Design and Development of Mobile Learning Platform Based on Android for College Physics Experiment Courses

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ABSTRACT

Under the background of "Internet + Education", the educational APP is explored and designed. This paper uses the literature method, the questionnaire survey method and combines with the actual development process to design the Physics Experiment Station APP for University of Science and Technology of Liaoning, and describes the core components, techniques and designs principles of each function module, in order to promote teaching of college physics experiment and make some contributions to the educational APP development.

INTRODUCTION

With the development of communication technology and network technology, mobile learning as a new way of education is attracting more and more attention. With its flexible learning time, short learning content, refining and fragmentation, it opens up a new concept of learning, allowing learners to really get rid of the constraints of time and space, so that any person is possible to learn anytime and anywhere according to their needs [1].

University physics experiment is a basic course which can cultivate students' basic experiment skills and enhance students' practical ability of application [2]. At present, the teaching methods of college physics experiment course are single and boring. Since the classroom teaching hours and teachers' teaching energy are
limited, they are unable to meet each student's individual learning needs [3]. To improve this single teaching mode, at the first stage, questionnaires were investigated in the students of University of Science and Technology Liaoning about their attitude, suggestions and functional requirements towards college physics experiment APP. And then we use the statistical data analysis to guide the actual design and development of the physical experiment station APP. The mobile learning platform integrates experimental courseware, teaching video, exercises and resources, so that students can better complete the experiment [4].

**DESIGN OF MOBILE LEARNING PLATFORM FUNCTION MODULE**

The mobile learning platform includes two parts: client and server. The client module is analyzed and designed in detail, and the implementation effect is given as shown in Figure 1.

**User Login Module**

Here design two landing methods: student ID login and registered account login. One is to directly use the student ID plus the initial password to log in, change the password after login, and the other is registered account login first and then bind the student ID. The user information is saved locally during login, so that app can be directly entered into the main activity by reading the local user information to optimize the user experience. After login, users need to improve personal basic information, such as college, specialty, class, gender, age, motto, avatar, nickname, etc. This information can then be modified in the "Me" module.

![Figure 1. Design of mobile learning platform function module.](image-url)
**The Main Activity**

The main activity is the current popular APP design similar to WeChat’s one activity plus three fragments form. The three fragments correspond to the ‘Message’, ‘Experiment’, ‘Me’ three major functional modules.

**Message Module**

Message module is mainly used for students’ discussion on the experimental problems. With no limitations to professional classes, any students can interact and push the centralized and unsolved problems to teacher to explain in class.

**Experiment Module**

The experimental module uses Expandable ListView components, the first level list shows the name of each experiment, the second level list shows the specific content of the experiment, mainly including exercises, courseware, teaching video, data processing four small modules.

Exercises Function module is similar to the Chinese University of MOOC APP answer form, using Radio Group and Radio Button components from the database to obtain the questions. There are two ways to change questions, one is to use the bottom of the ‘previous question’ and ‘next question’ button, and the other is the use of View Flipper and Gesture Detector left and right sliding the screen. When the answer is completed, clicking the submit button, the answer will be submitted to the server and compared with the database answer to calculate the results and returned to the client to display the score in the form of Alert Dialog dialogbox.

Courseware module is realized by using WebView component to load Html5 page link. Teaching video module can be uploaded to the web site through the FTP server, through the Video View components directly broadcast on the APP or jump to the phone player to achieve.

The data processing module has different experimental requirements, and it should be designed according to the specific experiment. The advantage of this module is that it can make use of APP's powerful computing power and graphic display ability.

**‘Me’ Module**

In addition to modifying personal information, the "Me" module can also check for updates of the APP, contact the developer, personalize settings (such as font size, night mode, etc.), and logout.
REALIZATION OF THE FUNCTION MOBILE LEARNING PLATFORM

System Development Environment

Development language: JAVA
Development Tools: Android Studio 2.2.2, jdk1.8.0_121.

Android Development Environment to Build

Follow these steps: JDK Installation → Android Studio Installation → Android SDK Installation → Create AVD.

Codes to Realize Teaching Video Module

// the link of video Uri
Uri uri=Uri.parse("cyj.lnkjdx.com/qcdp.mp4");
// Use the phone’s built-in player to play the video on the link
Intent video=new Intent(Intent.ACTION_VIEW);
    video.setDataAndType(uri,"video/mp4");
    startActivity(video);

The Main Codes to Achieve the Main Menu at the Bottom of the Main Activity

The main code for the bottom navigation menu to achieve of the main activity
Implementation process: Layout -> Initialization -> Instantiation -> Create tab page.

The code to create tab page implementation:

//tabHost is tan instantiated tabHost component’s name
//Create and add the first tab page: the message page
TabHost.TabSpec tab1 = tabHost.newTabSpec("tab1")
    .setIndicator("Message")
    .setContent(R.id.tab01);
    tabHost.addTab(tab1);
//Create and add a second tab page: Experiments page
TabHost.TabSpec tab2 = tabHost.newTabSpec("tab2")
    .setIndicator("Experiments")
    .setContent(R.id.tab02);
    tabHost.addTab(tab2);
//Create and add a second tab page: “I” page
TabHost.TabSpec tab3 = tabHost.newTabSpec("tab3")
    .setIndicator("I")
    .setContent(R.id.tab03);
    tabHost.addTab(tab3);
CONCLUSIONS AND RECOMMENDATIONS

This paper takes the university physics experiment as an example, studies the mobile learning platform, puts forward the design principle of the platform, the key technology of the design and implementation of the function module, the purpose is to explore the best combination of modern mobile communication technology and university physics experiment learning. Through the survey found that the APP mobile learning platform based on mobile terminal "Physics Experiment Station For University of Science and Technology of Liaoning" popular among students, it not only can stimulate students' interest in learning, improve learning results, but also can make the teacher's teaching more convenient and efficient [5]. Educational APP can break the restrictions of time and space, making fragmentation time learning and lifelong learning possible [6]. Colleges and universities can develop high-quality teaching APP with their own characteristics according to their actual teaching situation, providing diversified learning methods for students, and enabling more students to love learning.

With the development of mobile Internet, mobile online education is developing rapidly under the increasingly strong market demand, with the emergence of a large number of educational APP as a symbol [7]. The learning method of mobile platform is attracting more and more attention because of its content, form and content. Mobile learning, based on digital learning, combines mobile computing technology effectively and brings new feelings for learners to learn independently anytime and anywhere. It is considered as a new learning model in the future, and more precisely, it is an indispensable learning way in the future [8], providing diversified learning methods for students, and enabling more students to love learning.

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