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Application of Control Strategies in the Curriculum Design of Navigation Majors

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Abstract

With the increasing improvement of China's scientific and technological level and the continuous innovation of navigation technology, it has brought new opportunities for navigation education. As a bridge connecting the world, the education quality and talent cultivation level of navigation majors will directly affect the safety of international shipping. However, affected by objective factors, the traditional teaching methods and curriculum design have been unable to meet the needs of modern navigation talents and should be reformed and innovated based on the actual advance situation. Therefore, as a scientific management method, the control strategy has been widely used in the curriculum design of navigation majors. Through systematic planning, fine control and scientific evaluation according to the needs, the scientificity and effectiveness of curriculum design can be truly improved. This paper first analyzes the application value of control strategies in the curriculum design of navigation majors, combines it with the actual situation of navigation education, and formulates targeted application strategies to cultivate more excellent compound talents for social advance and promote the high-quality advance of navigation education.

Keywords

Control Strategy; Navigation Major; Curriculum Design.

1. The Application Value of Control Strategies in the Curriculum Design of Navigation Majors

1.1. Improving the Systematicness of Curriculum Design

Navigation education plays a role in connecting the world and promoting the advance of international trade. Against the background of the accelerated globalization, the quality of curriculum design is directly related to the professional quality and practical ability of navigation talents. To improve the coherence of the curriculum design of navigation majors, the control strategy can be applied. With the help of scientific planning methods and giving full play to the advantages of the control strategy, the core requirements of navigation education can be clarified in the shortest time, and the organic connection of curriculum content, teaching methods and learning evaluation can be realized, and finally a unified teaching system can be formed[1-3]. In this system, teachers are no longer simply imparting knowledge to students, but strengthening the improvement of practical ability and cultivating students into excellent talents with solid theoretical knowledge and proficient skills. In addition, compared with the traditional method, the control strategy attaches importance to the dynamic adjustment of the teaching process, combines with the advance trend of the navigation industry, and timely adjusts the teaching content and updates the teaching methods. The teaching content carried out can keep pace with the advance of the industry.

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1.2. Enhancing the Practicality of Curriculum Content

At present, due to the successive emergence of new technologies and new norms, higher requirements have been put forward for the professional skills and comprehensive quality of navigation talents. Therefore, navigation education must keep pace with the advance of the times, improve the curriculum content, and ensure that the education quality is closely linked to the industry needs. Giving full play to the advantages of the control strategy can accurately capture the dynamics of industry advance, including the update of international maritime regulations, the research and advance of new ship technologies, and the application of intelligent navigation systems. After doing a good job in all basic preparations, the latest industry knowledge, skills and standards are added to the curriculum content to improve the practicality and pertinence of the curriculum. When students enter the society, they can adapt to the job requirements in the shortest time. At the same time, the control strategy requires schools and enterprises to strengthen ties and establish close cooperative relations, and provide students with a real working environment through internships, practical training and project cooperation to help them clarify their own strengths and weaknesses and improve their professional quality[4-6].

1.3. Improving the Accuracy of Curriculum Evaluation

In order to meet the ever-changing industry needs and improve students' navigation knowledge and skills and have good professional qualities, the control strategy can be applied to the curriculum design. In specific practice, establishing a scientific evaluation system is the core part of the control strategy. Using a variety of evaluation methods such as theoretical examinations, practical operation assessments, project assignments and oral reports. (Figure 1), objectively and comprehensively evaluate students' learning achievements. By revealing the essence through the surface, it helps teachers master students' learning situations in navigation professional knowledge, skill operation, teamwork, problem-solving and other aspects, provides feedback information for the curriculum design, and takes it as a basis to clarify the deficiencies in the current curriculum design and adjust the curriculum content, teaching methods and teaching progress in a targeted manner to truly improve teaching quality and efficiency. From a domain perspective, a scientific evaluation system can stimulate students' learning motivation, make them willing to actively participate in teaching practice and improve their subjective initiative, thereby improving their comprehensive ability.

