

Reflections on the Construction of Mathematics and Physics Curriculum System of General College Integration under the Background of New Engineering

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Abstract: The curriculum personality challenge under the background of engineering education and the gender of gold course construction once pointed out the direction for specialty construction, and the setting of curriculum system is the core issue of specialty construction. Therefore, the construction of mathematical courses is related to the graduation requirements and whether the two sexes can achieve the basic problem. The solution of basic problems is helpful to the improvement of students' ability of curriculum transfer and the refinement of the integration of general education and specialized education.

1. Introduction

In order to adapt to the new trend of the new round of scientific and technological revolution and industrial revolution, and closely focus on the national strategy and regional development needs, we should transform traditional engineering majors and develop new engineering majors. Therefore, it is imperative to reconstruct the curriculum system and construct the curriculum. As the pioneer of the new engineering specialty, the course system of engineering mathematics not only lays a necessary foundation for the subsequent courses and further expanding the scope of mathematics knowledge, but also cultivates students' abstract thinking, logical reasoning ability, comprehensive use of learned knowledge, ability to analyze and solve problems, strong ability of autonomous learning Innovation consciousness and innovation ability have an irreplaceable position.

In order to meet the individual challenges of the new engineering education, we need to uphold the education concept of all-round development. First, we should pay attention to the group characteristics and individual characteristics of engineering students, and at the same time realize the maximum comprehensive development, and guide students to develop harmoniously in various dimensions such as individual development and social development, intellectual development and spiritual development. In response to the challenge from the internal goal of new engineering education, we should take the teaching idea of OBE as the foundation and the evidence-oriented education idea as the basis, comprehensively clarify the goal of the new mathematics and mathematics curriculum construction, and build the new engineering mathematics and mathematics curriculum system.

2. The Basic Idea of Integrating Mathematics and Physics Curriculum System in General Colleges under the Background of New Engineering

(1) The design of mathematics curriculum aiming at all-round development

① Clarify the concept of all-round development education, and construct a nodal and related knowledge structure system of teaching materials from the cognitive characteristics of students.

In order to get rid of the limitations of existing disciplines on students' development, it is distinguished from dimensions and dimensions. According to the analysis of the relationship between two dimensions (personality development and social development) and dimensions (intelligence development and spiritual development) of new engineering mathematical ability, the teaching objectives, reasonable teaching plans and curriculum design (curriculum matrix) of mathematical general courses are formulated.

② According to the concept and requirements of new engineering talents training, we

systematically sort out the knowledge logic system of new engineering specialty, build a modular mathematical course system with project as the chain, and design a curriculum system integrating new engineering and mathematical courses.

In the general idea of the new engineering mathematical education curriculum system, the vision of the new engineering mathematical education curriculum construction is made clear, and the integrity of the educational concept of all-round development of engineering mathematical ability is emphasized to meet the multi-dimensional development of students. It is determined that the OBE teaching concept is a reform system that requires the integration of mathematics and physics courses in new engineering courses, and clear and measurable expected learning results are formulated. Refine the goal of course construction, and explore the design and implementation path of new engineering mathematics and physics courses.

③ Absorb the theoretical knowledge and practical achievements in related fields, and highlight the cutting-edge, cross-cutting and comprehensive content of mathematical textbooks.

In the dimension of intelligence development under the dimension of personality development, the students' all-round development field of “thinking+” should be developed with finding, analyzing and solving problems as the core, and students' engineering thinking reasoning ability should be realized with systematic mathematical thinking, critical thinking and creative thinking. In the direction of intellectual development under the social development, develop students' “skills plus” field, break the traditional engineering knowledge system, and realize the teamwork ability and innovation and entrepreneurship ability promoted by the integration of subject knowledge and technical practice.

④ Incorporate the relevant requirements of “curriculum ideological and political education” organically, pay attention to condensing localized cases, carry forward craftsman spirit and cultivate engineering ethics consciousness.

Analyze the implementation path of engineering general education under the new system format, and explore the mathematical course system. In the process of implementing the new engineering mathematics and science course, the evaluation mechanism of employers should be explored and local cases should be optimized based on the quality of personnel training to meet the needs of economic and social development and promote people's all-round development. In the course of mathematics and mathematics curriculum implementation, teachers should set an example for students to learn by their own words and deeds, and at the same time contain the “ideological and political elements” of research spirit, patriotism, responsibility, technical ethics and ideal feelings.

(2) Construction of mathematics curriculum system based on engineering certification standard

Mathematics curriculum system, as the basic core curriculum of specialty construction, must ensure the realization of specialty training objectives and graduation requirements. In the early stage of the design of mathematics curriculum system, we should collect the latest policies, regulations and cutting-edge trends of national and local governments in relevant fields, so as to point out the direction for the reform of mathematics curriculum.

