

Exploring the Teaching Reform of Dissertation Writing Course for Big Data Majors in the Context of Engineering Education Accreditation

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Abstract

In the context of engineering education accreditation, the thesis writing course for big data majors is an important part of cultivating students' comprehensive ability. This study aims to explore the teaching reform of the thesis writing course for big data majors to adapt to the engineering education accreditation standards and improve the quality of thesis. Through literature review and analysis of teaching practice problems, this paper firstly outlines the basic principles and requirements of engineering education accreditation, and then puts forward specific strategies for teaching reform to optimize the course teaching content, construct a new course teaching system, and improve the diversified assessment and evaluation in view of the characteristics of big data majors. The results of the study show that through these reform measures, students' thesis writing ability and engineering practice ability can be effectively improved.

Keywords

Big Data; Thesis; Dissertation Writing; Curriculum Reforms.

1. Introduction

Engineering education accreditation is an important initiative to deepen the reform of engineering education in China's colleges and universities, and also an important hand to vigorously promote the construction of "new engineering discipline". In recent years, China's universities and colleges have pushed forward the engineering education accreditation work, and explored a new mode of talent cultivation by starting from the curriculum and projects. Yu H [1], Cui X [2], Yuan G [3], etc. From the perspective of engineering education accreditation to see the reform of the curriculum and practice, the curriculum reform and practice, through the optimization of reorganization of course content, updating the teaching mode, reforming the curriculum evaluation methods, promoting the cultivation of new engineering talents, and being able to integrate the policies, laws and regulations, standards, guidelines, and the construction of "new engineering disciplines" into the curriculum. , laws and regulations, standards, guidelines and the latest theoretical knowledge of technical methods to specific engineering examples, which enhances students' engineering analysis ability and deepens their understanding of theoretical knowledge. Wang X [4], in a study exploring how to improve teachers' teaching innovation ability in the context of engineering education accreditation, combines current science and technology and modern education policies to provide strategies to improve teachers' education innovation ability.

The course "Specification and Skills of Writing Graduation Design (Thesis) for Data Science and Big Data Technology" (hereinafter referred to as Thesis Writing for Big Data) is a theoretical and applied course oriented to graduation thesis (design). Yang Qing et al. study the analysis of graduation design problems and quality improvement strategies for engineering education accreditation, focusing on engineering education accreditation standards, by analyzing some of the existing problems in graduation design and proposing relevant measures to solve them,

which is in line with the concept of “continuous improvement” in the engineering education accreditation, in order to improve the quality of graduation design, and ultimately improve the quality of talent cultivation. Talent cultivation quality. Zhai Yafei et al. study the exploration of teaching reform of “scientific and technical thesis writing” under the background of engineering education certification, and adopt the teaching methods of “emphasizing the basics, strengthening the operation”, “strengthening the process monitoring” and “quantifying the experimental results”. In the course of teaching, “emphasizing the fundamentals, strengthening the operation”, “strengthening the process monitoring” and “quantifying the teaching mode of experimental results” were adopted to effectively cultivate students' scientific thinking ability. By reforming and exploring the graduation design (thesis) of food science and engineering under the background of engineering education accreditation, Xiang Qisen et al. took the professional accreditation of engineering education as an opportunity to carry out continuous improvement in the aspects of faculty training, graduation design (thesis) topic selection, process quality monitoring, assessment and evaluation methods, etc., in order to continuously improve the quality of talent training. Cao Lingmei, Li Ke and others took the graduation design (thesis) writing course as an example, explored the elements of ideology and politics that can be integrated into the teaching of the course - academic ethics and integrity, the spirit of innovation and research, the confidence of the national culture, the ability to discern literature, and the spirit of artisanal drilling and researching, and constructed a graduation design (thesis) writing teaching model that integrates the ideology and politics of the course. The teaching mode of graduation design (thesis) writing is constructed by integrating the ideology and politics of the curriculum.

