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A Discussion on the Practical Teaching Reform of Intelligent Mobile Terminal Technology Course

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Abstract: In this intelligent era, there is a high market demand for professional engineering talents in the computer industry. Based on engineering education accreditation, this paper briefly discusses the practical teaching reform of the intelligent mobile terminal technology course, which involves integrating theory with practical, taking students as the center, focusing on practical teaching, strengthening students' practical skills and computer application development skills, as well as promoting the construction and development of engineering accreditation.

Keywords: New engineering; Engineering education professional certification; Intelligent mobile terminal technology; Practical teaching; Curriculum reform

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1. Introduction

A new round of scientific and technological revolution and industrial change is being ushered in by artificial intelligence, fifth generation (5G) big data, and other new information technologies. These innovations are changing how people work and live while also advancing human society into an era of intelligence. In light of the current situation, colleges and universities are now required to cultivate a large number of new engineering talents who are capable and have high caliber. Under the new engineering background, colleges and universities have conducted a great deal of research on the cultivation of high-quality compound new talents with engineering skills and innovation ability [1-3].

In recent years, new computer majors such as digital media technology, the internet of things, artificial intelligence, and big data have emerged in major universities, and many new disciplines have been included in the curriculum system [4-6]. As an emerging discipline, the intelligent mobile terminal technology course is a professional practical course in computer science, which has an influence on student' future choice of Android application development for entrepreneurship and employment. It is evident that for this practical course, the traditional teaching method based on theoretical teaching, supplemented by practical teaching is not suitable for cultivating and improving the students' application and innovation abilities. Moreover, a theoretical exam alone cannot truly measure students' technical proficiency, much less inspiring them to demonstrate their capacity for innovation. Therefore, this paper takes the engineering education professional certification as the starting point, and on the basis of theoretical teaching, practical teaching methods are employed to familiarize students with application development methods and computer system analysis and design, as well as cultivate their innovative consciousness and innovation ability, so as to improve the professional quality of students as IT technology talents to meet the social market demand.

2. Teaching objectives

In order to meet the needs of talent growth in the social market, it is necessary to cultivate professional compound computer talents with good computer skills that would enable them to engage in such application and development work in the computer industry as well as a certain degree of innovative spirit and entrepreneurial consciousness, so as to meet the needs of social and economic development [7]. According to professional accreditation standards, the prerequisites for graduation comprise 12 key indicators based on the engineering education accreditation's results-oriented education concept. **Table 1** shows the corresponding matrix of the specific teaching objectives of the course to the graduation requirements.

Table 1. The corresponding matrix of the teaching objectives to the graduation requirements

Graduation requirements	Indicators	Teaching objectives
Knowledge	Master the basic theories and core knowledge of Java programming language, computer network, and operating system.	Curriculum objectives 1, 2
Ability	Having the abilities to solve complex engineering problems, develop simple applications, innovate, and work in a team.	Curriculum objectives 2, 3, 4
Quality	Having correct values, outlook on life, and world outlook; having dedication and a cooperative spirit, so as to realize the integration of computer and art in product design.	Curriculum objectives 1, 2, 3, 4

Through intelligent mobile terminal technology courses, students can grasp the general idea of the Android Studio platform and its applications, acquire core knowledge, learn the fundamentals of application development, master environment construction, control properties, and usage in the development process; and eventually master the complete Android software development process and technical architecture method on a case basis. This course emphasizes on the student-centered training concept and has four curriculum objectives.

(1) Curriculum objective 1: master the construction of the development environment, the basic structure of application programs, the application of interface components, internet application programming, database access, and system services; able to develop simple application programs.
(2) Curriculum objective 2: understand the essence of Android application development, improve one's development skills, and master the technical difficulties in the design and application development of mobile internet systems.
(3) Curriculum objective 3: simulate real project development and master practical testing and debugging technology through engineering cases.
(4) Curriculum objective 4: master the scientific division of labor and teamwork by completing curriculum cases.

The teaching is carried out based on the human training program design course syllabus, while experiments and knowledge points are designed and distributed, respectively, based on the curriculum objectives. **Table 2** shows the class hours assigned to each course content and its corresponding curriculum objectives.

