Exploration and practice of Graduation Design in Information Security Specialty under the Background of "Emerging Engineering Education"

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Abstract: Graduation design is the key link for the quality and ability training of undergraduates. Its aim is to develop students' ability to apply the theory, knowledge and skills they have learned to solve practical problems. It is of great significance to research and explore ways to improve the quality of graduation design under the background of "Emerging Engineering Education". The paper deeply studies and discusses the methods and measures for the graduation design reform of information security specialty in higher engineering colleges from the source of the topic, guidance model, achievement transformation and process management. That will improve the quality of graduation design and help build a powerful country of higher education.

1. Introduction

Graduation design is an important part of undergraduate practical education. Its main purpose is developing students' ability to solve practical engineering problems using basic theory and professional knowledge. Students master the basic methods of engineering development, improve engineering development capabilities through graduation design. This will lay a solid foundation for their future work or study. In view of the importance of undergraduate graduation design in talent training, I take the information security major of Chengdu University of Information and Technology as an example, and explore and practice the improvement of undergraduate talent training quality in all aspects of the undergraduate graduation design implementation process.

2. The Importance of Undergraduate Graduation Design in Personnel Training

Graduation design is one of the most important practical teaching links in the process of information security professional training. It is not only a comprehensive test of students' knowledge in the early stage, but also an important process for the cultivation of students' scientific research ability and comprehensive quality. The quality of undergraduate graduation design directly affects the quality of undergraduate talent training.

2.1 Graduation design can improve students' engineering practice ability and comprehensive scientific research literacy

In the early stage of undergraduate students majoring in information security, they mainly learn the theoretical knowledge and professional skills related to information security from different knowledge points and directions. Practical courses are offered for a relatively short period of time. And they mainly for some specific courses to complete the corresponding curriculum design, such as Cryptographic Algorithm Programming is a practical course for Applied Cryptography courses. The purpose of this course is to enable students to understand the implementation principles of cryptographic algorithms by designing and implementing cryptographic algorithm program. Graduation design is a comprehensive practice process. Simple cryptographic algorithm implementation cannot be used as a graduation design, but students can apply cryptographic algorithms to solve practical problems, such as designing and developing a file security system. Therefore, graduation design is more focused on the comprehensive application of students'

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theoretical knowledge and professional skills.

Graduation design is equivalent to a scientific research training project. To complete an engineering project that meets the needs of practical applications, students must think about problems and solve problems from the perspective of scientific research workers. After such a concentrated, comprehensive and systematic research and training, it not only enhances students' engineering practice ability, but also cultivates students' perseverance and wisdom to overcome difficulties, rigorous and pragmatic work style and serious scientific attitude. These will lay a solid foundation for their future work and study. Graduation design is a comprehensive summary of what students have learned in university. It is an important process to improve students' engineering practice ability and comprehensive research literacy.

2.2 Graduation design can cultivate students' innovative thinking

Innovative thinking is a kind of creative thinking activity. Psychology believes that innovative thinking ability can be acquired through long-term knowledge accumulation and repeated training. Undergraduate study has opened up the knowledge field of students and enabled them to have extensive knowledge. In the process of graduation design, students constantly discover the connection among various knowledge by integrating and applying these knowledge. And in the process of graduation design, new ideas are formed by constantly discovering problems, solving problems, triggering associations, generating migrations and connections. Finally, these new ideas are used to design and develop novel engineering projects. In the stage of graduation design, through repeated training of knowledge, students transcend the existing knowledge system, and gained knowledge and practical experience beyond the previous cognitive categories, thus effectively improving students' innovative thinking ability.

Therefore, undergraduate graduation design is a very important training process for cultivating students' innovative thinking [1, 2], which is beneficial to cultivate students' innovative thinking.

