Analysis on the Smart Classroom and Innovation Mode of Physics Teaching based on MOOC E-Learning Platform

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Abstract

The development of Internet and multimedia technology has led to a variety of educational forms; more and more people are starting to take online courses. In this paper, the author analyzes the smart classroom and innovation mode of physics teaching based on E-learning platform. The supporting technology of network education is a kind of network education software and hardware platform, which provides users with fast, high quality, interactive learning environment. Physics is a natural science based on experiment and application. According to its teaching content and subject characteristics, the physical network platform should have some special templates. By analyzing the innovation of physics network course and teaching mode, the result shows that network teaching method has important practical significance to improve the teaching effect.

Keywords: Smart classroom, Physics teaching, MOOC, E-learning platform

1. Introduction

With the continuous deepening of educational reform, teaching methods and teaching methods have been greatly improved. In recent years, more and more schools have been using large screen projection classrooms and multimedia network classrooms [1]. With the rapid development of network technology, especially the wide application of Internet technology, it brings a new way of thinking for school education [2-3]. In view of the problems of modern teaching methods, this paper puts forward the idea of making full use of the network information sharing and high speed and fast, and in addition to the classroom teaching, the research and development of the network teaching platform. Network teaching, can reasonably allocate the limited teacher resources, make the students make full use of network resources, get more information, greatly broaden the channels of knowledge acquisition.

In recent years, MOOC (Massively Open Online Courses), which is a large-scale open online course, has a profound impact on the global education community. The development of Internet and multimedia technology is about to change the pattern of education [4]. The Internet connects the world, and multimedia technology brings out a variety of educational forms. More and more people are or are going to receive online education courses, the trend of future education is a thorough education revolution. Network teaching is the construction ideas in recent years means of education information, the popularization of education resources under the rapid development of education, it is initially in the distance education, broadcasting television education as the main form, then gradually extended to school education [5-6]. Flexible teaching forms, vivid and interesting teaching content, multitude learning data, a full range of mutual exchange, immediate evaluation of teaching achievements makes the teaching of this education rapidly improve people's education, training and learning mode. Based on the latest computer technology, network technology, database technology, multimedia technology, network education theory, network teaching overcomes the limitation of the traditional teaching mode in time and space, improve the teaching flexibility and

diversity, is the current autonomous learning is one of the most powerful tool, is the country vigorously to promote the development of the modern teaching methods.

2. Network Teaching Platform based on Internet

2.1. Network teaching platform

Network education with its flexible and diverse characteristics of school education, countries continue to rapidly become one of mainstream education, social education, community education has become one of the core competition based on the point of national educational development technology [7]. The western developed countries have made all kinds of subsidies and support policies to help the network education providers, developers and service providers to improve their quality of education resources, expand the influence of network teaching and network learning, network teaching will be regarded as the traditional school education has concentrated force complement [8]. The Chinese government has opened the network education in more than and 350 universities, covering the mainstream education, with online and offline mode for students to provide quality and efficient means of learning. Supporting technology of network education is the network education of all kinds of software and hardware platform, they work together to provide users with fast, high quality, interactive learning environment, in-depth analysis of the system function module can grasp the development characteristics of current network education, the development of clear thinking, to carry out the design and lay the foundation for the development of such systems.
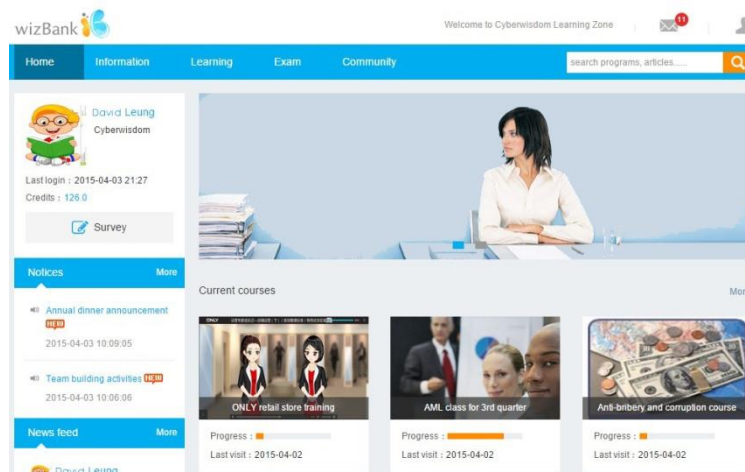

Figure 1. E-learning platform

- WEBCT: it is a network computer system for Bristal Columbia of the University of education and learning system, including the function of online learning, multimedia teaching resources, teaching quality inspection, release the on-line test, performance management, learning curve, with course release etc..