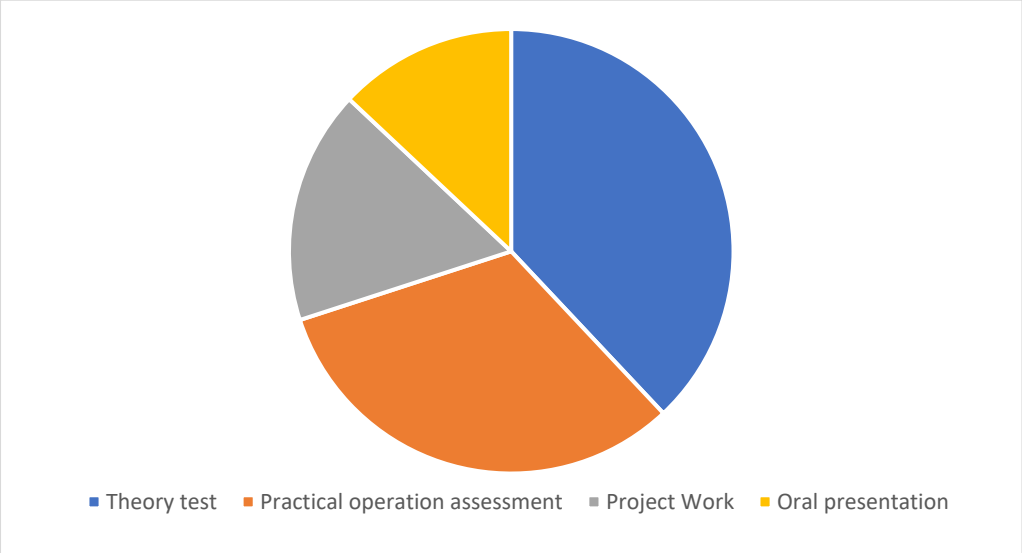

Figure 1. Proportion of Different Evaluation Methods

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2. The Application of Control Strategies in the Curriculum Design of Navigation Majors

2.1. Control of Curriculum Content

As an important discipline, navigation major plays a role in connecting the world and promoting international trade. The teaching quality and teaching content will directly affect the various abilities of navigation professionals. In order to meet the needs of the continuous advance of the industry, teachers must carefully plan and screen various curriculum contents. Based on the characteristics and needs of navigation major, various new technologies are introduced, and the scientificity, systematicness and practicality of the curriculum content will be significantly improved，helping students master solid navigation theoretical knowledge and be able to apply it to practical operations. However, this puts forward higher requirements for teachers' professional ability. Before planning the curriculum content, sufficient preparations should be made[7-9]. Traditional core courses such as navigation and guidance, ship maneuvering, maritime safety and maritime regulations should be integrated, and contents such as ship automation, intelligent navigation systems, new energy and environmental protection technologies should also be interspersed. In addition, the curriculum content also needs to be updated continuously according to the requirements. Combined with the new regulations of the International Maritime Organization and the research and advance and application of new technologies, the curriculum content is regularly improved to ensure that the content students learn can keep pace with the advance of the industry.

2.2. Control of Teaching Methods

Facing the diversified learning needs of students, teachers should apply various new teaching methods and means to improve the quality and efficiency of curriculum teaching. Because each student is a different individual with his own strengths and weaknesses, and there are differences in their learning abilities and learning styles, teachers can adopt diversified teaching methods and apply case teaching, simulation training and practical operation to meet the needs of each student as much as possible. For example, case teaching can enable students to deeply understand the complex problems and coping strategies in the field of navigation through the analysis and discussion of specific cases, and gradually improve students' various abilities by using different teaching methods. In addition, while imparting theoretical knowledge to students, teachers should also pay attention to cultivating their autonomous learning ability and innovative spirit. Due to the continuous update of technologies in the industry, students must have the ability of autonomous learning in the future to keep up with the advance needs of the times. When teachers design the curriculum, they should improve students' learning enthusiasm and creativity by guiding students to think independently and encouraging innovative practice.

2.3. Control of the Learning Process

Strong professionalism and high practical requirements are the characteristics of navigation major. By establishing a scientific learning supervision mechanism, the learning process of students can be evaluated throughout the process to ensure that students complete various tasks within the prescribed time and achieve good learning results through autonomous participation. Before establishing the learning mechanism, teachers are required to first clarify the learning goals and learning tasks, closely focus on the core knowledge and skills of navigation major, and conduct scientific and reasonable planning and design in combination with industry needs and students' characteristics. These clear goals and tasks can play a positive guiding role for students, clarify their future efforts direction and improve the pertinence of the learning process. During the learning process of students, the learning

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supervision mechanism can directly reflect students' learning performance, and help students discover the problems in learning through regular evaluation, feedback and guidance, and adjust them as reference. Over time, students can make progress in the learning process, and their learning motivation can be significantly improved to achieve good learning results.