Based on the related attributes of mathematical courses and core courses of different majors, the characteristics of integration with majors are highlighted in the revision of mathematical courses system. Engineering certification emphasizes the concept of student-centered education and teaching, and the mathematical course system should conform to the general psychological process of students receiving knowledge. In the process of integration with specialized courses, we must fully consider the knowledge matching and inheritance relationship between mathematical courses and different specialized courses, and make clear the order of various courses. The course teaching plan should follow the principle of from mathematical courses to specialized courses, from specialized basic courses to specialized courses, from theoretical courses to practical courses. Through comparative analysis with the relevant standards of the talent training program of engineering certification, the newly revised professional curriculum system covers all the curriculum categories required by engineering certification, such as mathematics and natural science, engineering foundation, professional foundation, professional, engineering practice and graduation design, and general education of Humanities and social sciences.

(3) Guarantee construction of curriculum implementation guided by learning evidence

In order to ensure the implementation effect of new engineering mathematics and physics courses, we should strive to create “evidence culture” and explore the implementation and evaluation methods of new engineering mathematics and physics courses. Focusing on the five aspects of teaching philosophy, teaching methods, assessment scheme, integration of general education and specialized education, and curriculum evaluation, this paper systematically analyzes the implementation path of mathematics and physics courses in engineering under the new format, and builds the guarantee system of mathematics and physics courses in different schools for different learning groups. At the same time, in order to cope with the challenge and high-order nature of mathematics and physics courses, efforts should be made to expand the teaching forms of mathematics and physics courses in new engineering, and attract students to participate in the course learning by online and offline mixed teaching, modular teaching, flipped classroom and other course implementation methods.

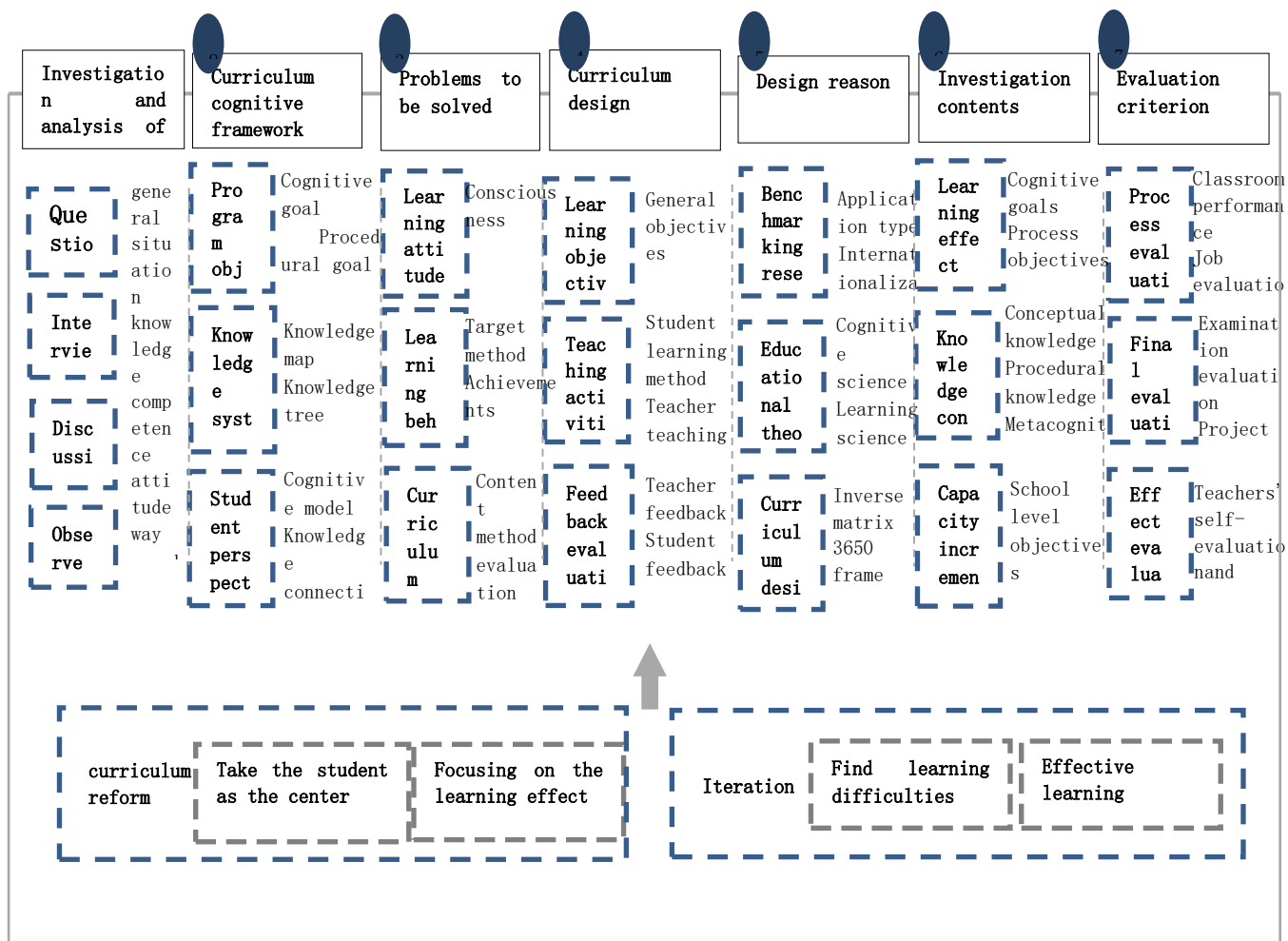
In the process of implementing mathematics and physics courses in new engineering, we should always explore the evaluation method of combining qualitative and quantitative evaluation for the achievement of training objectives in order to meet the development needs of talent training programs for new engineering majors. Optimize the evaluation process, improve and revise the mathematical course system according to the evaluation results, and achieve the goal of curriculum reconstruction for continuous improvement. We should pay attention to the retention of students' learning evidence, construct the quality assurance system and academic evaluation system of mathematics and physics courses in new engineering based on learning evidence, and form an “evidence culture” in which evidence is used for quality improvement, evidence is emphasized in curriculum evaluation and evidence is emphasized in academic evaluation.