- Vitual-U system: it developed by the University of Simon Fraser, Canada, is unique in that it is easy to create and manage educational learning groups to facilitate discussion.

- WISH: system is developed by the University of Pennsylvania, based on the traditional network teaching platform, it can also realize the electronic whiteboard, video, e-mail, teaching resources management and other functions.

- Moodle: the domestic translation for magic lamp system, is one of the well-known network learning system, by the Australian teacher Martin Dougiamas development, using PHP server script language, the database uses My SQL, guarantee the robust and stability of bottom support platform. Moodle is based on the SCORM interactive learning network standard, modular system design facilitates the integration with the third party educational resources. At present, China is gradually carrying out the localization of Moodle, which may improve the current intelligent network education platform, the degree of integration is not enough.

- MOOC: in 2012, top American universities have set up the network learning platform, to provide free courses on the Internet, the rise of Coursera, Udacity, edX three course provider, to provide a systematic study may give more students. In 2013, National University of Singapore and the United States Coursera company to join a large open online course platform. National University of Singapore is the first to reach a cooperation agreement with Coursera Singapore University, which took the lead in 2014, the company launched a platform for quantum physics and classical music courses. These three platforms are all aimed at higher education, and like a real university, there is a set of their own learning and management system. Moreover, they are free of charge.
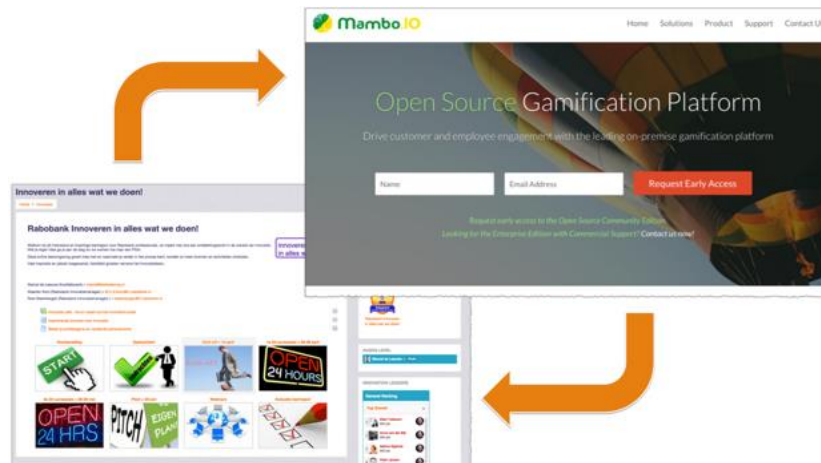

Figure 2. Moodle open source platform

2.2. System Architecture

The full name of the B/S architecture is Browser/Server, the browser / server architecture. Browser refers to the Web browser, a very small number of business logic in front of the realization, but the main business logic in the server side, Browser client, Web server and DB side of the so-called three layer architecture App. B/S architecture does not require special installation, only Web browser can. B/S architecture, the display logic to the Web browser, transaction logic on the Web App, so as to avoid a huge fat client, reducing the pressure on the client. Because the client contains little logic, it has also become a thin client.
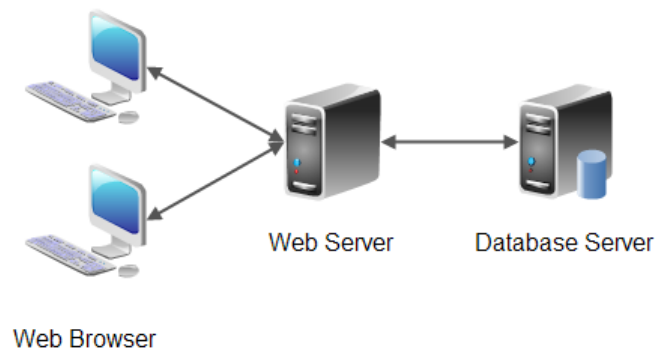
Figure 3. B/S distributed structure