In summary, the road to a strong engineering education is to strengthen the adaptability and leadership to the needs of economic and social development and industrial development, which needs to take engineering education as the grip and focus of high-quality connotative development of higher education, and high-quality of higher education needs to start from the curriculum and projects, and to explore a new mode of cross-fertilization, and the core concept of the engineering education accreditation is to be results-oriented, student-centered, and continuous improvement. The traditional teaching method of thesis writing is rather boring, and the teaching effect is biased, this paper explores the teaching reform of thesis writing courses from the aspects of teaching content, teaching methods and assessment methods according to the direction and requirements of engineering education accreditation in course design, which makes the teaching quality improved.

2. The Current Situation of Thesis Writing Course for Big Data Majors

As the most direct instructive course for graduation design, the thesis writing course has a very important status. At present, the following problems still exist in the thesis writing for big data majors: ① The selection of topics is not suitable for the scope of big data majors, the direction of students' selection of topics is often the same as that of software engineering, information systems management and other majors, and through the research, it was found that the big data juniors generally do not have a clear understanding of the professional design project; ② Theory and practice are out of touch, and the students lack the ability to apply the theoretical knowledge of the big data they have learned to practical problem solving. ③ Insufficient data literacy and analytical ability, some students have insufficient knowledge and skills in data cleaning, data mining, data analysis, etc., which directly affects the quality of thesis and the depth of research. ④ Academic writing and expression ability needs to be improved, and professionalism is insufficient, such as the use of the first person, predicate overlap, colloquialism and other cases, big data majors, like most engineering majors, rarely have writing training. ⑤ The use of electronic library resources, literature search skills and other

literature resources is not skilled; ⑥ The thesis format is not standardized; ⑦ The cognition of the framework structure of the thesis is not in place, at present, the data science and big data technology majors provide students with directions of five, the thesis reference framework of two, the students are not logical enough to write the thesis, the thesis is relatively poorly organized and lacks a sense of hierarchy; ⑧ Insufficient time management and project management skills The students' time management and project management skills are insufficient, resulting in delayed progress or affected quality of the dissertation. ⑨ Insufficient tutor resources and guidance, unable to provide adequate individual guidance and support for each student. ⑩ academic integrity issues, big data thesis faces the challenge of plagiarism, falsification of data and other academic misconduct, and needs to be guided in order to comply with the principle of academic integrity; ⑪ big data students have insufficient overall knowledge of the graduation design project, did not establish a process from the analysis of requirements, system organization and design, data storage design, lack of experience in project management as well as scientific research thinking.

Aiming at the above problems, this project will explore and reform the teaching mode of the thesis writing course for big data majors, optimize the teaching content of the thesis writing course, and improve the teaching mode and assessment and evaluation methods.

3. Teaching Reform of Thesis Writing Course for Big Data Majors

The course "Specification and Skills of Graduation Design (Thesis) Writing for Data Science and Big Data Technology Majors" is characterized by strong theoretical and practical aspects, and at the same time, it is deeply integrated with many application fields. The textbook is "Introduction to Literature Retrieval and Scientific and Technological Thesis Writing" edited by Wang Hongjun, which belongs to the "Thirteenth Five-Year Plan" textbook of general higher education, and is oriented to scientific and technological college students, providing writing guidance and suggestions for scientific and technological thesis writing and graduation thesis writing in the stage of college study. It is one of the classic textbooks for thesis writing course and literature searching course. Although it is a classic textbook, it also has the disadvantages of too broad content and lack of integration with big data, which makes it difficult for the course to carry out in-depth and effective practice, and fails to meet the requirements of graduates for the certification of engineering education. Therefore, the thesis writing course for big data majors should be reformed from three aspects: teaching content, teaching mode and assessment method.

