-based teaching. Teachers may, at their own discretion, adjust the time allocation of face-to-face and computer-based teaching according to the difficulty of the teaching content. The two forms of teaching can be carried out in one class, or in separate classes. However, unlike in the traditional teaching model, students in the blended teaching model have already learnt and gained some understanding of the relevant teaching content before class and come to the class with questions. Therefore, the teaching activities should be designed with students as the center and aimed to develop students' key competencies. Teachers no longer play the main role, but rather, the organizer of teaching activities and the answerer to students' questions in class. Figure 8 shows the framework of offline teaching design [12].
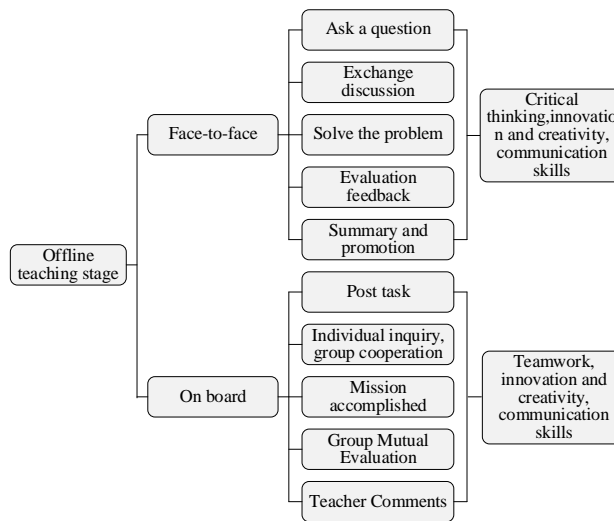

Fig. 8. Framework of offline teaching design

In face-to-face teaching, the teacher will set up a problem situation based on the students' online autonomous learning status before class, and the students will communicate on and discuss the problem raised by the teacher, and at the same time put forward the problems, doubts and discoveries they have encountered in the learning process, and jointly solve them through group discussions, debates and summaries.

For some difficult problems, the teacher can give appropriate hints and guidance to help students solve them. In this process, students shift their role from passive learners to active inquirers, which improve their thinking, creative and innovative abilities as well as communication skills. At the end of the discussion, the teacher should evaluate and summarize the students' discussion, communication and learning to deepen students' understanding and cognition of the knowledge they have learnt and allow them to gradually form their own knowledge system [13].

In computer-based practical teaching, in order to enable students to integrate theory with practice, enhance their practical abilities and develop their independent investigation abilities and teamwork spirit, the teacher may design appropriate learning tasks according to the teaching content, and when receiving the learning tasks, students can explore how to complete them independently. If any student encounters a problem, he may communicate and discuss with the group members, or if necessary, members of other groups or even ask the teacher for solutions, so that the students can ultimately complete the learning tasks. For a simple task, each student must prepare his own task report; and for any difficult task or large design work, students can form teams, and each team will decompose the task into different parts and each member will complete the assigned part. After the task is completed, each team can conduct a peer review of the members' performance so that they can learn from each other; and the teacher can also comprehensively evaluate the performance of each team, and point out the common problems the teams have to help students internalize the knowledge [14].

After-class online evaluation: In traditional teaching, teachers often focus on the lecturing during class. They do assign some homework, but they pay less attention to the review and practice of students after class, and as a result, students do not spend much effort in after-class review and often copy others' homework. This does not help students consolidate their learning and internalize the knowledge. In mobile Internet technology-based blended teaching, on the other hand, there are more flexible and diverse forms of homework after class, which also increases the opportunities for teachers and students to communicate after class [15]. Figure 9 shows the framework of the proposed after-class online evaluation. After teaching, teachers can assign project tasks and competition tasks on the online learning platform according to the students' learning status, and students can form teams to complete these tasks through cooperation after class. During the process, students can communicate on and share their creative ideas, experience and related resources regarding the projects or competitions by using various communication tools like WeChat and QQ groups to inspire each other. After completing the tasks, they can upload the works to the online learning platform so that all teachers and students of the school can give comments and suggestions on the works, and students can also conduct peer reviews. After receiving feedbacks, students in each team can incorporate the comments, make timely revisions to the work and upload it again to the online learning platform to check their ranking in the class. During this process, students and teachers can communicate via the platform, and teachers will also answer the questions raised by teachers in time and guide students to complete the tasks successfully [16]. In addition, students can also complete relevant review questions through the online practice function of the