The C/S architecture is a typical two layer architecture, the whole is Client/Server, namely the client server architecture, the client contains one or more running on the user's computer program, and the server has two kinds, one is the database server, the client through the database connection to access the server data; the other is Socket server, application server and client communication program by Socket. C/S architecture can also be seen as a fat client architecture. Because the client needs to achieve the vast majority of business logic and interface display. This architecture, as part of the client needs to bear great pressure, because the display logic and transaction processing are included in them, through the interaction with the database (usually SQL or stored procedures) to achieve persistent data, in order to meet the actual needs of the project.
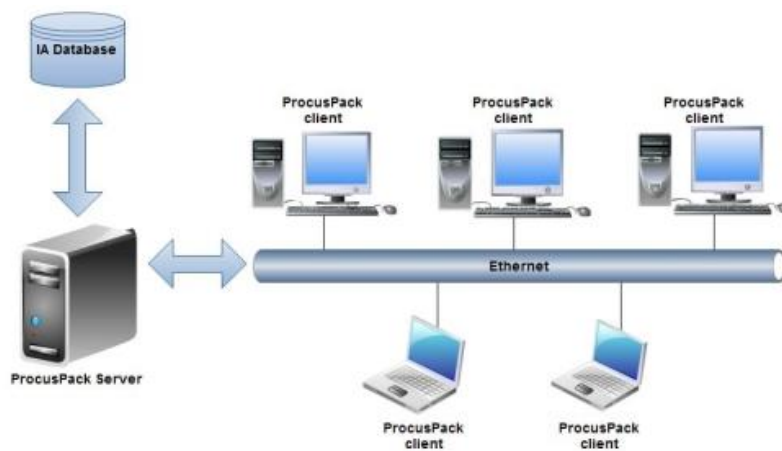
Figure 4. Client/Server distributed structure

MVC is originated from the Small Talk language enterprise application design patterns, from the industry for many years of practice shows that MVC has a very strong vitality. The design pattern of MVC application is divided into Model, View, Controller and other three components, the Model is responsible for the business organization of data and business logic encapsulation, View is responsible for handling the view of interaction with the user, serve as a bridge between Controller Model and View, the two link complete user application logic processing. The MVC model is proved in practice to achieve model system with excellent performance, loosely coupled design between each software layer to enhance the flexibility and robustness of the system, simplify the system design and development of the difficulty. And in recent years, the Java community in the

popular MVC open source but the performance is not lost in the commercial software MVC middleware, to further broaden the scope of the application of design patterns in large distributed systems. Taken together, the MVC design pattern has several advantages as follows:

(1) the data view that allows the same model has diversity, which provides a variety of reference mechanisms for data representation and visualization. At the same time, the changes of the model will be broadcast to each view to ensure synchronization.

(2) the relationship between view and controller is flexible, and can be used to replace the object when the system is running.

(3) The model reusability, because there may be similar and even the same function module between different software systems, and the model can be done with the view of independence, so the model can be transplanted to other separate systems, and transplant the workload is very small, and even do not need to change the code.
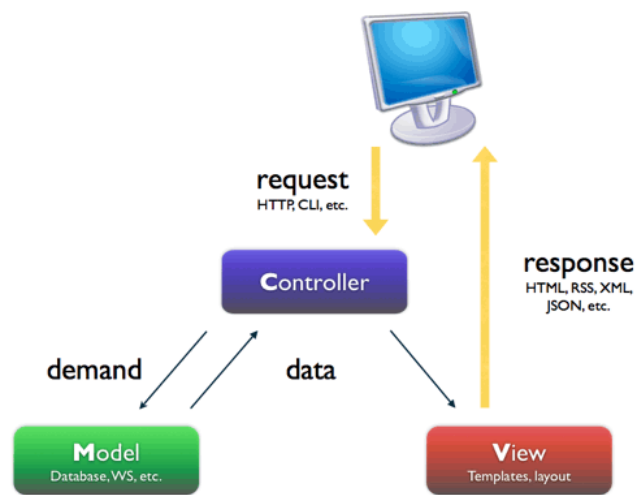

