Construction of Mobile Teaching Platform for the Ideological and Political Education Course Based on the Multimedia Technology

Shanshan Wang
Hunan Communication polytechnic, Changsha, China
`wangshanshan_0412@163.com`

Abstract—with the continuous development of mobile communication technology, learners can easily take advantage of the fragmentary time to learn through smartphone and tablet PC due to their portability. We applied the mobile multimedia technology to the multimedia teaching of the ideological and political course, designed a mobile multimedia teaching platform for the ideological and political course, put forward the application of mobile technology to the ideological and political education for the first time. In addition, based on the frame of Ruby on Rails, we used HTML5 technology to enrich the functionality of the education platform, and adopted the online examination technology in the online examination section of the mobile teaching platform in order to help students evaluate their learning better and improve their learning efficiency. The teaching practice test showed that the excellent rate in the experimental group is improved obviously, reaching 10%; the good rate in the experimental group increases by 25% compared with that in the control group, and the number of people at medium and passing stages declines obviously: the medium rate decreases by 30%. These findings indicate the mobile teaching platform for the ideological and political course could improve students' learning scores significantly, which has a broad application prospect.

Keywords—Mobile learning, online independent examination, mobile multimedia, ideological and political education

1   Introduction

Mobile multimedia refers to a portable and mobile device, which is the integration of computer and video technique and the media for the information communication and dissemination of human-computer interaction with two types of media or above [1]. In the development of mobile terminal devices, there were more than 1 billion smartphone users in the world by the third quarter of 2012 and 354 million smartphone users in China by the first quarter of 2013, and China has surpassed America to become the country with most smartphone users in the world. With the maturity and popularization of mobile communication technology, especially 3G, and the continuous development of 4G, more and more educators and learners begin to

use mobile terminals [2]. Learners can easily take advantage of the fragmentary time to learn through smartphone and tablet PC due to their portability. In addition, the multimedia performance of mobile terminals and various sensors (such as GPS) can assist in developing a variety of interactive applications that cannot be realized by ordinary computers [3].

Combined with the current development status of education and information technology, we shall focus on the following issues in our current researches: how to develop the mobile multimedia technology, so that learners can easily gain high-quality educational resources conveniently for lifelong learning; provide higher learning institutions with a convenient teaching management platform; provide teachers with flexible means to express the course contents; all course participants can communicate and share with each other conveniently; provide essential data for education research scholars, so that they can research the human learning to be developed from the hypothesis driving pattern to the data driving pattern.

2 State of the art

With the rapid development of mobile technology and internet technology, mobile learning is formed on the basis of web-based learning and distance education. The application of mobile internet technology to the mobile terminal platforms provides a platform and foundation for the education reform. Mobile learning has the characteristics of portability, convenience and interactivity without strict requirements for time, environment and site, so that students can use their disengaged time to learn [4]. Stanford, Harvard and some other colleges and universities in America have applied the MOOC mobile learning platform [5]. Uluyol et al [6] put forward to empirically compare text-plus-mobile phone learning using an integrated 2D barcode tag in a printed text with three other conditions described in multimedia learning theory. The method examined in the research involved the modifications of the instructional material. For example, a 2D barcode was used in the text, and the learner scanned the tag with the camera on his/her mobile phone to realize the activation and narration on the screen of the mobile phone. Viana et al [7] proposed to use the mobile multimedia technology to establish mobile documents, and our approach combines metadata extracted and enriched automatically from the users context with annotations provided manually by the users and with annotations inferred by applying user-defined rules to context features. China explored the sharing of teaching resources earlier, such as the early online excellent courses. Su [8] used Flash＋XML to construct the mobile multimedia electronic teaching map with comprehensive and concrete teaching information and strong interactive function and according with the middle school students' cognition and learning for the geography teaching, and concretely discussed the implementation techniques of electronic map zoom, movement, label, query, ranging and other basic functions to get a good application effect in the geographical teaching. Some researchers [9] constructed digital libraries through multimedia teaching, remote teaching and mobile media technology combined with the resource management of mobile multimedia and university libraries to improve students' independent learning and

increase their reading time. However, at present, there are still some deficiencies in the application of mobile media technology to teaching: (1) most ways of political and ideological education are traditional and simple multimedia technologies, and there is no well-functioning education platform based on mobile terminals; theoretical teaching prevails, and teachers instill the theories into students, so students' learning enthusiasm is low and their learning efficiency is not high [10]. (2) There are some defects in the online examination methods for traditional independent learning: not flexible group questions, simple function, narrow range of application, poor stability, and no expansibility. Moreover, it is difficult for teachers to fully understand the students' learning effect.

