

A Quality Assurance System of Graduation Design (Thesis) for Software Engineering Major of Applied Undergraduate Based on OBE

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Abstract—Graduation design (thesis) is a crucial section for practical teaching to achieve the training objective of application-oriented talents. The research is based on the concept of Outcomes Based Education (OBE) and taking the software engineering major of Anhui Sanlian University as an example, this study is devoted to the construction of a feasible quality assurance system of graduation design (thesis) from the perspective of process management in the context of OBE. Furthermore, further work is put forward to promote the development of the quality assurance system of graduation design (thesis).

Keywords—graduation design(thesis); quality assurance; software engineering; process management; OBE

I. INTRODUCTION

In recent years, on the announcement that issued by the Ministry of Education of China, graduation design (thesis) was clearly mentioned as one of the five outstanding issues in the key areas, which requiring universities to take effective measures to ensure the quality of the thesis for undergraduate

graduates. The undergraduate thesis training is the primary comprehensive practical teaching in the undergraduate training program, and achieving its teaching target is the key task to achieve professional training requirements [1]. Therefore, the undergraduate graduation design (thesis) of universities is a crucial factor in undergraduate talent training for the graduation requirements and achieves the professional talent training targets. However, the quality of undergraduate graduation design (thesis) was continued to decline in recent years and has been criticized [2]. On the other hand, the graduation thesis has become more and more formal that cannot be combined with actual engineering projects for application. The target of talent training for a certain major in a local university cannot be connected with the talent requirement of local enterprises seamlessly, and the assessment of the graduation design (thesis) cannot be supported effectively by the society's requirements for graduates of this major. As the most crucial practical section in undergraduate teaching, the content of the graduation design is not closely related to the target of talent training for the major. The management and monitoring process of the graduation design became a mere formality. The internship

with graduation design and the content of the graduation are not well connected, and the quality of the graduation thesis is underdeveloped. Conflicts on quality of talent training for higher education in local universities and development of local economic are getting worse.

Under the background of new engineering construction currently, the target of applied talent training in local universities is to serve the local economy and realize the requirements of local enterprises [3]. The phase of graduation design (thesis) in applied universities must be centered as the core requirement of "student's application ability is output". This is completely consistent with the concept of OBE (Outcomes Based Education), and applied talent training must be aimed at students' graduation ability.

This paper devotes to the construction of a quality assurance system of graduation design (thesis) for software engineering major of applied undergraduate based on OBE. The structure of the paper is organized as the following: Section 2 defines the concept of OBE. Section 3 explains how to design this quality assurance system of graduation design (thesis) for applied undergraduate based on OBE. Section 4 is developed to the construction of a feasible quality assurance system of graduation design (thesis) for the software engineering major as a study case of Anhui Sanlian University. Section 5 concludes the paper and puts forward the further work.

II. CONCEPT OF OBE

OBE is an education concept based on education mode of learning outcomes, which requires the outcomes of education. That is to say, "outcomes" should be determined first to clarify the target of students training, and "what kind of students to train" is specified in universities [4].

For the applied software engineering major, it is necessary to determine the target of talent training according to the development of social information technology and local software industry, to cultivate applied engineering and complex talents with scientific and innovative thinking, rich of knowledge, outstanding engineering and practice ability, and lifelong learning ability. Based on the concept of OBE, the most basic requirement for undergraduates of applied software engineering major must be guided by learning outcomes for students, and the graduation requirements are highly accordance with the talent training target [3].

III. A QUALITY ASSURANCE SYSTEM OF GRADUATION DESIGN (THESIS)

In this section, the paper is devoted to establishing of a quality assurance system of graduation design (thesis) based on OBE from the perspective of effective process management, to standardize the management and monitoring on each stages of graduation design (thesis).

A. Management of Title Selection for Graduation Design(Thesis)

Title title selection for graduation design (thesis) is the basis for improving the quality of the graduation thesis, which

determines the engineering value of the courses and talent training. The source and type of titles must be diverse and scientific, and the content of the titles should be consistent with the talent training target on the software engineering major. Production practice should be combined with the key technologies of IT enterprises, which has certain practical significance. Students are allowed to self-selecting titles of hot spots according to their own interests. The template of graduation design (thesis) is shown as Table I.

A title is only for one student and students are encouraged to participate in scientific projects for teachers to complete the graduation design. Mutual selecting for titles between teachers and students is implemented in the management of the graduation design (thesis) selection, and content of graduation design for each title must be reviewed strictly by committee of software major. The process of selection of graduation design (thesis) management is shown as Figure I.