3.1. Optimization of the theoretical teaching content of the graduation design (thesis) writing specifications and skills course of data science and big data technology under the background of engineering education certification

Due to the poor relevance of the big data specialty in the textbook of the dissertation writing class, the teaching process deviates from the actual situation to a certain extent, which will lead to the loss of students' interest in learning if they are taught according to the traditional classroom. If you want to attract students, you need the content of the teacher's lectures to closely follow the characteristics of big data specialties, and the design is closely related to the problems encountered by students in the learning process. The thesis writing course for big data majors should be closely related to the practical needs of big data majors, scientific research, etc., and grasp the practicality and advancement of the teaching content from the application level based on the tasks, for example, the introduction before the class can be supplemented with the requirements of engineering education certification for engineering graduates' communication, cooperation, professional knowledge and skills, etc.; the thesis topics are selected according to the characteristics of big data majors and analyze the

differences between the thesis topics of software engineering majors; read the excellent thesis topics of big data majors and analyze the differences between them; and interpret the thesis topics of big data majors. The thesis topic selection is based on the characteristics of the big data specialty, analyzing the differences with the thesis topic selection of software engineering and other specialties; interpreting the excellent thesis of big data, analyzing the differences in thesis organization structure of visualization system, big data development, machine learning and other directions; leading students to practice the thesis template, analyzing and explaining the format of the common errors. Optimize and improve part of the knowledge teaching module from the content of both professional characteristics and the expansion of Civic and Political education.

The construction of the thesis writing course in big data specialization is adhering to the concept of synergistic effect of teaching content and ideological and political theory course in the same direction and forming synergistic effect, integrating the content of the disciplinary courses with the resources of the ideological and political courses, so that the ideological and political elements of the courses are carried through the teaching of the thesis writing course, giving full play to the advantages of the overall nurturing of human beings, attaching importance to the cultivation of the scientific method of thinking, combining it with the education of scientific ethics and spirituality, cultivating the students' devotion to It emphasizes the cultivation of scientific thinking method, combines with the education of scientific ethics and spirit, cultivates students' sense of responsibility and mission to dedicate themselves to science, promotes the spirit of pioneering and innovation, stimulates students' enthusiasm and sense of responsibility to serve the country with science and technology, makes college students firm in their ideals and beliefs, cultivates national sentiment, inherits the spirit of craftsmanship, fosters cultural self-confidence, strengthens their responsibility, and shapes a sound personality.

Table 1. Supplementing the content of Civics teaching

Supplementary Civics Elements	Design Ideas
Academic Ethics and Integrity	Showcasing China's Ministry of Science and Technology's briefing on thesis fraud detected from January-November 2021, students are guided to keep scientific integrity in mind and to cultivate the spirit of truth-seeking.
Innovative Research Spirit	Academician Huang Xuhua and Gu Ching-fen inspire students to explore and innovate.
Cultural Confidence	The "Dreaming of Rice Flower Writing Essays on the Earth, Keeping the Spirit between Heaven and Earth" deepens students' understanding and awareness of "Writing Essays on the Motherland", stimulates students' patriotic feelings, cultivates students' sense of mission and responsibility, and builds up their cultural self-confidence.
Craftsmanship	Learning the spirit of Tu Youyou and other scientists' in-depth research, cultivating students' craftsmanship and research spirit through the power of role models.

3.2. Reform of Teaching Methods of Graduation Design (Thesis) Writing Standards and Skills Course for Data Science and Big Data Technology under the Background of Engineering Education Certification

Teaching method reform based on group task-driven. Specific implementation points are as follows: three people in a group (up to four people in a group), a total of 14 groups in each class (in order to carry out mutual evaluation of the group), the group requires one person to be responsible for writing the opening report, one person to be responsible for writing the thesis, one person to be responsible for the project development (engineering thesis should be dominated by a practical project, which can be accomplished in part of the project function), and the group will collaborate with each other to complete the tasks set up by the course knowledge points. Teachers guide students into the learning situation with real tasks, organizing students to complete the graduation design project implementation, thesis writing, defense, play the role of judges commenting on the task, so that learning is more intuitive and visualization, fully mobilize students to take the initiative to learn and explore the practice of curiosity.