2.3 Graduation design can effectively improve students' technical writing level

In the process of graduation design, it involves writing the opening report, literature review, foreign language translation, development documents and graduation thesis. The writing of these documents requires students to start from collecting data, conducting in-depth investigation and research. On this basis, the data are classified and analyzed to form a document structure. Then, the content of each part of the document is sorted out, and finally the document is written. In the process of data writing, it is the students' review and summary of the learning and work done in the early stage. It can not only systematically train students' logical thinking ability, but also an important process to train students' writing skills. Therefore, the writing of relevant documents in the graduation design process plays an important role in improving students' written expression ability and their scientific writing level.

3. Exploration and practice of Graduation Design in Information Security Major of Chengdu University of Information Technology

Graduation design plays an important role in the training of undergraduate talents. The work of graduation design mainly includes several important parts, such as topic selection, task assignment, report writing, mid-term examination and graduation reply. However, there are still some shortcomings in the various stages of undergraduate graduation design. Graduation design topics have a single source and are not closely integrated with the practical application of the project. Teachers have limited energy and ability, and they cannot guarantee the comprehensive and in-depth guidance on the graduation design content of all students. Graduation design is not very attractive to students. The management system of graduation design process is imperfect and lacks supervision [3]. Based on the experience accumulated in the implementation of graduation design of information security specialty in our college, this paper discusses the above problems and puts forward corresponding solutions.

3.1 Diversification of undergraduate design topics

Topic selection for graduation design is the basis for students to carry out follow-up work smoothly. The traditional method of topic selection is that the supervisor unilaterally decides the graduation project topic of the students, which has many drawbacks. At present, many universities adopt the two-way selection mode, that is, the graduation design topic can be assigned by the supervisor or can be chosen by the student [4]. Based on the characteristics of information security specialty in our university, our college have added research projects and social (industry) practices to the source of graduation design topics. Students are allowed to extend and convert the content of research projects, practice content, innovation and entrepreneurship training program for college students, and various information security competitions into graduation design topics. This reform has increased the initiative and enthusiasm of students to complete graduation design, and solved the problem that students cannot balance practice, research projects and graduation design [5].

The integration of research projects, competitions and practice that meet the professional requirements into the graduation design, which is not only enriches the diversification of the source of graduation design, but also enables students to better complete the graduation design work under the interest-driven model. That will improve the quality of graduation design.

3.2 Creating multi-dimensional guidance model for graduation design

With the continuous expansion of undergraduate enrollment, the number of students has increased year by year, but the number of teachers has not increased significantly, which will inevitably lead to the supervisor cannot give students sufficient guidance. Moreover, the research direction of the supervisor is limited, and it is impossible to understand various the research fields of information security. Therefore, with the help of lectures by college supervisor, students can have a better understanding of the research direction of the supervisor. Students can choose the supervisors according to their own interests. In addition, the college encourages supervisor to guide the graduation design in a teamwork manner, that is, from the topic selection, task arrangement, guiding students and process inspection, all the links are conducted by means of teamwork. This way of teamwork has concentrated the power of many instructors, which not only broadens the research direction of students, but also enlarges the scope and strength of guidance for students. Team students can also communicate with each other to achieve common progress and enhance the teamwork ability of students.

In addition, the college strengthens cooperation with enterprises and institutions, establishes off-campus practice bases, and introduces out-of-school supervisors, so that in-school supervisors and off-campus supervisors can cooperate to guide students. In this way, students are arranged for engineering projects based on research and production. The graduation design content is closer to actual situation, so that students can change roles as soon as possible.

3.3 Guiding and encouraging students to realize the transformation of graduation design achievements

The results of graduation design are formed through continuous accumulation, precipitation and repeated improvement. After the completion of graduation design, the college displays good works and encourages students to transform the achievements. The supervisor instructs the students to apply for software copyrights and utility model patents according to the graduation design content, and puts the works in APP stores for users to download and use, and cooperates with the enterprise to guide the students to carry out secondary development, so as to realize the transformation of graduation design results.