3. The Application Countermeasures of Control Strategies in the Curriculum Design of Navigation Majors

3.1. Determine the Curriculum Goals

Teaching goals are the teaching basis for teachers and the direction for students' efforts. In the early stage of the curriculum design of navigation majors, teachers should make sufficient preparations and formulate clear curriculum goals to ensure that the teaching content is in line with the training goals of the navigation major. Because the content involved in the navigation major is highly practical, the learning of theoretical knowledge, the cultivation of practical skills and the improvement of professional quality should be the focus of the curriculum goals. First, the curriculum goals must be consistent with the overall goals of the navigation major to cultivate navigation talents with solid professional knowledge, proficient practical skills and good professional qualities for the advance of the industry. Second, combine the curriculum goals with the advance needs of the industry[10-11]. After clarifying the advance trend of the navigation field, continuously optimize and adjust the teaching methods to improve the forward-looking of the curriculum goals. Third, adhering to the people-oriented principle, considering the learning characteristics and needs of students, the set goals meet the needs of students and provide strong support for students' learning.

3.2. Position Characteristic Courses

Different colleges and universities have different school-running characteristics and resource advantages, but these characteristics and resources can provide a solid foundation for creating distinctive industry professional courses. Combined with the school-running characteristics and the characteristics of the navigation major, design courses that meet the advance needs of the industry and are unique, and gradually improve the attractiveness of the courses. Because the navigation major has a high degree of practicality, technology and internationalization, teachers must pay attention to the combination of theory and practice and cultivate students' international vision when designing the curriculum. Make full use of the existing resources of the school, such as advanced navigation simulators, laboratories and training bases, and rich navigation culture to create characteristic courses. If conditions permit, characteristic courses related to navigation technology, ship management and maritime law can also be carried out in combination with the characteristics of navigation major to meet the diversified learning needs of students.

3.3. Improve Teachers' Quality

In the field of navigation education, teachers' professional ability and comprehensive quality will directly affect students' learning ability and comprehensive level. Due to the continuous advance of navigation technology and the increasing improvement of industry needs, higher requirements have been put forward for teachers' professional ability. Therefore, teachers should view problems from a advance perspective and truly keep pace with the times to provide students with high-quality education services. The knowledge involved in the navigation field is extensive and updated rapidly. Teachers need to constantly learn new knowledge and new technologies to keep pace with the advance of the industry. In addition, teachers should have good teaching ability and methods, flexibly use a variety of teaching means and methods according to the characteristics and needs of students, and stimulate students' learning interest and enthusiasm. Finally, teachers should also have a high sense of responsibility and

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professionalism, pay attention to the growth and advance of students, and actively provide guidance and help for students to promote the sustainable advance of navigation education.

3.4. Strengthen Practical Teaching

Because the navigation major is a highly practical discipline, in order to further improve students' innovative spirit and practical ability, teachers must increase the proportion of practical teaching links to help students transform theoretical knowledge into practical operation skills and gradually improve students' independent thinking ability and problem-solving ability[12-13]. Under such an educational background, schools can provide students with more practical opportunities and platforms by using methods such as school-enterprise cooperation and the combination of industry, university and research. Through cooperation with enterprises, students can conduct internships and practical training in a real working environment, understand the actual operation process and industry norms in the navigation field, thereby deepening the understanding and mastery of professional knowledge. In order to improve students' innovation ability, the advantages of the combination of industry, university and research can be exerted. Through cooperation with scientific research institutions and enterprises, students can participate in scientific research projects and the solution of practical problems, thereby improving students' scientific research ability and laying a foundation for their future career advance.