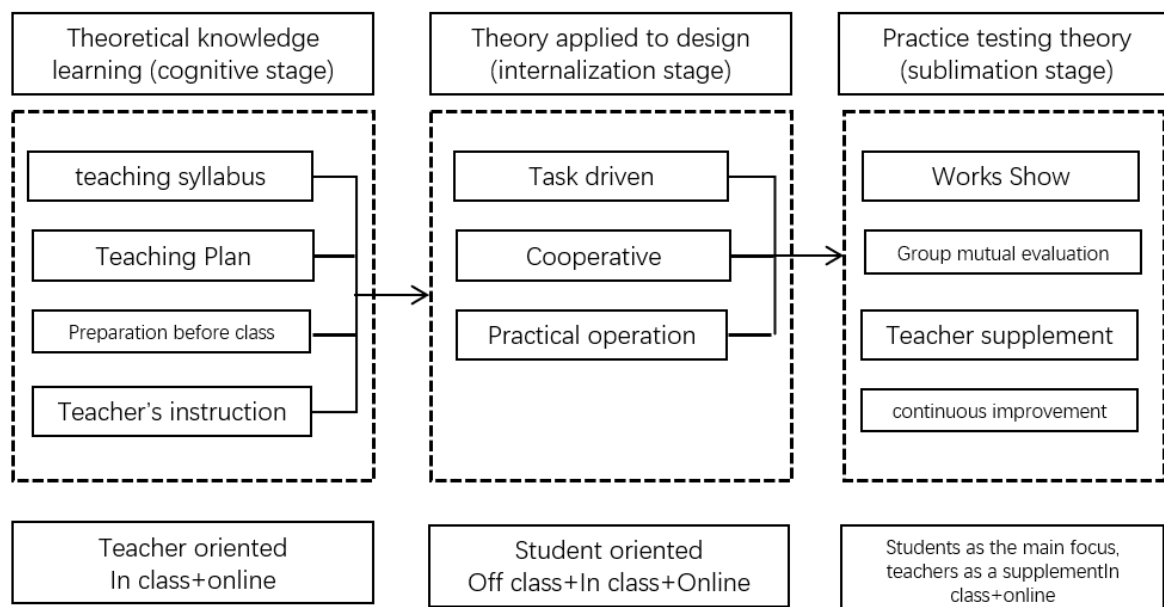


Figure 1. Teaching model reform map

The teaching model of the dissertation writing course can be seen as three parts. The first part of the teaching implementation aspect of the teacher-oriented, structural decomposition of the task, positioning to the corresponding knowledge points of the course, the construction of the task program, the preparation of the teaching environment, etc.; the second part of the student-oriented, teacher-guided teaching mode. The second part is student-oriented and teacher-guided teaching mode. Students practice the task in a practical way, through the teacher's structural decomposition of the task, students complete the practical task independently in groups, due to the limited class time, students need to spend part of their time to complete the task in the classroom; the third part is student-oriented to show the results of the stage, and at the same time, the group will evaluate each other (find out the routine problems or professional problems to accumulate points, and be counted as part of the assessment), and the teacher summarizes the stage of the task. The teacher will summarize the stage tasks and reflect on the teaching and learning, and actively adjust the teaching tasks to help students make continuous improvement.

3.3. Reform of the Assessment Method of the Graduation Design (Thesis) Writing Specification and Skills Course for Data Science and Big Data Technology in the Context of Engineering Education Accreditation

The evaluation of the teaching effect of the thesis writing course carries out process holistic assessment. The process assessment pays more attention to the practical ability of students, teachers actively mobilize students to work in groups in and out of class, and integrate the task score into the process assessment of thesis writing course. The whole assessment is divided into the end-of-semester assessment (40%) to test the students' comprehensive knowledge, and the other process assessment (60%) to test the students' practical application ability, and the use of diversified evaluation subject, the evaluation subject in addition to the teacher, but also includes the group mutual evaluation, group self-assessment, and the course of the informatization platform record evaluation, and so on.

