

# Analysis on the Construction of Ship and Ocean Engineering Specialty from the Perspective of New Engineering

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**Abstract:** Have a strong engineering background with the major of marine engineering. With the development of China's shipbuilding industry, the concept and technology of ship design and manufacturing are constantly improving, which puts forward higher requirements for talents. Based on the perspective of new engineering, this paper classifies and analyzes the general situation and research contents of the discipline of ship and sea, and puts forward relevant reference suggestions for the problems existing in the development and construction of ship and sea in China. At the same time, facing the major of ship and ocean engineering, taking the new engineering construction as an opportunity and taking the certification of engineering education as a guide, this paper expounds the connotation and needs of the times of the new engineering construction. In view of the current situation of the demand for talents in shipbuilding and ocean engineering and the shortcomings in talent training, this paper discusses and analyzes how the professional education and teaching can adapt to the rapid development of China's shipbuilding industry, and puts forward some ideas on the training mode of training innovative scientific and technological talents. Put forward the reform measures of ship and ocean engineering specialty from the perspective of new engineering. In order to further innovate and establish the education and training mechanism of engineering majors, and provide reference for related development.

## 1. Introduction

At present, the construction of new engineering courses in Chinese universities is progressing in an orderly way[1]. Shipbuilding is the first-level discipline in the engineering category, and it belongs to the minor discipline in the engineering category, but it undertakes the important task of scientific research and personnel training in the construction of China's maritime power. The shipbuilding industry is a strategic and basic industry related to national defense construction and national economic development, with a strong combination of military and civilian, and a high degree of industrial correlation[2]. The major of ship and ocean engineering focuses on cultivating compound and applied advanced engineering and technical talents of ship and ocean engineering with solid foundation, extensive professional knowledge, strong hands-on ability, innovative spirit and practical ability for major shipbuilding enterprises and local shipyards[3]. China's shipbuilding and ocean engineering professionals have made gratifying achievements, but the cultivation of students' practical ability and innovative ability is still weak[4]. On the basis of the existing teaching system, how to further strengthen the cultivation of engineering students' practical ability and innovative ability is a question worthy of deep consideration.

New engineering has put forward clearer goals for traditional engineering majors, as well as more specific requirements for its ideas, models and standards, which plays an important supporting role in China's industrial upgrading and the establishment of innovative engineering education and training mechanism[5]. Economic development and competition, first of all, is the competition of human resources, which is fundamentally the competition of education. The social demand for compound talents with marine engineering specialty is increasing day by day, and the number of enterprises and ship design institutes in China's coastal cities, such as ship building and shipping, is increasing rapidly[6]. To reform the talent training mode is to take the demand of the society and

the country as the guide, and form a training system conducive to the growth of diversified and innovative talents through innovation in teaching philosophy and management mechanism to meet the demand of shipbuilding industry for high-quality talents[7]. At present, the social demand and fierce competition put forward higher requirements for practical teaching[8]. Based on this, this paper analyzes the construction of ship and ocean engineering specialty from the perspective of new engineering.

## **2. Status quo and connotation construction of marine engineering specialty**

Marine engineering majors serve the strategic needs of national security and marine resources development, and build a strong navy, which involves the research and development, design and manufacture of large ships such as aircraft carriers, combat vessels and submarines, as well as equipment in the South China Sea and the East China Sea, and plays a very important role in safeguarding national security, ensuring national energy security and safeguarding national maritime rights and interests[9]. In response to the proposal that the education of ship and ocean engineering should be developed into connotation, this paper studies the specific requirements of new engineering construction. It is found that there are still many places to be reformed in the development and construction of ship and ocean engineering specialty. For a long time, there have been some problems in the discipline construction of China's ship and sea, such as unclear discipline category, lack of concentration of research strength, confusion of discipline orientation, etc. Different institutions have obvious differences in the content of construction in the same field, or have high repetition in the construction of different disciplines. At the same time, the specialty of ship and ocean engineering is not wide, and there are some shortcomings in theoretical teaching, such as emphasizing theory, neglecting practice, single teaching mode, boring teaching methods, relatively outdated knowledge, etc. In practice teaching, although the cultivation of applied ability is reflected in the teaching plan, the proportion is small and the means are backward. In terms of scientific research, China's shipbuilding and ocean engineering discipline has turned more to engineering application research in recent years. However, due to the late start, some core technologies are still in the initial, imitation or catch-up stage, and have not formed enough influence. With the continuous emergence of high value-added ships and the continuous improvement of the concept and technology of ship design and manufacturing, a large number of high-quality innovative talents are urgently needed. In order to cultivate applied senior shipping talents who are based on shipping, relying on Shanghai, serving the whole country and facing the world, it is an inevitable requirement for the connotation construction of universities to build a high-level ship and ocean engineering major. Therefore, it has become a top priority to cultivate college students majoring in ship and ocean engineering who have solid basic knowledge, practical skills and innovative spirit, strong self-development ability and adaptability to work.