The innovations in this research are: firstly, propose to try using the mobile teaching platform in the ideological and political education course, and design and construct the mobile teaching platform according to the professional features. Moreover, add the online examination module into the mobile media teaching platform, which is an online examination system for independent learning and focuses on online learning and online examination to help schools improve management level, reduce costs and promote value and help teachers to master students' learning through the examination system.

3 Theoretical construction

3.1 Blended learning

New implication has been given to Blended Learning [11] in recent years, and it has attracted a lot of attention: in a brand-new teaching and learning environment and based on the traditional advantages of teaching and learning, incorporate the advantages of mobile media technology skillfully, so as to play the leading role of the teachers in guidance, enlightenment and monitoring the teaching process, sufficiently express students' initiative, enthusiasm and creativity as the subjects in the learning process, and combine the collective teaching with the group learning organically (such as collaborative and discussion) to create a brand-new learning environment and train students' ability. This learning model or environment can effectively arouse students' initiative and enthusiasm to meet the requirements in independent inquiry, multiple interactions, stimulant situation, cooperative learning, resource sharing and other aspects, and break the traditional teaching structure of "deciding everything by the teacher's say", in order to fully reflect the characteristics of students as the subjects in the learning process while teachers are playing the leading role in guidance, enlightenment and monitoring in the teaching process. The blended learning structure chart is shown in Figure 1 and the classroom effect picture of the blended learning model is shown in Figure 2.

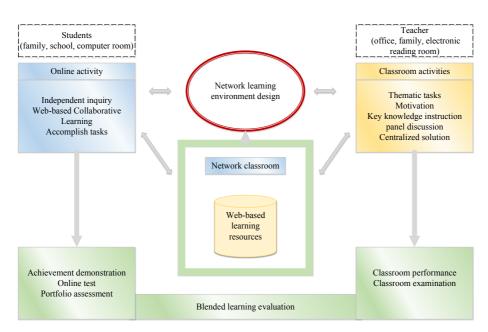**Fig. 1.** The blended learning structure chart

Fig. 2. The classroom effect picture of the blended learning model

3.2 Frame of Ruby on Rails

Ruby is a scripting language and has the feature of facing objects completely. ORM is the abbreviation of object relational mapping, which a programming technique converting relational data to the object-oriented programming language. The ORM in Rails is Active Record, which can help use the object-oriented syntax operation database directly [12]. Rest is a software architecture style for the webpage application program. A method of only testing the performance of application program but not paying attention to the specific realization process is adopted for Rail, which is called behavior-driven development.

The architecture principle of Ruby on Rails is to build the frame with a group of assumptions for rewriting and dynamic programming languages, which is suitable for solving the problems in the project, and the various tools included can use the frame to realize more functions without too much integration. Dynamic languages provide more capabilities and flexibility for the experienced developers, and express more extensive meanings with fewer codes.

3.3 HTML5

HTML5 is the certain requirement of internet standard when internet is developing fast, and the network application services with plug-ins need fewer browsers. HTML5 supports many technical standards, such as presenting mathematical formulas, using canvas labels for dynamic graphics presenting, using video labels for video playing, offline resource caching, online resource monitoring and local storage. With the addition of HTML5, the teaching resource can be presented well and the compatibility of the recourses of the mobile multimedia terminal can be solved. HTML5 can generate some complicated mathematical formulas, such as formulas 1:

$$\int_0^1 x^x dx = \sum_{n=1}^{\infty} (-1)^{n+1} n^{-n} \tag{1}$$

3.4 The function and performance of the mobile multimedia teaching platform

The mobile multimedia teaching platform has the functions of login management, user management, course management, test management, message management, feedback management, learning management, learning evaluation management and course resource management (as shown in Figure 3). Because the objects using the mobile multimedia teaching platform are teachers and learners, the objective for teachers to manage the teaching resources and teaching process conveniently is needed, and learners can use the mobile terminals to learn whenever and wherever possible.