3.5. Improve Teaching Methods

Table 1. The Application Significance of Diversified Teaching Methods

Teaching methods	Application effect
Case study	Help students to combine theoretical knowledge with practical application, improve practical ability
	Develop students' critical thinking and problem-solving skills
	By analyzing the mistakes and lessons in the case, the safety awareness of students is improved
Group discussion	Improve students' teamwork ability and communication ability
	Encourage students to participate actively and enhance their initiative and interest in learning
	Through the discussion, help students understand the problem from different angles and broaden their thinking
Role play	To help students understand the actual operation process of navigation work, improve practical skills
	Through the role play, students' sense of responsibility and professional quality are cultivated
	Create a relaxed learning atmosphere, so that students can experience the fun of sailing work in a simulated environment

Because the traditional teaching methods are too single and difficult to stimulate students' learning interest, students will also be bored over time. To solve related problems, teachers can apply diversified teaching methods according to the characteristics and needs of different students to provide students with flexible and diverse learning experiences. Combined with different contents, interactive teaching methods such as case analysis, group discussion and role-playing are applied to create a relaxed learning atmosphere for students and help students quickly master the knowledge content. (Table 1) In addition, the auxiliary effect of modern scientific and technological means can also be exerted to provide students with rich learning resources, breaking the limitations of factors such as time and space and further improving

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students' learning effect[14]. Affected by the nature of navigation work, it requires mutual cooperation among team members. When carrying out teaching activities, teachers should also pay attention to cultivating students' teamwork ability and adopt team projects and simulation exercises to allow students to improve these abilities in practice.

4. Conclusion

In conclusion, in the curriculum design of navigation majors, the application of control strategies is an innovation of the traditional education model and also the key to adapting to the needs of modern industry education and improving the quality of talent cultivation. Combined with the needs of today's social advance and the characteristics of students, through systematic curriculum design, fine content management and scientific teaching methods, navigation talents with solid foundation and practical ability are cultivated for social advance. At the same time, students' innovative thinking and teamwork ability can also be cultivated, injecting new vitality into the sustainable advance of navigation.

References

[1] Jennings, N. (2014). Protecting and promoting the UK in a digital world. IET.

[2] Kessler, G. C., & Ramsay, J. D. (2014). A proposed curriculum in cybersecurity education targeting homeland security students. In 2014 47th Hawaii International Conference on System Sciences (pp. 4932–4937). IEEE.

[3] Libicki, M. C., Senty, D., & Pollak, J. (2014). Hackers wanted: An examination of the cybersecurity labor market. Rand Corporation.

[4] Hol, A., Richardson, J., Hamilton, M., & McGovern, J. (2024). Strengthening undergraduate information systems education in an increasingly complex computing disciplines landscape. Communications of the Association for Information Systems, 54(1), 50–65.

[5] Howles, T., Romanowski, C., Mishra, S., & Raj, R. K. (2011). A holistic, modular approach to infuse cybersecurity into undergraduate computing degree programs. In Annual Symposium on Information Assurance (pp. 7–8).

[6] Immersive Labs. (2024). Immersive labs: Cybersecurity training platform. [Online]. Available: https://www.immersivelabs.com/. (Accessed 21 August 2024).

[7] Lasisi, R., Menia, M., Farr, Z., & Jones, C. (2022). Exploration of AI-enabled contents for undergraduate cyber security programs. In The International FLAIRS Conference Proceedings, vol. 35.

[8] Klaper, D., & Hovy, E. (2014). A taxonomy and a knowledge portal for cybersecurity. In Proceedings of the 15th Annual International Conference on Digital Government Research (pp. 79–85).

[9] Kannan, U., & Swamidurai, R. (2021). Integrating cybersecurity concepts across undergraduate computer science and information systems curriculum. In 2021 ASEE Annual Conference.

[10] ISC2. (2024). ISC2 global academic program. [Online]. Available: https://www.isc2.org/landing/global-academic-program. (Accessed 21 August 2024).

[11] Lehto, M. (2015). Cyber security competencies: Cyber security education and research in Finnish universities. In ECCWS2015-Proceedings of the 14th European Conference on Cyber Warfare & Security, vol. 2015 (pp. 179–188).

[12] Lo, D. C.-T., North, M., & North, S. (2014). Hardware components in cybersecurity education. Information Security Education Journal, 1(1), 30.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202505_8(5).0039

[13] Levy, Y., & Mattord, H. (2018). Final report of the ACM/IEEE/AIS/IFIP joint task force (JTF) on cybersecurity education.

[14] Johns, E. (2020). Cyber security breaches survey 2020. London: Department for Digital, Culture, Media & Sport.