3. Construction and Implementation Path of Mathematics Curriculum System in New Engineering

The construction of mathematics and physics curriculum system in new engineering includes the construction of curriculum resources such as “thinking+”, “skill+” and “spirit+”. As the foundation of specialty construction, mathematics and physics curriculum system is supported by ensuring professional training objectives and meeting graduation requirements. Therefore, in the process of the construction of the new engineering mathematics curriculum system, we should ensure that the construction of the new engineering mathematics curriculum system can achieve substantive results through the basic path of inter school construction, key construction and phased construction.

(1) All branches jointly build and design the curriculum system

According to the concept and requirements of new engineering talents training, we systematically sort out the knowledge logic system of new engineering majors, implement linkage measures in branches at all levels, systematically analyze the existing courses, realize matrix evaluation on the core general ability of new engineering majors, find out the key points and strategies of mathematics and physics curriculum construction, and find out the differences with the ability benchmark (that is, the expected learning results) of new engineering general courses. Build a modular mathematics curriculum system with project as the chain, and scientifically design a curriculum system integrating new engineering, general and specialized courses. In order to reach the international certification standard of new engineering and realize the mathematics curriculum system of general and specialized education, the “seven step” model of mathematics curriculum practice is adopted.



The seven-step model of mathematics curriculum reform

(2) Integrating mathematical courses into “curriculum thought and politics”

The implementation of mathematics courses is based on learning evidence, setting up students' learning models. When you encounter problems, you should carefully observe and think about them, explore the rules contained in them, be good at starting from the essence of things, so as to find out the connection between things, solve problems by studying hard by yourself, at the same time, promote patriotism and responsibility, and stick to your own technical ethics and moral bottom line. We should be firm in our ideals, persistent in our beliefs, not afraid of difficulties, brave in pioneering and tenacious in our struggle.

(3) Integrating mathematical culture into mathematics classroom

Mathematics is not only a tool, but also a mode of thinking, not only a kind of knowledge, but also a kind of accomplishment, not only a science, but also a kind of culture. Deepening education and teaching reform, innovating education and teaching methods, and cultivating innovative scientific and technological talents to adapt to social development are issues worthy of exploration and deep thinking by higher education workers. Therefore, mathematics course is an important basic course for engineering majors. Its importance is reflected in rigorous thinking mode and scientific methods to solve problems. It is an important way to cultivate students' innovative ability. Mathematics course is a discipline to study the quantitative relationship and spatial form of the real world.

The carrier of mathematical culture must be the mathematical knowledge that students want to learn at present. The related mathematical knowledge points should have a clear connection and can be well integrated. They must be classic and excellent mathematical achievements. Teachers should conduct sufficient research and analysis to ensure that relevant mathematical knowledge can be well combined with mathematical culture, and fully cultivate students' mathematical quality and cultural quality, so that students can truly appreciate the value of learning mathematics and master the

thinking logic of learning mathematics. While cultivating students' logical thinking ability and independent inquiry ability, we should guide students to fully understand mathematical culture and cultivate students' awareness of mathematical culture. It is also necessary to organize relevant mathematical teaching activities to effectively cultivate students' mathematical cultural awareness and ability.

(4) Establishment of Mathematics Curriculum Learning Support Center

Mathematics course learning support center pays close attention to students, tutors and tutors to improve service ability. First, the clients-students, carry out the investigation of learning needs and satisfaction, improve the student feedback system, and provide reference for teaching and management. There are two types of service personnel-tutors and tutors (head teachers). The professional quality and service ability of the two teams can be improved by compiling the tutorial teacher's manual and the tutorial teacher's manual, establishing the access system, perfecting the management mechanism of appointment, registration, training and assessment, and establishing the online communication and training space.

The Learning Support Center of Mathematics and Science Course explores various teaching service modes and gradually implements personalized support services. According to the diversification of students' learning needs, the difference of learning conditions and the school-running conditions of learning centers, various teaching service modes such as mixed teaching, network-based teaching and completely network-based teaching are explored. In qualified areas or mature majors, promote personalized support services, especially personalized teaching services based on network, provide students with individualized course selection guidance, course learning process guidance, consulting services, active learning promotion and other services, and solve various difficult problems encountered in the learning process.

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