The mobile multimedia teaching platform has some requirements for the performance. The response time of regular pages and manuscripts of the mobile multimedia teaching platform shall be controlled within 5 seconds. The concurrence refers to requests that the system can process per second, which needs to be calculated by esti-

Fig. 3. The functions of the mobile multimedia teaching platform

mating the scale of users. Generally, when 80% of the daily access requests occur within 40% of the time, the formula 2 is as follows:

$$n = ((80\% \times pv_{total}) / (24h \times 60min \times 60s \times 40\%)) / L \qquad (2)$$

In the above formula, n presents the quantity of the requests that every server can process per second, and L presents the quantity of servers.

It can be calculated in the above formula that the concurrence request is 9.3pv/s, but the actual result can be 3 to 10 times average concurrence request, namely 93pv/s.

4 Establishment of the mobile multimedia teaching platform for the ideological and political education

4.1 Architecture of the mobile multimedia teaching platform for the ideological and political education

The frame structure of this mobile multimedia platform is shown in Figure 4. Learners can use the services of the mobile multimedia teaching platform for the ideological and political education through network, and the platform can judge the type of the mobile terminal used, and display the interface view of the corresponding effects of different intelligent terminal.
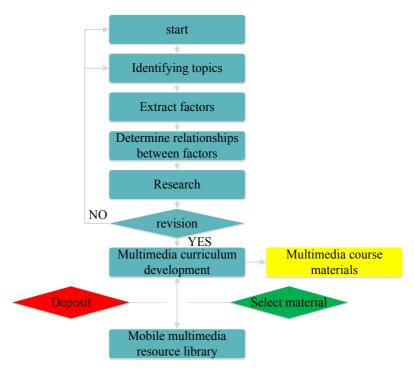
Fig. 4. The hardware architecture of the mobile multimedia teaching platform

4.2 Design the mobile multimedia teaching platform for the ideological and political education

Combined with the online examination technology of independent learning of the mobile multimedia, in this design, it is very convenient to import and export questions and edit test questions, and it can meet the needs of learners' online examinations better.

The mobile multimedia teaching platform for the ideological and political education is mainly composed of the foreground display system, teaching management system, learning management system, course management system, resource management system, test management system, interactive management system, performance management system, evaluation management system and back-stage management system (as shown in Figure 5). The foreground display system is used to display views, log in, register, etc; the teaching management system and course management system are mainly operated by teachers to plan courses reasonably and assign homework. The resource management system is an important constituent part of the mobile multimedia teaching platform, which is used to manage the rich teaching resources and is controlled by teachers to add or modify the teaching resources; the learning management system is used for learners to learn; the managerial subsystems of the system and other systems are mainly responsible for the management of performance, online examination, evaluation, interaction, and users.
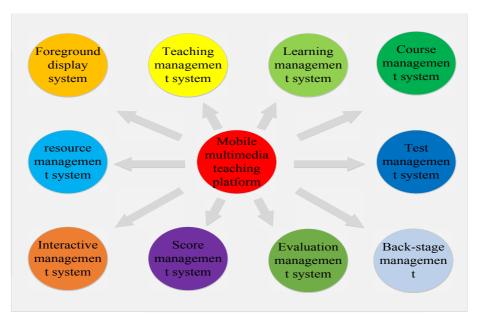
Fig. 5. The system structure drawing of the mobile multimedia teaching platform

4.3 Realize the interface of the mobile multimedia teaching platform for the ideological and political education

In Ruby language, we can establish objects with constructors.

In every category, we can define instance methods, and every method can realize a function convenient for internal and external calls of the category.

The name before "." is receiver and the name after that is the method for call.

In this way, a process of searching and storing is completed. The frame of Ruby on Rail contains the fast webpage generation module, which is divided into three parts: Mina, fragment and layout. The header and footer in the fragment are most commonly-used method for writing pages.