system. After students submit their answers, the system will automatically feed back the results until all the questions are answered correctly. The system will also feed back students' rankings among all answerers, to arouse their enthusiasm in after-class learning. This model truly consolidates and improves students' knowledge after class, strengthens communications and interactions between teachers and students, and help develop students' innovative and creative thinking abilities and communication skills [17].
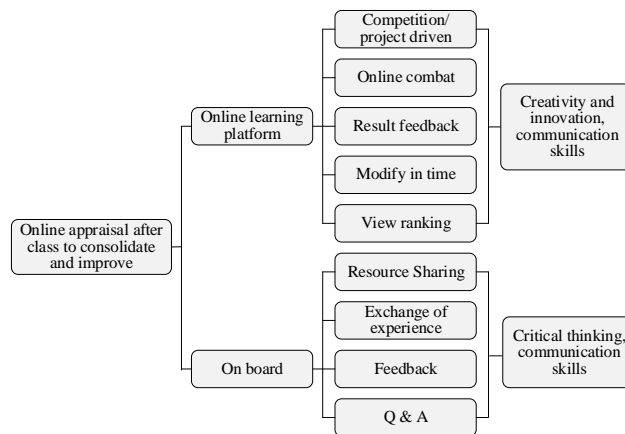

Fig. 9. Framework of after-class online evaluation

Design of teaching evaluation

Table 1. Blended teaching quality evaluation system based on Internet technology

Evaluation target	Primary indicators	Secondary indicators
Online learning	Online learning engagement	Platform usage
		Online test completion status
		Online communication and discussion
		Project task/competition completion status
Offline learning	Offline teaching engagement	Active engagement in discussions
		Solving of key and difficult problems
		Completion of computer tasks
		Active thinking
		Mastery of professional knowledge
Outcome Evaluation	Overall learning results	Final grade
		Task completion status
	Key competencies development	Communication skills
		Teamwork
		Creativity and innovative thinking
		Critical thinking

Teaching evaluation is an important part of teaching activities. The blended teaching model based on mobile Internet technology is quite different from the traditional

model in terms of teaching form, means and methods. so the traditional evaluation based on final grades is not quite suitable for the blended teaching model. In this model, the evaluation should focus more on the key competencies of the students such as their performance in the learning process, teamwork, innovative and creative abilities. Based on this, considering the characteristics of the digital media major, a blended teaching quality evaluation system based on mobile Internet technology was established, as shown in Table 1. The evaluation includes not only the traditional evaluation on students by teachers, but also the self-evaluation and peer review by students [18].

3.2 Application of the blended teaching model based on mobile Internet technology in the art teaching in the digital media major

Experimental design: In this paper, the blended teaching model based on mobile Internet technology was applied to the Poster Design course for two classes of sophomore students majoring in digital media in a college to investigate the effectiveness of the model in teaching. One class was taken as the experimental class, and the other, as the control class, with 45 students in each class. The proposed blended teaching model based on mobile Internet technology was applied in the teaching of the experimental class, and the traditional teaching model was applied in the teaching of the control class. In order to avoid the influences of other factors, the two classes are taught by the same teacher.

Frontend analysis: Before the start of the experiment, the teacher first analyzed the learning situation of the students in the two classes. The sophomore students have gained a certain understanding of this major after a year of study, and most of them are full of expectations for learning in the future, but there are also some who lack the motivation to study or clear goals, have poor learning habits, and are tired of classroom learning. They often sleep in class or play with their mobile phones, and are reluctant to do their homework after class. The two classes of students did not have much difference in their grades in the freshman year.

The course "Poster Design" is one of the specialized courses for the digital media major. Students have already learnt the rules of art related to graphic composition. Through the learning of "Poster Design", students should master the related concepts, functions and basic elements of poster design and be able to design and typeset posters according to different themes. This course is also aimed to develop students' key competencies, like teamwork, communication skills, innovative abilities and thinking and critical thinking.

The course "Poster Design" mainly consists of five parts: definition and basic theory of posters, composition and creativity, ways of expression, case studies of famous posters at home and abroad, and curriculum research.

Teaching design and evaluation: The course "Poster Design" was taught under the proposed blended teaching model based on mobile Internet technology and the evaluation system.