## **3. Training objectives of leading talents in shipbuilding and ocean engineering under the new engineering concept**

Enterprises are in urgent need of graduates who can be qualified for jobs after graduation. Quick hands and strong stamina are the necessary qualities for applied talents majoring in ship and ocean engineering, and graduates trained in universities are required to know not only the design, manufacture and research of ship and ocean engineering structures, but also the innovation and management[10]. This puts forward very high and specific requirements for the training of talents majoring in ship and ocean engineering. For engineering-oriented universities, the quality of specialty construction is directly related to the quality of personnel training and the core competitiveness of the country. New engineering has put forward clearer goals for traditional engineering majors, as well as more specific requirements for its ideas, models and standards, which plays an important supporting role in China's industrial upgrading and the establishment of innovative engineering education and training mechanism. Under the background of new engineering construction, it is necessary to aim at the international frontier, study the development

needs of China's overseas shipbuilding and ocean engineering fields, formulate the talent training objectives and standards, and improve the training system of outstanding leading talents. Figure 1 shows the training standards for innovative talents in leading engineering.

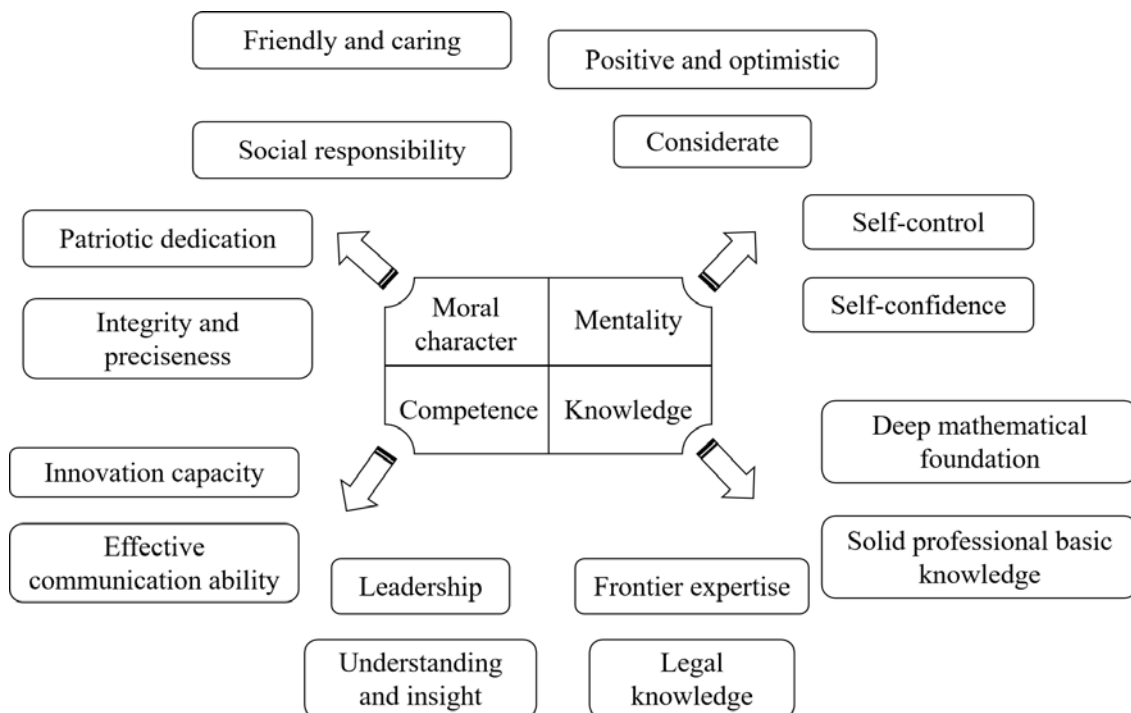


Figure 1 Leading engineering innovation talent training standards

The basic elements of talent training mode are training objectives, training specifications and training methods. Talent training mode is the concentrated embodiment of educational thoughts and concepts of universities, disciplines and specialties, which determines the fundamental characteristics of the trained talents. First of all, according to the orientation of universities, innovative talents with knowledge, ability and quality should be trained in an all-round way. At the same time, we should give students comprehensive and solid training and education, so that they have a high sense of social responsibility and solid knowledge of mathematics and physics. Have the ability to design and develop marine engineering products and solve practical problems; And have the awareness and ability of lifelong learning, actively adapting to the development of disciplines and infiltrating into other disciplines. Excellent ship engineers should not only have solid theoretical knowledge of ship and ocean engineering, but also have theoretical foundation of engineering design, construction