Teaching evaluation reform "emphasizes the combination of process evaluation and result evaluation, explores value-added evaluation, and improves comprehensive evaluation", and utilizes the modern information platform to carry out accurate evaluation. The course establishes a diversified and comprehensive evaluation system, in which the evaluation subjects carry out assessment and grading of teaching tasks, such as questionnaire survey before class, review and review, in-class practice, mock defense, etc. These diversified evaluation subjects and assessment contents can provide a more comprehensive and objective evaluation perspective, so as to more accurately reflect the learning process and results of the students. Teachers quantify the results of practical task evaluation, construct a reasonable evaluation model, and conduct detailed and perfect evaluation of the tasks completed by students.

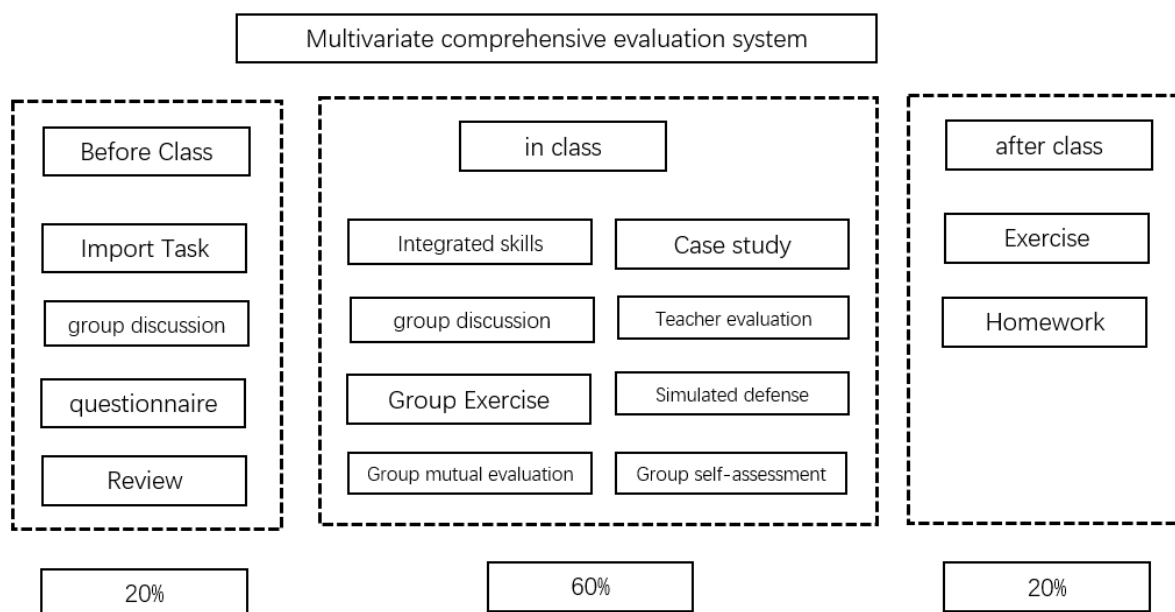


Figure 2. Multi-dimensional comprehensive evaluation system

4. Summary

In the context of engineering education certification, the task-driven orientation not only overcomes the shortcomings of the traditional thesis writing, such as more boring, teaching effect bias, but also through the integration of professional knowledge in the field of big data, civic and political elements, the theoretical teaching content of the "Data Science and Big Data

Technology Professional Graduation Design (Thesis) Writing Norms and Skills" course update and optimization, the realization of the students' graduation project and thesis writing. The teaching reform explores the teaching content and system of the thesis writing course for big data majors in the context of engineering education certification, which not only meets the professional knowledge and skills requirements of graduates for engineering education certification, but also effectively realizes the cultivation of students' practical hands-on ability and ensures that graduates of big data majors meet the quality standards recognized by the industry.

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