Figure 5. The MVC structure

3. Physics Teaching Innovation Based on MOOC

3.1. Online learning platform

Network teaching is a model of successful application of modern information technology in the field of education, it opens up a new mode of education and teaching, broaden the students' access to educational resources, relying on the construction of fast, flexible and diverse teaching environment for teachers' education and teaching theory, teaching activities, students' extracurricular academic life opened a new the situation. The network teaching platform of network teaching support platform, generally refers to based on computer network communication, can through the construction theory of modern information technology and the latest examination provides software support for the comprehensive service system of network teaching. In general, it provides basic services such as communication, content and learning support. In addition to the software service system, the more extensive network teaching platform includes the hardware facilities supporting the network teaching. Network teaching platform has the following characteristics:

1) Software system, network teaching platform is a technology platform, it is a set of user management, learning support tools and online based communication services,

and teaching methods, teaching contents are not necessarily linked the general software system.

2) The design of multi user privilege, the main object of the network teaching platform is the system administrators, learners and teachers. The system administrator is responsible for the daily maintenance of the system and the content of the course, the Department of public opinion and the user's opinion monitoring and audit functions to ensure that the platform is always in a stable and good running state. For learning, communication, and communication, self testing applications such as curriculum learning provided by the platform, to improve their knowledge level and athletic ability. Teachers mainly through the platform to upload relevant course materials, management of teaching content and communication with students, Q & A and communication activities.

3) The design of curriculum development tools, network teaching platform must provide teachers with good curriculum development tools, including the teaching content editing tools, creative and integrated applications, etc.. Through the curriculum development tools, teachers can create a high quality of network teaching courses, and provide better services for learners.

4) The examination and evaluation system, in the course of learning through the network, the network teaching platform must provide a good evaluation system for learners. Only in this way can we make the learners understand their knowledge in time, and improve the quality of the network teaching and the students' learning efficiency through the way of learning, testing and re learning.

5) The online exchange platform rich, network teaching platform to build a variety of between teachers and students, students and students to communicate, through these simple network communication tools, let users better synchronous or asynchronous communication, to further improve the quality of network teaching.
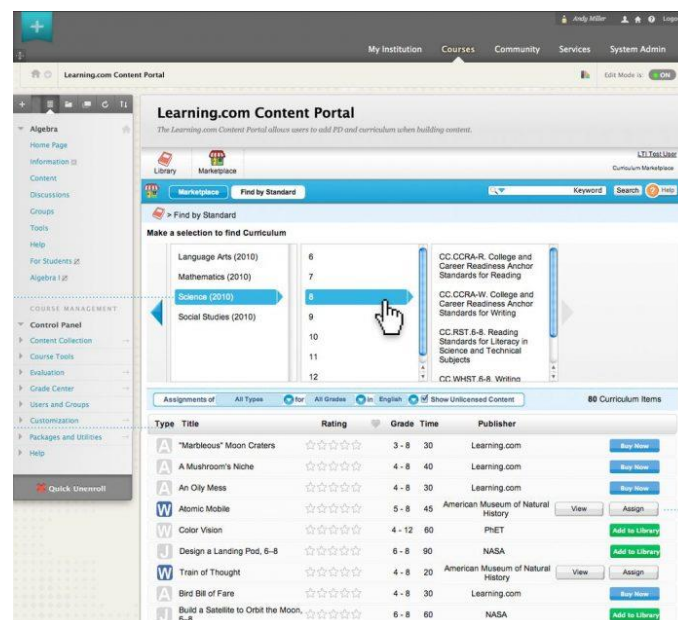