After that, header and footer will be displayed on the page, and now we only need to adjust part of CSS, so the layout part will be used. The layout part is mainly used to write the style sheet. For part of codes listed above, the following style can be defined in header and footer:

div.header{background-color:#575757;font-family;simhei}

div.footer{background-color:inhert;front-family;simhei; font-size;75%}

When the user is logging in, the method for login in the welcome controller will be called.

The login interface of the mobile multimedia teaching platform for the ideological and political education is shown in Figure 6. Students and teachers log in with respective account numbers and passwords applied, and they have different authorities of

the system. Teachers are mainly responsible for the management of courses, re-sources, testing, interaction, performance and evaluation, and students are responsible for learning in the learning system. On the login interface, students can choose the corresponding part to learn as needed. The student navigation interface is mainly divided into four parts: course learning, after-school summary, online examination and communication feedback. Learners can take full advantage of teaching resources to learn in the course learning module. Even though the ideological and political theory knowledge is boring, the diverse materials can help learners understand the theoretical knowledge better. The after-school summary mainly contains the key points and difficulties of knowledge and students' notes. The questions in the online examination part are rich and diverse, which can help students evaluate their learning effects better, and teachers can evaluate students' overall learning according to the test performance. In the communication feedback part, learners can communicate and interact with teachers or other learners to improve their learning efficiency. The mobile multimedia teaching platform is displayed in the ideological and political education classroom as shown in Figure 6.

Fig. 6. The display of mobile multimedia teaching platform in the ideological and political education classroom

4.4 Effect check

In order to test the validity of this teaching platform, we chose the course of Ideology and Politics as the experiment content, selected the 2016th of 80 students from the major of ideological and political education in a university as the experimental subjects, and randomly divided them into two groups: experimental group and control group with respective 40 students. The students in the experimental group were taught

with the mobile multimedia teaching platform for the ideological and political education, and the students in the control group were taught in the traditional classroom. After a semester, we analyzed the learning effects of the experimental group and control group. We used the score stage to refer to: excellent (90 – 100 scores), good (80 – 90 scores), medium (70 – 80 scores) and passing (60 – 70 scores). We contrasted the percentage of the number of people at every stage accounting for total people in the two groups:

$$C = \frac{S}{S_{total}} \times 100\%$$
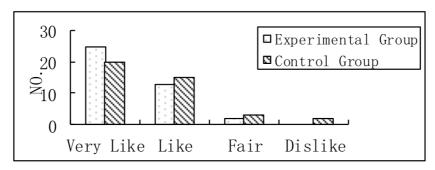
$$\Delta C = C_1 - C_2$$

(3)

In the above formula, C presents the percentage of the number of people at every stage, S presents the number of people at every stage, S total presents the total number of people,   presents the difference value of the percentage of the number people at same stage, and the result is shown in Table 1.

Table 1. The contrast of learning scores in the experimental group and control group

Group	Excellent	Good	Medium	Passing
Control Group (n=40)	0	11	25	4
C	0%	27.5%	62.5%	10%
Experimental Group (n=40)	4	21	13	2
C	10%	52.5%	32.5%	5%
ΔC	10%	25%	-30%	-5%

As shown in Table 1, the excellent rate in the experimental group is improved obviously, reaching 10%; the good rate in the experimental group increases by 25% compared with that in the control group, and the number of people at medium and passing stages declines obviously: the medium rate decreases by 30%, and the passing rate decreases by 5%. It is observed that the learning scores of the students using the mobile multimedia teaching platform for the ideological and political education are improved obviously.

We conducted a questionnaire survey on the willingness of these 80 students. The survey results are shown in Figure 7. There are 38 students in the experimental group who like learning through the mobile multimedia teaching platform for the ideological and political education, including 25 students who like it very much. There are 35 students who like the mobile multimedia teaching platform, including 20 students who like it very much and want to use it to learn the ideological and political course. The survey shows that students like using the mobile multimedia teaching platform to learn the ideological and political course and they are very interested in it.