TABLE I. TEMPLATE OF GRADUATION DESIGN (THESIS)

Title	
Source	<input type="checkbox"/> production practice <input type="checkbox"/> scientific project <input type="checkbox"/> self-select
Type	<input type="checkbox"/> academic research <input type="checkbox"/> application research <input type="checkbox"/> discipline competition <input type="checkbox"/> enterprise practice <input type="checkbox"/> social investigation <input type="checkbox"/> others
Reason	Content of significance of title selection, problems to be solved, the relevance of knowledge for software major.

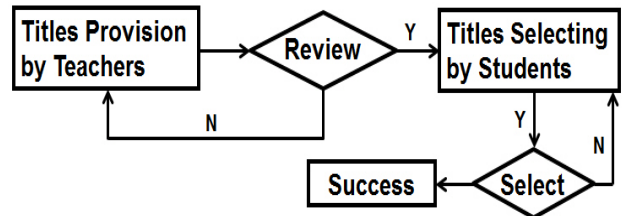


Figure 1. Process of selection of graduation design (thesis) management.

B. Management of Graduation Design(Thesis) Opening Report

Titles for graduation design (thesis) are confirmed by students in this section, scientific and reasonable preparation of titles should be designed by teachers. For one hand, the content of each title of graduation design should be targeted, and the difficulty of implementation is moderate. For the other hand, minimum standard on completion must be included in the preparation of titles, which is shown as Table II. Students are not allowed to changing the content of the preparation of titles without authorization.

Solutions for research problems should be included in opening reports of graduation design (thesis) that should be reviewed, and the content must be consistent with the preparation of the titles. Numbers of references in an opening report should be more than ten and the implementation task is not allowed to lower than minimum standard on completion of graduation design. The main process of management of opening report is shown as Figure II. Existing problems in

opening reports which has passed reviewing must be evaluated and positive advice are also provided by teachers.

TABLE II. MINIMUM STANDARD ON COMPLETION OF GRADUATION DESIGN(THESIS)

Minimum Standard on Completion	
<i>Design of a web system</i>	Design of a prototype of the system, and user data for basic functions of addition, deletion, query and others could be implemented.
<i>Software testing</i>	Test plan, test data and test result could be provided.
<i>Scheme investigation</i>	Scheme investigation is feasible and unique prospect could be provided.
<i>Technology exploration or optimization</i>	Research plan is specific and feasible, contrast effect is presented.
<i>Others</i>

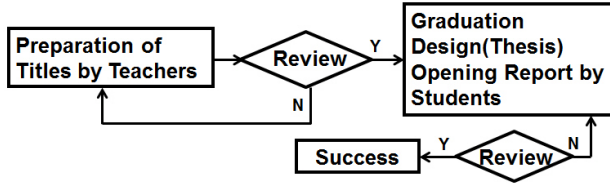


Figure 2. Main process of management of opening report.

C. Management of Guidance on Graduation Design (Thesis)

Teachers provide guidance to students on graduation design no less than once a month, no less than six times during the whole process of graduation design.

For the software engineering major, a dual-mentor guidance mechanism is implemented on campus and off campus (enterprise) which is complementary. Regularly guidance is implemented by instructors which are from enterprise for communication to solve the technology problems [3]. Forms of guidance are required to diversified, such as conference, QQ or WeChat on website, network video, etc. Detailed guidance records must be written by teachers, and is not devoid of content. In addition, students are required to submit interim reports which are reviewed by teachers. For a student, the design tasks which are completed and the problems that are needed to be solved should be described in an interim report.

D. Management of Defense on Graduation Design (Thesis)

In the section of management of defense on graduation design (thesis), after students applied for their defense, for one student's graduation design (thesis), peer review for other teachers is crucial. Figure III demonstrates the process of the defense. At least three questions are put forward by defense committee in actual defense on site, and all the questions must be answered correctly by the student. Answers will be recorded and kept independent by secretary of committee, students who are not pass the reviewing will be delayed on graduation. A template of record defense is shown as Table III.

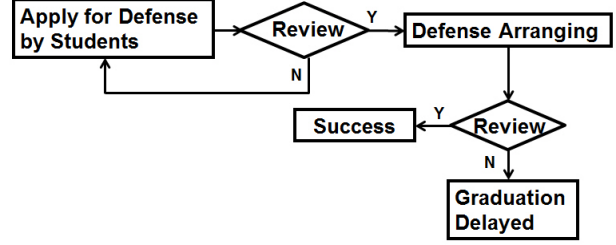


Figure 3. Process of the defense.

