Teaching Reform Practice of "Mobile Application Development" Course

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Abstract: "Mobile Application Development" is a professional course offered by computer science, which aims to let students master the development capabilities of Android applications. In view of the problems existing in the current curriculum system, such as the derailment of the teaching content, the teaching method is single, the research and learning content cannot be deepened, etc. This paper formulates teaching reform through the use of online and offline dual-platform, the introduction of curriculum ideological and political, the introduction of real project cases in the course, the use of 1 + X assessment form, so that ultimately achieve a good results-oriented teaching effect.

1. Introduction

1.1 Course Nature

The purpose of the "Mobile Application Development" course is to let students master the basic features, basic processes, and methods of Android program development. Let them independently complete the construction of the Android development environment, use the Android Studio development tools, combined with the layout, controls and JAVA knowledge to complete the development of the program, on this basis to master the life cycle of the activity, broadcast mechanism, HTTP protocol, etc., know how to use Sqlite Complete local database creation and data entry[1].

1.2 Existing Problems

Nowadays, with the rapid development of information technology, various kinds of information-based teaching methods have emerged in endlessly. Traditional offline teaching is facing the dilemma of insufficient class hours, single teaching mode and no extension after class[2]. At the same time, the integration of Ideological and political education into curriculum content to guide students' correct value is also a key point of curriculum reform in recent years. The teaching reform centered on students is also facing great challenges and changes[3].

2. Main Contents of Teaching Reform

2.1 Reform of Teaching Content

Through the teaching mode of online and offline dual platform in Table 1, on the one hand, it makes up for the dilemma of the original class time. On the other hand, under the condition of ensuring the integrity of the course content, the online course with 28 hours is extended and deepened on the basis of the original knowledge, which not only expands the course content, but also adjusts individual knowledge, making full use of the different characteristics of online and offline[4]. Different knowledge points are divided into different teaching methods. In principle, some partial theoretical knowledge points are put online so that students can preview and self-study in advance after class, while partial operational knowledge points are more practicing and learning online. The final lottery program and face recognition are also adapted to teaching through real cases, in order to make a qualitative leap in students' mobile application development ability[5].

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Table 1 Comparison before and after the reform of teaching content

Before the reform		After the reform			
		Offline teaching		Online teaching	
Content	Class hour	Content	Class hour	Content	Class hour
1. Android introduction 1.1 Android development history 1.2 Environment setup and configuration of Android 1.3 Use of Android Studio	4	1. Android introduction 1.1 JDK and SDK installation configuration 1.2 Environment setup and configuration of Android 1.3 Use of Android Studio	4	Android development history Console information view Troubleshooting analysis	2
2.Activity 2.1 Creation and configuration of Activity 2.2 Use of Toast and Menu 2.3 Intent 2.4 Lifecycle of Activity 2.5 startup mode of Activity	10	2.Activity 2.1 Creation and configuration of Activaty 2.2 Use of Toast and Menu 2.3 Intent 2.4 Simple use of fragments 2.5 Dynamically add fragments	10	Lifecycle of Activity Startup mode of Activity Lifecycle of Fragment	4
3.UI 3.1 Use of common controls 3.2 Layout 3.3 ListView	8	3.UI 3.1 Use of common controls 3.2 Layout 3.3 ListView	8	build.gradle Configuration file Use of RecyclerView	4
4.Broadcast 4.1 Static broadcast 4.2 Dynamic broadcast 4.3 Send and receive broadcast	4	4. Broadcast 4.1 Send and receive broadcast 4.2 Truncate broadcast 4.3 Local broadcast	4	Static broadcast Dynamic broadcast Standard and ordered broadcast	4
5. Network technology 5.1WebView 5.2 Http protocol 5.3 Parsing network transfer text	8	5. Network technology 5.1 Http portocol 5.2 Okhttp 5.3 Parsing network transfer text	4	WebView JSON Text parsing	2
6. Data storage technology 6.1 File storage 6.2 SharePreference 6.3 SQLite Database storage	8	6. Data storage technology 6.1 SharePreference 6.2 SQLite Database storag 6.3 LitePal Operation database	8	File storage Generate an officially signed APK file Publish the app	4
7. Content provider 7.1 Running Permissions 7.2 Content provides its creation 7.3 Cross-program data sharing	6	7. Content provider 7.1 Running Permissions 7.2 Content provides its creation 7.3 Cross-program data sharing	6	Actual combat Lottery applet Face recognition application	8

2.2 Introducing Ideological and Political Education into Course Contents

The core idea of the curriculum ideology is to regard morality as the fundamental task of education. Transforming traditional knowledge capabilities into values that lead knowledge and capacity building. Decompose the various modules of the teaching content, guide students to establish the

correct values, and thus transform into personal abilities[6].