Table 2. Time distribution of course contents

Content of courses	Class hour assignment		Cultivation objectives
	Theory	Practical	
(1) Android overview	2	0	Curriculum objectives 1
(2) Android Studio environment construction	2	2	Curriculum objectives 1
(3) Layout	4	4	Curriculum objectives 1, 2
(4) UI control	4	6	Curriculum objectives 1, 2
(5) Data storage	4	4	Curriculum objectives 1, 2
(6) Activity module	4	2	Curriculum objectives 1, 2
(7) Multithreading and UI communication	4	4	Curriculum objectives 1, 2
(8) Broadcast	4	4	Curriculum objectives 1
(9) Android online	2	2	Curriculum objectives 1, 2, 3
(10) Comprehensive examples	2	4	Curriculum objectives 1, 2, 3, 4
Total	32	32	Curriculum objectives 1, 2, 3, 4

3. Student-centered practical teaching reform

Other than being limited to classroom teaching, the traditional teaching method is teacher-centered, and there are fixed teaching materials for it. Despite the addition of new teaching methods, the fact that teachers are still the ones who impart knowledge to students remains unchanged. As a result, students find it difficult to express their enthusiasm, initiative, and creativity, and the issues with students who learn poorly and dislike learning have not been completely resolved.

The idea behind the engineering education professional certification highlights the need of placing students as the center of education. As they shift from being passive to active learners, their initiative for learn increases. Teachers engage with students based on their needs and individual differences. They help students improve through case learning. Students are more likely to be self-reliant and develop a habit of lifelong learning. The student-centered practical teaching reform design is shown in **Figure 1**.

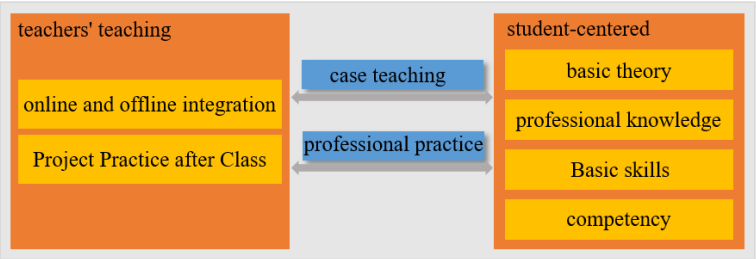

Figure 1. Student-centered practical teaching reform design

3.1. Professional practical teaching reform

Professional certification advocates the student-centered and results-oriented education concept. Professional practical teaching reinforces students' basic theoretical knowledge, deepens their mastery of theoretical learning, and cultivates their innovative consciousness and skills to solve complex engineering problems. In order to ensure that the quality standards of professional certification are met, the intelligent mobile terminal technology course is taken as an example to improve the professional practical teaching.

3.2. Professional practical teaching process

In addition to theoretical teaching, the intelligent mobile terminal technology course has three types of practices: basic practice, expanded practice, and innovative practice. Basic practice involves the setting up

of extracurricular experimental assignments based on relevant knowledge points following the basic theoretical knowledge learned. Knowledge points are practiced through experiments, which would help strengthen students' curriculum knowledge. Expanded practice is a way to expand students' practical skills, improve their innovation ability, and strengthen students' practical skills through extracurricular resources. Innovative practice is based on completing all of the required courses. When paired with the knowledge learned, this allows students to design, analyze, and develop their own applications.

Figure 2 shows the links of practical teaching, from basic practice to expanded practice, and eventually to innovative practice, having a progressive nature. Through this teaching method, students can master and strengthen their knowledge in a gradual way; additionally, the difficulty level gradually increases from simple to difficult. There are certain scoring standards to assess students' knowledge mastery through different methods. The development of students is characterized by personality differences. For students with different knowledge levels, practical teaching links with different levels of difficulties are set. Basic practice is for those with basic general knowledge. In this level, there is no fear among students to learn because of the level of difficulty; hence, they would not lose motivation or confidence in learning, neither are they hindered from achieving the expected learning outcomes. Expanded practice and innovative practice can effectively stimulate students' interest in learning, their learning itself, and also their learning potential. This method fully embodies the student-centered teaching concept and improves the quality of practical teaching.

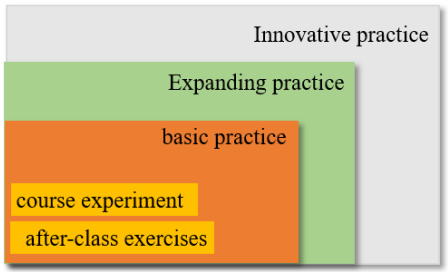

Figure 2. Settings of practical teaching

4. Assessment methods of practical courses

The establishment of a reasonable course assessment mechanism is conducive to stimulating students' learning initiative and enthusiasm. In the course assessment of this discipline, in order to strengthen students' learning initiative and enthusiasm, both the usual performance results and final examination results are considered. The proportion of usual performance results is 40%, while that of the final examination results is 60%. In order to improve students' practical skills, the usual performance results are mainly based on the basic and expanded practice links, comprising of four parts: attendance rate, classroom performance, schoolwork, and extracurricular activities. The final examination results are mainly reflected in the assessment of large-scale assignments based on the performance of innovative practice (**Table 3**).