Through the application, display and transformation of graduation design results, it is not only a summary of graduation design work, but also an incentive for the next graduates to constantly practice and innovate. This will mobilize the initiative and enthusiasm of follow-up students in graduation design. It also improves research ability of students and the quality of undergraduate graduation design.

3.4 Improve management system for graduation design process

Strengthening process management and improving management methods are one of the important ways to improve the quality of graduate graduation design [6]. The process management flow of graduation design in our college is shown in Fig. 1.

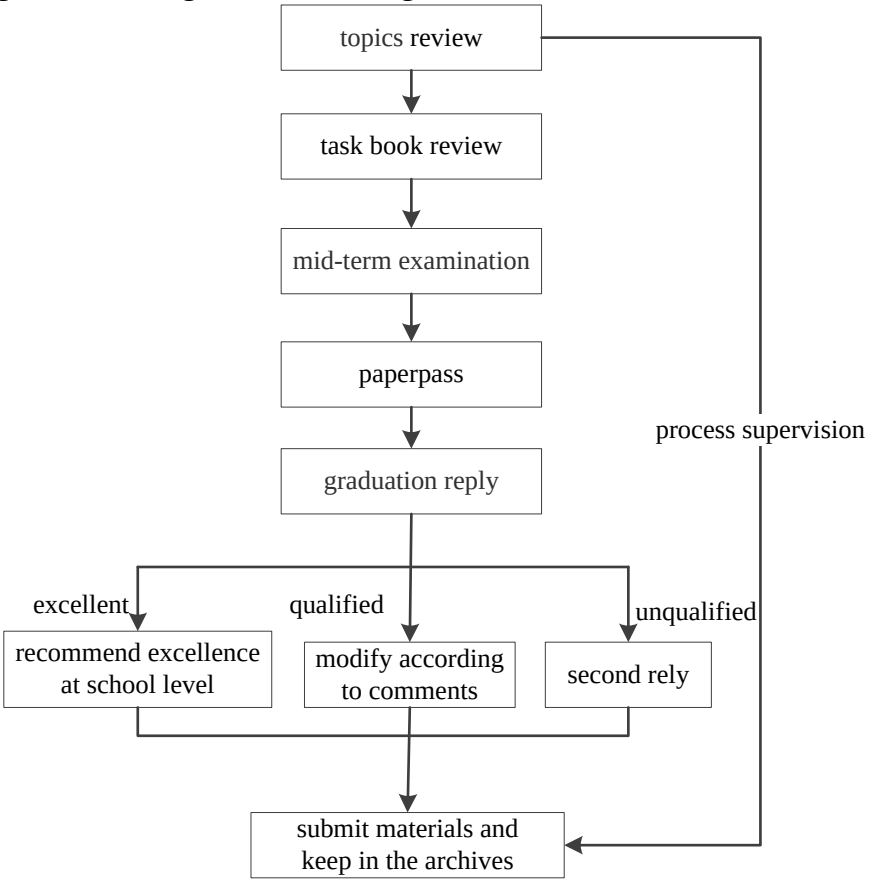

Fig. 1 The process management flow of graduation design in our college

The college supervises the entire process of graduation design. In the initial stage of graduation design, the college will review the topics and task books to ensure the quality of graduation design. In the process of graduation design, the college organized two code checking to ensure the originality of graduation design, and also to supervise the completion of graduation design. Before rely, the college checks all the graduation thesis of students, and the repetition rate of the paper is no more than 15%. Furthermore, the college requires students and teachers to record the guiding process to ensure that the instructor supervises and adequately guides the students throughout the graduation design. For the graduation design with long cycle, many links and complicated process, improving the management system is the basis to ensure smooth operation of graduation design.

4. Conclusion

Graduation design is an important practice link in undergraduate education. It is an important part of the construction of “Emerging Engineering Education”. Graduation design helps students to comprehensively apply and innovate on the basis of the current knowledge system. It lays a foundation for students to smoothly move to work, and it is of great significance to improve the quality of undergraduate talent training.

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