Figure 6. Online learning platform

3.2. Network physics teaching

At present, in the traditional classroom teaching mode, the vast majority of teachers are only self centered systematic knowledge. The cramming teaching method has neglected

the cultivation of students' comprehensive quality, many courses cannot mobilize the enthusiasm and initiative of students, and students from the realities. For the middle school physics teaching, the present physics classroom teaching mainly has the following drawbacks: the teaching method is not targeted, in the classroom, it is a unified teaching mode for all students; the lack of students' creative thinking ability and scientific quality in physics class; most physics teachers in the lecture only in accordance with the textbook to explain the abstract examples of the book, but I do not know the actual application of the actual life, so that students cannot learn the true meaning of physical knowledge; the teaching process is tedious, can't arouse the student's interest and the enthusiasm of the independent study, to the student to explore the question the opportunity to induce obviously insufficient; most teachers only pay attention to the conclusion of memory, while ignoring the physical problems that students only know the sequence of events, and I do not know the origin of the problem of knowledge and practical application, seriously deviated from the combination of theory and practice, practice teaching thought.

Compared with the traditional teaching form, the use of network teaching platform to carry out teaching activities have the following advantages:

1) Network teaching is not limited by time and space, teachers and students can be based on their own actual situation to choose the classroom design and learning methods.

2) Through the comprehensive utilization of text, graphics, audio, video and other media forms in the network teaching, the learners can better remember and understand the creation and cognition of the physical situation.

3) The network teaching has the massive information resources, open, sharing, interconnection and so on. Through the network teaching platform, learners can better develop their own creative thinking and comprehensive quality, but also according to their own interests and hobbies to choose the way of learning, better personalized education.

4) Learners can obtain multi-channel and diversified and multi-level knowledge sources in network teaching, compared to the single classroom teaching and class learning, learners can quickly enrich their knowledge system.

5) Network teaching platform has a variety of convenient communication platform for teachers and students between teachers and students, between students and students to maintain asynchronous or synchronous communication, to better strengthen the exchange of ideas and information.

6) The network teaching platform provides curriculum design platform greatly reduces the workload of teachers. Teachers can easily and quickly develop courses, you can also set up a system of problem creation, results evaluation and other conventional teaching activities. Through the exchange platform, teachers can learn more quickly and directly grasp the situation of the students, the students' answers to the questions.

7) Students in the network teaching platform can customize the interface and learning content according to their preferences, but also to stimulate students' self-learning ability. This kind of personalized service can make students use Web's non-linear presentation way to jump learning. In theory, the network teaching can provide learners with more information, more to meet the individual needs of learners, and to create greater possibilities for cooperative learning. Therefore, the network teaching has the characteristics of contemporary constructivism learning theory. Constructivist learning theory is a kind of teaching theory, which emphasizes the learner as the center, and takes the situation, cooperation, conversation and resources as its basic elements or basic attributes. From the

practical point of view, the network teaching has better flexibility. It strengthens the learners' learning process and is beneficial to learners' long-term memory. The network teaching has better interaction, and it can close the distance between teaching and learning. Network teaching can better save and optimize social resources. Therefore, the development of network teaching is an important reform of traditional teaching, which has important practical significance to improve the teaching effect.
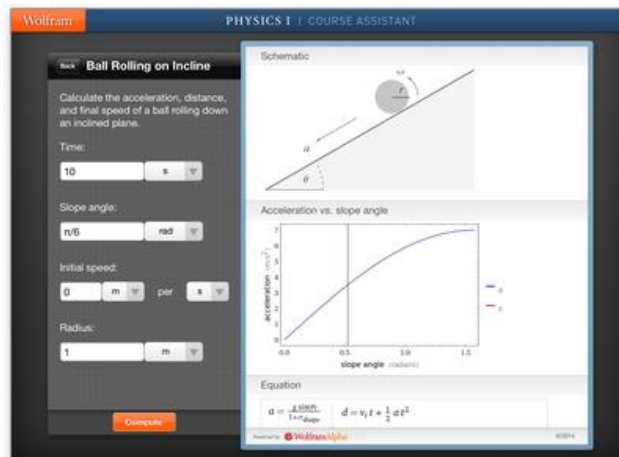