3.3 Analysis of the effectiveness of the blended teaching model based on mobile Internet technology

Analysis on students' scores: After teaching of the course "Poster Design" for one semester, the scores of the two classes were analyzed. Figure 10 shows the distribution of the students' scores in the experimental class and the control class, and Table 2 provides a summary of the students in the two classes. It can be seen that the scores of the students in the experimental class were significantly higher than those of the control class, with a failure rate of 0, and an excellence rate of 42.2% (80-100 points), and that the average, highest and lowest scores were also significantly higher than those of the control class, indicating that the blended teaching model based on mobile Internet technology can improve students' learning.
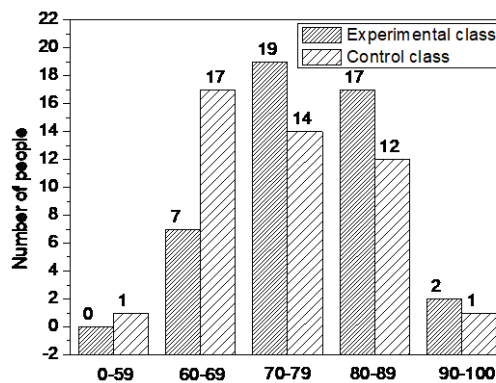

Fig. 10. Distribution of students' scores in the experimental and control classes

Table 2. Statistical table of students' scores in the experimental and control classes

Grades	Experimental class	Control class
Average score	83	74
Highest score	96	91
Lowest score	64	57
Excellence rate	42.2%	28.9%
Failure rate	0	2.2%

Analysis of the questionnaire survey results: At the end of the course, a questionnaire survey was conducted among the students in the experimental class to investigate and analyze their satisfaction with the blended teaching model and the influences of the proposed model on the development of their key competencies.

Figure 11 shows the survey results of students' satisfaction with the teaching model. It can be seen that 70% of the students were very satisfied or satisfied with it, and no students are dissatisfied.

Figure 12 shows the survey results of whether the students found this teaching model helpful for improving their key competencies (teamwork, communication,

creativity and critical thinking). It can be seen that only 1% of the students found this teaching model not helpful, and that 71% of them found it helpful.
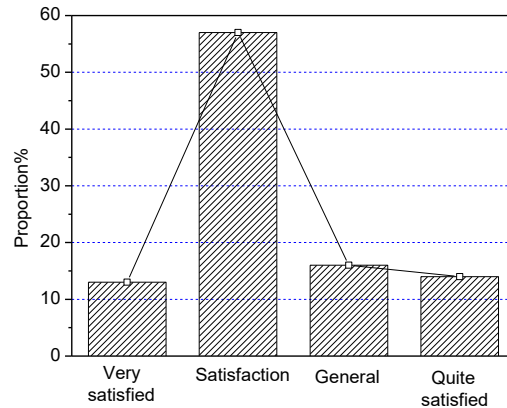

Fig. 11. Students' satisfaction with the blended teaching model
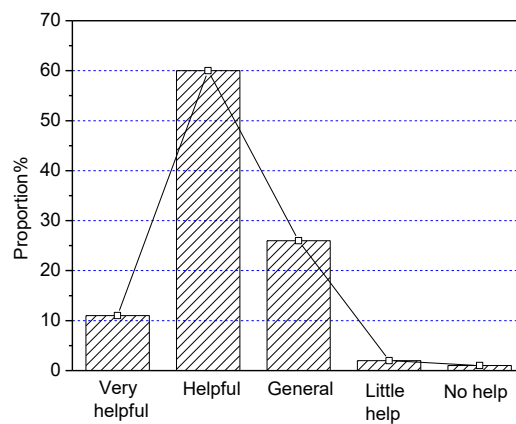

Fig. 12. Survey results of whether the students found the teaching model helpful for improving their key competencies

The above survey results show that students recognize the application of the blended teaching model based on mobile Internet technology in teaching.

4 Conclusion

The development and popularization of the mobile Internet technology has changed the way people live and learn. Aiming to develop students' key competencies, this paper investigated an innovative teaching method for digital media based on mobile Internet technology. The specific conclusions are as follows:

1. The survey of the students majoring in digital media shows that most students have a strong interest in digital media and very much hope that teachers can adopt innovative education and teaching methods, and that they are also quite interested in online learning. Therefore, based on the survey results, the blended teaching model for digital media based on mobile Internet technology was proposed, for the purpose of developing the key competencies of students.
2. The blended teaching model for digital media based on mobile Internet technology consists of four parts, namely, frontend analysis, online autonomous learning, offline teaching, and after-class online evaluation. The teaching activities of each part were described and analyzed in detail.
3. The proposed model was applied to the course "Poster Design" in digital media major. Comparative analysis was performed on the effectiveness of the blended teaching model based on mobile Internet technology, which shows that the model promotes students' learning efficiency and their key competencies, and receives high recognition from the students.

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