and management. It is necessary to have not only book knowledge, but also strong engineering practice ability, not only good humanities literacy, but also broad engineering vision and international communication ability. In addition, artificial intelligence, as one of the important symbols of the fourth industrial revolution, has entered a new stage of deep integration with industry. As the training base of leading talents in the industry, universities should apply artificial intelligence to the training system of new engineering majors in a forward-looking way, constantly promote the intersection and integration of artificial intelligence and traditional superior engineering majors, promote the upgrading and transformation of traditional superior engineering majors, and cultivate world-class outstanding engineering talents.

#### 4. Training mode of innovative talents

##### 4.1. Strengthen the teaching of professional courses

New engineering is the embodiment of the characteristics of the times, with the characteristics of wide coverage, multi-subject participation and multi-disciplinary integration. It is a practical activity for universities to carry out new reform and exploration. Under the new engineering

perspective, the rationalization of teaching plan and curriculum system is one of the important guarantee conditions for cultivating innovative talents. The curriculum system of marine engineering specialty consists of two parts: specialized elective courses and specialized compulsory courses. Optimize the teaching content and curriculum system, and pay attention to the ability training. After years of construction, the teaching system of this major has been further integrated and optimized, and the modular curriculum has been formed, highlighting the cultivation of practical ability. In the aspect of knowledge optimization system, strengthen the cultivation of moral quality and psychological quality, strengthen the mathematical and professional foundation, and build an interdisciplinary basic platform course; Setting up specialized courses with clear backbone; Setting credits for research and innovation; Constructing information technology curriculum group; Establish a curriculum system of humanities and social sciences and a practical curriculum system with basic-comprehensive-research and innovation as the core. At the same time, heuristic, research and case teaching modes can be adopted. Construct a student-centered classroom teaching mode and explore independent, cooperative and inquiry learning methods; All-round small class teaching, flipped classroom and stage assessment are implemented. Figure 2 shows the curriculum structure of ship and ocean engineering specialty.