Table 2 illustrates the integration of curriculum and thought into the syllabus of the curriculum, from the content to lead knowledge and ability structure, and further refined to the top-level values. The chapter on activities in the mobile application development course is the starting point for learning, which determines the attitude of the course to a certain extent[7]. The learning of this chapter requires a very strict attitude. Because it combines elements such as the registry and layout in the traditional concept of classes, the entire code setup and writing will become more cumbersome. Some bad writing habits of students in the code are not conducive to becoming an excellent programmer in the future. An excellent programmer should write code in a clear format, have a standardized naming, and make notes simple and easy to understand to serve others. Therefore, the combination of chapter content and ideological and political education in the course will influence students imperceptibly. Teach them some qualities that a highly accomplished programmer should possess, so as to achieve the goal of Ideological and political courses. Classroom teaching is not only the transmission of book content but also the subtle effect of cultivating morality and cultivating high-quality college students in the new era[8].

Table 2 Part of the syllabus

Teaching Content	Knowledge	Ability	Values
1. Active Activity	1.1 Characteristics of activities 1.2 Application of Activities 1.3 Jump of activity	Ability to create and configure activities Using activities to develop mobile programs	From code writing norms to remarks, students develop a careful attitude and serve others' good character
2.Content provider	2.1 The meaning of the content provider 2.2 The importance of running permissions	Implement cross-program data sharing Assign different permissions to different programs	To cultivate students' healthy, honest and trustworthy character through the authority of the program and the security of data sharing

2.3 Drive from the project, the task leads the real case teaching

At present, there is a bottleneck in the classroom of mobile application development, that is, rationality is greater than reality. The so-called learning only stays at the stage of arguing on paper, and knowledge can not be transformed into practical ability[9]. Although there are practical and experimental courses to assist, but the lack of a real trial environment, so the effect is still unsatisfactory.

Table 3 Items/Tasks/Contents List

Project name	Task	Content
Mobile lottery program	Preparation in advance	1. Requirement analysis
		2. Functional Structural Diagram
		3. Relevant research and literature reading
	Work Development	1. Interface Design
		2. Database Design
		3. Functional realization
	Code testing	1. Database Connection Test
		2. Functional testing
		3. Generation and Installation of APK File
	Software copyright	Application for Software Copyright
	Take part in the competition	Shanghai Application Competition

As shown in Table 3, through the guidance of real projects, the tasks are decomposed and

transformed into actual content, and the results are taken as the guide, which truly integrates the curriculum system and greatly improves the teaching effect of the classroom. The mobile lottery program in the table is developed by a team formed by students and guided by teachers, so as to develop real cases. As shown in Figure 1, students need to complete various kinds of research and needs analysis in the early stage. After setting the goal, they begin to develop their works. In this process, they need a lot of data to read and self-study experiments, which is very helpful for them to transform traditional knowledge into practical ability and achieve the real expected teaching effect. In addition, the students also applied for the Software Copyright and the second prize of Shanghai Applied Ability Competition. This project-driven curriculum system not only greatly improves students' professional level in knowledge ability, but also trains their social practice ability in the follow-up tasks.

Figure 1 Mobile lottery program

2.4 Phased assessment in 1+X

The concept of " Fate is determined by one examination" is being rejected. It is more humane and reasonable to carry out the phased assessment in the way of 1 + X. Here, 1 refers to the final examination, accounting for 40% of the total assessment results. It is mainly based on the requirements of the curriculum syllabus, using the theory plus computer model to systematically and comprehensively test the content of the whole semester for students. X is divided into three parts: X1, X2 and X3. X1, which refer to experiments accounting for 20% of the total score. There are three classroom experiments throughout the course, which correspond to the three chapters of UI, database storage and content provider. On the one hand, the original intention of this design is that the contents of these three chapters are more operable. On the other hand, it can also cultivate students' synergy ability, practical ability, inquiry ability through experiments, so that the ways of assessment are more diverse and vivid. X2 refers to the stage theory test. The original purpose of the design is to enable students to grasp the theoretical knowledge of mobile application development more steadily and firmly. Although the final result of this course is to fall on practical ability, theoretical knowledge is an indispensable part of cultivating practical ability. All teaching contents and teaching arrangements are logical. Without a clear theoretical system, the latter practice will only appear disorderly and chaotic. X3 refers to the periodic computer examination which accounts for 20% of the total score. X3 refers to the phased computer test of the network technology chapter, which accounts for 20% of the total evaluation results. The reason is that the content of the network technology chapter involves server construction, network text analysis, data capture and crawling, etc. The content of the examination is relatively large, which is too large as the experimental content. Therefore, according to the characteristics of the computer test, it can interpolate the knowledge content of the UI, activities and other chapters, so as to make the test fuller.