Table 3. Assessment of the intelligent mobile terminal technology course

	Assessment	
	Usual performance (40%)	**Final examination (60%)**
Practice links	Basic practice + Expanded practice	Innovative practice
Components	Attendance rate	Assignments
	Classroom performance	
	Schoolwork	
	Extracurricular activities	

The intelligent mobile terminal technology course mainly focuses on the curriculum objectives, so its curriculum assessment standards are mainly based on these objectives and students' ability to master knowledge. The scores of major assignments are based on three criteria as shown in **Table 4**.

Table 4. Evaluation standards for the intelligent mobile terminal technology course assignments

Evaluation point	Scoring standards	Score
Point 1	(1) Reasonable specification and aesthetics of project interface design. (2) The use of layout, the comprehensive use of various controls, and the integrity of functions. (3) The project test is normal, and the work design can achieve practical value.	30
Point 2	(1) On the basis of mastering curriculum knowledge, the ability to learn and apply extracurricular knowledge. (2) Based on the difficulty of the project design, the ability to solve complex problems. (3) The project design reflects innovation and the students' innovative thinking ability.	20
Point 3	Students' comprehensive practical ability and whether the project works are contested or applied.	10
Total score		60

After the end of the course, the total score is calculated according to the proportion of the assessment results, and the weak links are taken into consideration, so as to realize the continuous improvement of teaching.

5. Course teaching construction

The intelligent mobile terminal technology course is a practical professional direction course. The course is arranged in the third or fourth semester. The teaching focuses on examining students' computer design ability and programming ability. Computer design ability is manifested in students' design thinking ability and mastery of knowledge, such as basic controls. On the other hand, programming ability is manifested in the overall mastery of Java, data structure, database, computer network, and other professional basic course knowledge. Therefore, in order to promote the construction of course teaching, the construction of practical teaching must be strengthened from the following three points: (1) the training and construction of teachers; (2) the teaching system, cross-disciplinary learning, and integration; (3) curriculum practice and practical training, skills competition, innovation, and entrepreneurship. Under the joint construction of various aspects, students should be encouraged to learn professional skills through the reform of the new practical teaching mode.

5.1. Strengthening the training and construction of teachers

In the construction of course teaching, there are teaching teams and tutorial systems in the course group. These teachers should construct innovative teaching models and methods, introduce typical projects of enterprises and industries, integrate cases into their teaching, explore the reform of modular teaching methods that emphasize on the notion of "one subject and many teachers," promote the curriculum form of "theoretical teaching + case analysis," as well as introduce interdisciplinary, cross-disciplinary, cross-grade learning groups, so as to deepen the reform of innovation and entrepreneurship education. Tutorial systems, on the other hand, can be used to guide students in learning, improve students' learning quality and efficiency, provide professional guidance and guidance services, as well as enhance students' enthusiasm and creativity for entrepreneurship. In addition, a school-enterprise collaborative education mechanism can be developed to improve students' interest in learning, innovation, and entrepreneurship.

5.2. Perfecting the teaching system and improving the integration of various subjects

The intelligent mobile terminal technology course is offered to senior students. It includes important basic courses, such as Java language programming, computer network, and operating system. In addition, the course also focuses on the design aesthetics of development and application. Therefore, students are actively encouraged to form cross-disciplinary and cross-grade learning groups as well as participate in competitions, which would also promote teaching.

5.3. Course practice and practical training, skills competition, innovation, and entrepreneurship

The integration of curriculum practice and practical training, skills competition, innovation, entrepreneurship, resource sharing, mutual promotion, and the improvement of the utilization and effectiveness of practical teaching resources enables students to exercise and improve their own skills, expand and innovate their knowledge, strengthen their practical ability, and enhance their innovation ability, thus improving the quality of graduates for employment.

6. Conclusion

The new engineering construction puts forward new goals and requirements for the cultivation of professional engineering talents. The practical teaching reform of intelligent mobile terminal technology, as a new discipline, is imminent. Under the background of the professional certification, taking students as the center, and focusing on practical teaching as well as stimulating students' enthusiasm and initiative in learning, this paper puts forward the practical teaching reform of the intelligent mobile terminal technology course, which combines practical teaching with practical training, skill competition, innovation, and entrepreneurship to further improve students' practical skills and employment quality. This practical teaching reform has achieved desirable outcomes, which have a certain guiding role and reference significance for the teaching reform of other emerging disciplines in engineering.

Disclosure statement

The authors declare no conflict of interest.

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