E. Management of Filing of Documents on Graduation Design (Thesis)

A process management handbook of graduation design (thesis) for each student is designed to assure standardization of documents, which including documents of title selection, title preparation, opening report, process record of guidance, table of review, table of peer review, table of defense record, etc. All documents must be standardized and saved in form of both in electronic document and paper document for checking, and modifications are not allowed after they have been saved.

IV. APPLICATION

Anhui Sanlian University is a local application-oriented university in the city of Hefei in China and the software engineering major was first set up in year of 2017 to cultivate application-oriented talents for the profession of mobile terminal engineers who are engaged in requirement analysis, designing, coding, testing, maintenance, and management of web software application systems which are based on current mobile terminal platform [5-6].

The establishment of a quality assurance system of graduation design (thesis) based on management processes above since year of 2017. According to the OBE concept to evaluate the high quality and efficiency of learning output, Internet can be used to strengthen the management process of graduation design, and the teaching objectives are realized, the guidance plan can be adjusted timely [7]. Before the end of the third grade, a special graduation design (thesis) committee was set up to determine the number of teachers which are on campus and engineers of enterprise. The number of students for guidance per teacher is defined and a standard process of title selection is established.

Taking the software engineering major as an example, the title selection of graduation design must be centered on the current software development and application of the mobile intelligent terminal platform. Diversifications on types of title are required and all the titles cannot be repeated. Content of graduation design is combined with project development in software enterprises and teachers' scientific research topics. Guidance of the title selection is emphasized, the final guidance of graduation design (thesis) list is determined before the summer vacation [8]. Plagiarism is prohibited, and the content repetition rate of each graduation thesis does not exceed 30%.

Multiple defense groups are set up, which are responsible for defense qualifications of students, the implementation of the defense process, score evaluation, etc.

TABLE III. TEMPLATE OF RECORD OF DEFENSE

Question	Answer	Evaluation	Score	Total
Question 1	Answer 1	Evaluation 1	Score 1	
Question 2	Answer 2	Evaluation 2	Score 2	
Question 3	Answer 3	Evaluation 3	Score 3	
.....	

After the defense for the graduates is completed, academic departments, experts and teaching supervisors of the university are organized to select some of the graduation thesis randomly and evaluate indicators of title selection, opening report, paper structure, literature review, research methods, conclusions, word expression, academic norms, etc. for guidance and standardize graduation design (thesis) next year [8].

V. CONCLUSIONS AND FURTHER WORK

In this paper, a quality assurance system of graduation design (thesis) based on OBE is designed which is composed of five stages and the process is described in each stage. As a study case, the quality assurance system is fully applied of software engineering major of applied undergraduate in Anhui Sanlian University, and the implement and effect are positive.

Graduation design (thesis) is also a comprehensive platform for cultivating students' ability to solve practical problems with theoretical knowledge and innovation and entrepreneurship [9]. For better development of graduation design (thesis) for software engineering major of applied undergraduate under background of OBE, from my own perspective, further work will be done in the future.

A. Investigation on Site in Software Enterprise

OBE is oriented on output, for local universities, the content of graduation design is required to solve the requirements of local economics and software enterprises [3]. For software engineering major of applied undergraduate, Titles of graduation design (thesis) must be accurate and avoid similar to the content of the software engineering course design.

Before selecting a title, a student must visit the local software enterprise to investigate the engineering projects on-site which are related to graduation design in depth. Students' engineering understanding of the content of graduation design will be improved positively.

B. Development of a Local Lightweight Platform of Graduation Design (Thesis)

From the whole process of titles selection to the final of the graduation design (thesis), the time is almost a year. It must be supported by the management information system. For only one major in Anhui Sanlian University, nearly dozens of teachers need to participate in guiding to the graduation thesis for a few hundred students. The work is particularly

miscellaneous and toilsome. Development of a local lightweight platform of graduation design (thesis) whatever based on PC client-side or Android client-side will reduce the complicated manual labor and improve the management process quality. If the construction of the platform can be incorporated into the construction of local smart campus, it will be more conducive to the improvement of OBE.

ACKNOWLEDGMENT

The work was supported by "Project of Quality Engineering of Anhui Province University" under Grant No. 2019jyxm0508, "Project of Quality Engineering of Anhui Province University" under Grant No. 2019jxtd122 and "Excellent Young Talent Support Project of Anhui Province University" under Grant No. gxyq2019138.

As the corresponding author of this paper, I would like to express my heartfelt gratitude to my colleagues of Anhui Sanlian University and the whole authors of the references, which are listed at the end of this paper.

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