3. Contrast of teaching effect

3.1 Teaching Objectives

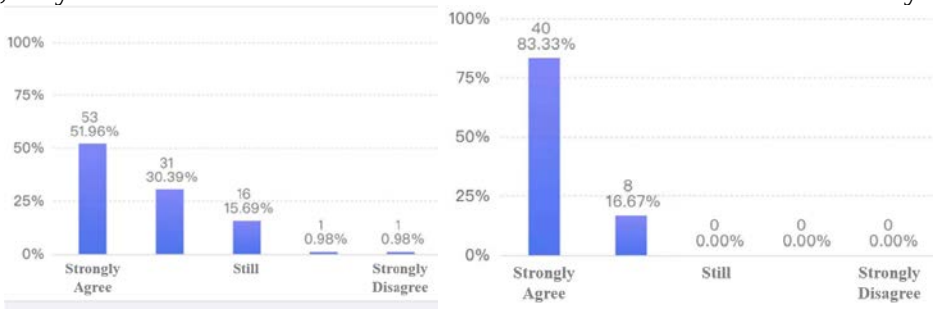
Table 4 shows that, according to the six teaching objectives embodied in the syllabus, after one semester of curriculum reform, there has been a significant improvement, and the average achievement has increased by about 15%. Among them, the target index of autonomous learning and software development has increased by more than 20%, which shows that the project-driven teaching mode combined with online teaching means has a good role in promoting and strengthening students' self-learning ability and software development ability. However, the improvement of team division and collaboration ability is relatively weak. In order to cooperate with the concept of software development team in the later stage, it is necessary to strengthen their collaboration ability and the autonomy of team managers, which can not rely too much on the guidance of teachers[10].

Table 4 Comparison of teaching objectives

Teaching objectives	Before reforming	After reforming
Learning API Documents Independently and Learning Practice Cases Independently	56.2%	78.4%
Master basic mobile application development skills and be proficient in IDE	70.6%	82.2%
Master the architecture of android development and be familiar with the entire development process	53.4%	72.4%
Independent operation, master the most basic software development and production	58.6%	70.8%
Conduct the practice as a team, and develop the ability to cooperate and the ability to solve problems on their own.	66%	72.8%
From the previous functional requirements analysis, to the mid-term design, to the final software development	55.7%	76.2%

3.2 Contrast of Students' satisfaction with Teaching

Students' teaching satisfaction is scored through the platform of teaching quality management combined with relevant questionnaires every semester. These problems mainly cover ten aspects such as teachers' teaching ability, curriculum design, students' self-evaluation and learning status. To a certain extent, they can reflect students' satisfaction with the whole course in a timely manner.



(a) Pre-reform satisfaction survey (b) Post-reform satisfaction survey

Figure 2 Results

According to the comparison of the histogram data in Figure 2 (a) and (b), after the implementation of the teaching reform, the overall satisfaction of the students in the course has been greatly improved. After the curriculum system is full, it can motivate students' learning enthusiasm and learning autonomy. About 83% of the students are very satisfied with the reformed teaching mode. The multi-line teaching mode not only does not bring extra negative pressure to the students, but also further strengthens the students' thinking about the curriculum. Compared with the single dull output teaching in the past, the effect after the teaching reform is obvious. In addition, about 17%

of the students chose to agree because they doubted their personal abilities and were not satisfied with their personal self-confidence and practical work. This is due to the attributes of mobile application development course, which is a professional course based on object-oriented programming. The weakness of JAVA language learning in the early stage will also lead to the weakening of this course. Therefore, consideration for students with poor foundation should be added in the follow-up of the curriculum reform.

4. Conclusion

Through online and offline hybrid teaching mode, integration of curriculum ideological and political, project-driven, results-oriented and other methods to promote the teaching reform of mobile application development curriculum. It plays a good role in promoting students' interest in learning, cultivating their moral qualities and achieving the teaching objectives.

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