Fig. 7. The questionnaire survey on the willingness of the experimental group and control group

5 Conclusions

In the era with rapid development of mobile technology and network technology, mobile learning has become a trend of university education, the traditional ideological and political education has no longer been suitable for the development needs of modern society, and the teaching method for ideological and political education needs to be reformed urgently. In this article, we applied the mobile media technology to the multimedia teaching of ideological and political education, established the mobile multimedia teaching platform for the ideological and political education, and proved that the mobile multimedia teaching platform could improve learners' learning interest and learning effects through testing the effects of teaching examples. Firstly, the mobile multimedia platform provides more channels for spreading the ideological and political education: more and more schools have established their own campus network, students can receive outside information by internet, and microblog, blog, forum, etc have become the platforms for students to exchange their opinions and ideas; these new platforms make teachers adopt new teaching methods possibly and enrich the dissemination methods and channels for traditional education. Secondly, the mobile multimedia platform improves the scientific connotation of the ideological and political education: this mobile teaching platform guides students to express their true views on events through various communication platforms provided by new multimedia. Although it is a virtual space, it doesn't affect students to think and answer questions, and this way will improve students' learning interest and learning efficiency, and will promote mutual progress among students and between teachers and students. Thirdly, students can evaluate the learning effect through the online examination module, and the examination questions can be combined freely and are very abundant, which can help students to master knowledge. In a word, as a representative in the information technology era, the mobile multimedia technology brings positive influence to the educational field, which is affirmative, and this influence will be reflected more objectively in the future. However, in this article, we proposed and designed the application of mobile multimedia technology to the teaching of ideological and political education for the first time, and there are still many deficiencies needing to be researched further.

6 References

[1] Luo, H.L., Shyu, M.L. Quality of service provision in mobile multimedia - a survey. Human-centric Computing and Information Sciences, 2011, vol. 1(1), pp. 5. https://doi.org/10.1186/2192-1962-1-5

[2] Ojala, T. Case studies on context-aware mobile multimedia services. Journal of Digital Information Management, 2010, vol. 8(1), pp. 4-15.

[3] Hoque, M.A., Siekkinen, M., Nurminen, J.K., et al. Mobile multimedia streaming techniques: QoE and energy saving perspective. Pervasive & Mobile Computing, 2015, vol. 16, pp. 96-114. https://doi.org/10.1016/j.pmcj.2014.05.004

[4] Buchinger, S., Kriglstein, S., Brandt, S., et al. A survey on user studies and technical aspects of mobile multimedia applications. Entertainment Computing, 2011, vol. 2(3), pp. 175-190. https://doi.org/10.1016/j.entcom.2011.02.001

[5] Pattanaik, M. Design and Analysis of a Novel Low-Power SRAM Bit-Cell Structure at Deep-Sub-Micron CMOS Technology for Mobile Multimedia Applications. International Journal of Advanced Computer Science & Application, 2011, vol. 2(2), pp. 43-49.

[6] Uluyol, C., Agca, R.K. Integrating mobile multimedia into textbooks: 2D barcodes. Computers & Education, 2012, vol. 59(4), pp. 1192-1198. https://doi.org/10.1016/j.compedu.2012.05.018

[7] Viana, W., Miron, A.D., Moisuc, B., et al. Towards the semantic and context-aware management of mobile multimedia. Multimedia Tools & Applications, 2011, vol. 53(2), pp. 391-429. https://doi.org/10.1007/s11042-010-0502-6

[8] Su, Y.W. Design of multimedia electronic teaching map based on Flash+XML. China Educational Technology, 2011, vol. 32(3), pp. 127-130.

[9] Jiang, B. Construction of Characteristic Information Resource Repository in Mobile Digital Library. Journal of Library and Information Sciences in Agriculture, 2017, vol. 29(1), pp. 12-14.

[10] Zhang, Y.X. Some problems existing in the discipline construction of Ideological and Political Education. Ideological & Theoretical Education, 2015, vol. 5, pp. 52-54.

[11] Bonk, C.J., Graham, C.R., Cross, J., et al. The Handbook of Blended Learning: Global Perspectives, Local Designs. Turkish Online Journal of Distance Education, 2009, vol. 10(4), pp. 181-181.

[12] Li, S., Cai, Z.Y. Research on and Application of Ruby on Rails Framework. Sci-Tech Information Development & Economy, 2008, vol. 18(13), pp. 151-153.

7 Author

Shanshan Wang is an intermediate political engineer in Hunan Communication polytechnic, Changsha 410132, China (wangshanshan_0412@163.com).