Figure 7. The physical network teaching

4. Physics Curriculum Online Education Mode Innovation

4.1. Online Education Website

At present, the website of Physics Teaching in China is mainly carried out in two ways: the physics teaching website of the third party and the school education information and resources network. In the form of interactive teaching content production, dissemination, download, teaching resources sharing, online learning tools, online counseling, online learning, online testing and automatic marking. Generally speaking, compared with the foreign related interactive learning system, this system has a huge gap in the aspects of design concept, resource organization, advanced content, interesting and rich information. This type of website, most simply resource site, two integration and selection of resources not just react, put on the website by the learner himself to the selection, thus causing the knowledge overflow and information disaster and other issues, the learners cannot in a limited time to choose suitable learning materials, not to mention said with the help of learning materials to obtain knowledge, increase the ability; secondly the lack of reasonable design knowledge navigation system, all kinds of knowledge is just a word, a rough chart, unable to establish knowledge learning process inside, cause students to study the problem of information confusion, indigestion and so on; again, the system basically focus only on a single the direction of knowledge push, and feedback of students' learning, teachers cannot rely on feedback on students' learning outcomes to assess the current work The current focus, adjust teaching plan timely and appropriate; finally, the website is the main commercial website, developers only pay attention to the on-line video and then to various types of advertising to attract users to access, instead of knowledge itself on the internal logic of the network, learning psychology and other key issues and not given enough attention, which leads to the system while in the continuous on-line however, the results have little effect.

Accumulation of physics teaching websites abroad successfully rooted in its years of network technology in-depth study of learning psychology theory, to provide professional,

interesting and easy to accept learning materials for students at the same time, pay more attention to the inherent logic of knowledge itself, actively mobilize the enthusiasm of students, and play its own imagination, interactive participation in the learning process through the mouse and keyboard, complete virtual experiment, helping students to deepen physics basic laws, basic theorems, basic logic control.
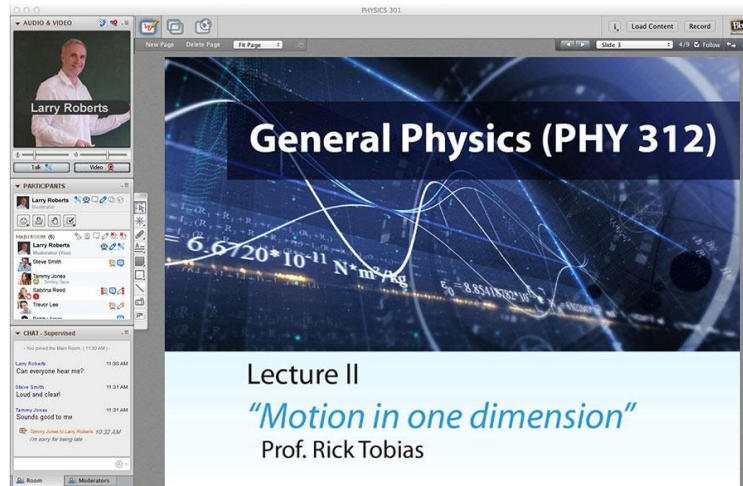

Figure 8. Physics teaching website

4.2. Specific teaching function module

This is online learning network platform design for the current junior middle school daily teaching activities in the business needs and development, make full use of the computer system in the multimedia interactive learning, curriculum resources, complex information system management, uninterrupted work, *etc.*, for students and teachers to provide curriculum information, off-line teaching, online learning, network courseware browsing, online FAQ, multimedia learning resources display, online testing and other functions. 2 based on the constructive learning theory, to fully mobilize the students' interest in participation, we can supplement the traditional teaching mode. The design of network teaching platform architecture physical network teaching platform follow the general, including online classroom and online testing, teaching management, thinking training, real-time platform for communication and discussion, even can provide space for the users of personal blog.