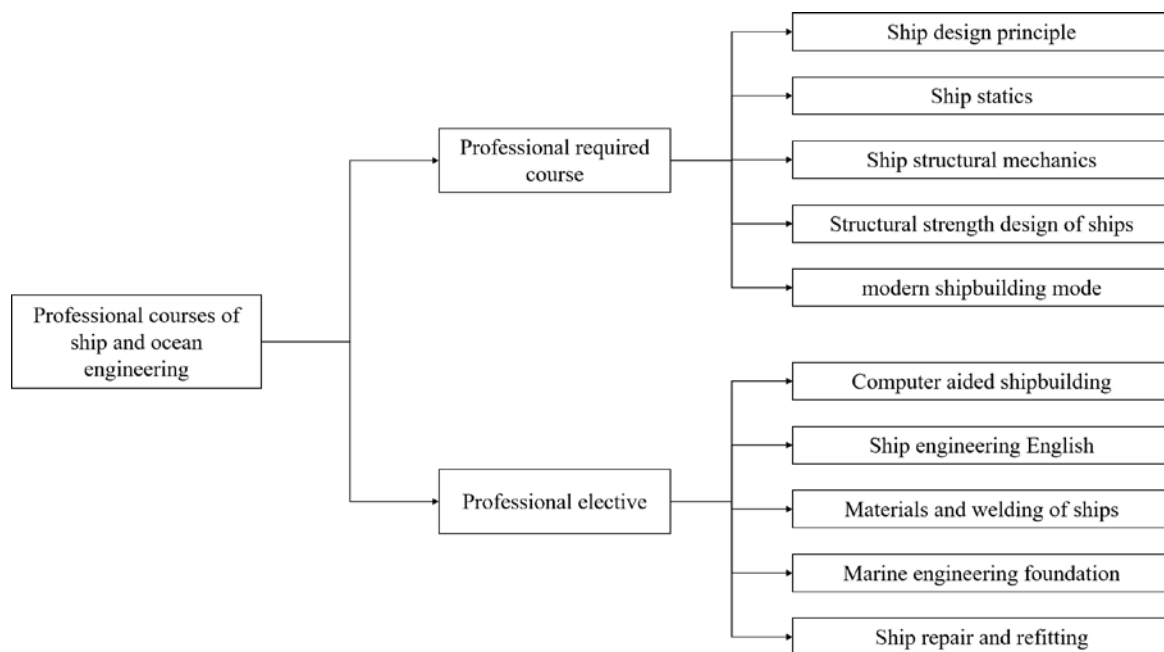


Figure 2 Course structure of ship and ocean engineering specialty

In addition, strengthening the construction of laboratory and practice base is the guarantee of perfecting practice teaching. Practice includes experimental teaching and practice teaching, and the experimental teaching system includes basic subject experiment, technical basic experiment and professional course experiment. According to the requirements of knowledge and ability in the professional field of ship and ocean engineering, engineers must have the engineering quality and practical ability necessary for ship and ocean engineering projects, as well as engineering application abilities such as organization and management of engineering projects. Based on this, in order to cultivate college students' abilities and exploration spirit, we should further optimize the training scheme, broaden the professional foundation and strengthen the intersection of disciplines and majors. We can try to construct the training mode of ship and ocean engineering, emphasize the integration of practice and research into the teaching process, and build a curriculum system for undergraduate and graduate students. By organically combining the course study of the last two years of undergraduate with the training scheme of master's degree students, senior undergraduate students can take postgraduate courses.

#### 4.2. Improve the construction of teaching staff

The construction of teaching staff is the core of training talents, and also the key to the

construction of ship and ocean engineering specialty. Therefore, building a teaching staff with reasonable age structure, high education level and strong innovation ability is the premise to realize the training of talents in shipbuilding and ocean engineering. The cultivation of young teachers' scientific research and engineering design ability should be strengthened. We can make full use of the long-term cooperative relations established by well-known universities, shipbuilding enterprises and research institutes outside China, establish multi-channel communication platforms, and rely on the Industry-University-Research base of our major to provide young teachers with opportunities for first-line practice of ship and ocean engineering. At the same time, we can set up an excellent development center for teachers' teaching. The main responsibility of the Center for Teaching Excellence Development is to provide substantive resource support and training programs for all teachers' personal teaching development and departments' efforts to promote teachers' development and improve undergraduate and graduate education and teaching. Teachers of specialized courses in universities should impart professional knowledge and cultivate students' professional skills, so that students can firmly grasp the necessary basic theories and professional knowledge. At the same time, we should pay attention to the cultivation of students' scientific research and innovation ability and the improvement of their comprehensive quality, and guide students to systematically study scientific thinking and research methods to meet the social needs and the fierce competition in the professional talent market. From the perspective of new engineering, the major of ship and ocean engineering needs to explore and improve constantly in the course system construction and teaching content arrangement. It is necessary to conduct in-depth research on the effect of talent cultivation among teachers and students, focusing on finding shortcomings and deficiencies, and seeking solutions and improvement measures.

## 5. Conclusions

Marine engineering is a major with broad development prospects. This paper explores the new talent training methods and training objectives under the new engineering concept, and establishes a new goal and training system for the best growth of talents. Marine engineering is a practical engineering major. At present, the construction of new engineering universities is still in the initial stage, and the practice, teaching and personnel training system are still in the exploratory stage. Only by making concerted efforts from top-level design, policy formulation, teaching practice and other aspects, can we establish a more sustainable talent training system, further improve students' engineering literacy, and make them truly become outstanding talents of ship and ocean engineering who meet the needs of industry and social development. In addition, in the future course system reform process, it is necessary to further increase the proportion of practice class hours, optimize the practice training and practice assessment methods of the course, so that students can understand the professional content more through practice, and constantly improve their ability to apply professional knowledge in engineering practice. At the same time, in the concrete implementation and construction of the training system, the cultivation of students' innovative consciousness, practical ability and entrepreneurial spirit should run through the whole process of professional teaching.

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