However, physics as an experimental and applied natural science, according to its teaching content and analysis of the characteristics of the subject, the physical network platform should also have some unique template needs. In order to meet learners' curiosity and more convenient to choose their own learning content, we in the physical platform of the physics basic knowledge and application of knowledge template, the template for the planning and design of laboratory research

(1) Course learning system: Students in the learning section can be based on their own learning progress to facilitate the discovery of knowledge points and learning. Students can also through the bulletin board to understand the teacher's teaching arrangement or layout of the work, and then find the corresponding courseware to complete the work or study. The system will automatically record the students' learning history, and the node stored in each landing after the exit, so that it is convenient for students to understand their own learning process, when the need to understand the lesson a few days ago when the knowledge or by learning history to quickly locate a learning position.

(2) Online test system: The system mainly provides self testing, self testing section and online examination after several test form. Chapter is chapter test made by self testing in

the teacher upload end of a chapter of the courseware, can send through the form of notice to inform the students to finish the test within a specified time to submit. After the self testing provides the system in each chapter after the end of the courseware, courseware mainly emphasizes the knowledge point, so that students in a day watching online courseware, review in time to the class knowledge, deepen the impression.

(3) online question answering system: The platform provides two forms of answering questions, one is based on the online real-time communication platform, and the other is the message board. Communication platform similar to QQ communication tools, this form can facilitate students to communicate directly with the instructor. The other is that when the teacher is not online, the students can be described through the message of the problem when the problem is described clearly and submitted, you can also ask for help or discussion of the students and teachers.

(4) Job management system: Job management module for middle school teachers can work in the online platform announcement arrangement and notice the students within the prescribed period of time to complete and submit to the teacher, and the teacher can check the student completion and give feedback.

(5) Resource management subsystem: Network learning platform generally contains a large number of teaching resources need to be managed, including electronic materials, video, audio, images, text, office documents, all kinds of 3D models, falsh, etc.. Therefore, it is necessary to design special components to maintain data.

(6) System management: Any IT system will develop the corresponding background management system, it works behind the scenes to provide various types of services for the system, the general will assign a number of levels of management authority to the user. Log on to complete the corresponding functions of the work. The basic features include system maintenance, parameter setting, data backup and recovery, data security and integrity; divide the system role, add the corresponding user access permissions for user roles and role assignment for access and control rights; record user access record.
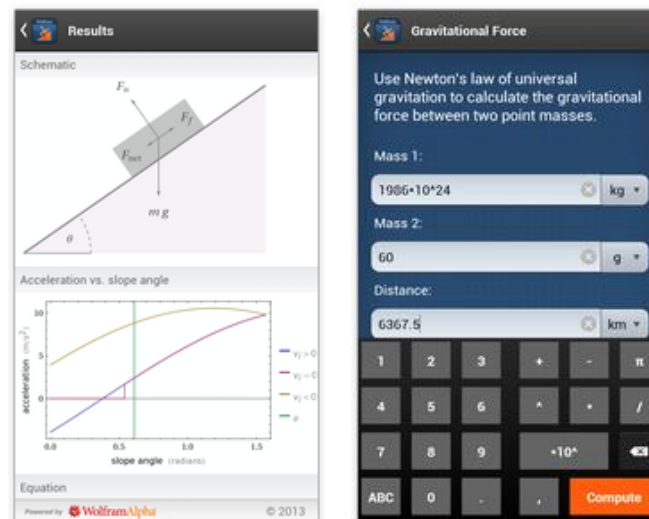

Figure 9. Course learning system

5. Conclusions

Driven by the trend of MOOC, college entrance examination and high tuition fees will no longer be a necessary condition for higher education, higher education will be free or very low cost of public goods, which will largely eliminate the digital divide. Using their

own advantages, we should vigorously develop the Chinese MOOC courses, high-quality courses to attract a large number of student registration, so that they will become a member of the future super university. Course should be free, after a large number of registered students, and then consider profit. With the improvement of network infrastructure, network teaching as a new teaching means, make full use of the latest computer technology, network technology, multimedia technology, teaching materials show more and more flexible and vivid, so that teaching can break the limits of time and space, with great flexibility and interactivity, is the most powerful tool for students' autonomous learning support model under the guidance of teachers, so the excellent network teaching is of great practical significance to improve the teaching effect.

Acknowledgments

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