

Research on High-performance Teaching Method of Ship Helmsman Manipulation Course

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Abstract—In order to improve the teaching effect of the Helmsman Manipulation course, the Helmsman Manipulation course was analyzed. According to the characteristics of the high-performance teaching method, twelve high-performance teaching links of the Helmsman Manipulation course were designed, moreover, the effects of the application in the Helmsman Manipulation course were evaluated either. The evaluation results show that the high-performance teaching method can significantly improve the teaching performance, specifically in aspects of forming a virtuous circle, enable students to accumulate experience, forming a positive steering concept, and having important application value in the warship steering class.

Index Terms—helmsman manipulation; efficient teaching; ship; teaching section

I. INTRODUCTION

Helmsman Manipulation is an important skill training course in professional learning processes such as ships, naval vessels and submarines [1], the traditional training methods of “Leading Disciple by Masters” have not been able to meet the requirements of modern education. Thus, the adoption of advanced training methods and scientific training methods is an important factor in ensuring the effectiveness of the training course of the ship's helmsman manipulation ability training course [2]. With the development of new educational concepts, teaching concepts and learning concepts, high-performance teaching methods have attracted the attention of world-class universities and well-known military academies [3], [4]. It has formed a set of effective teaching ideas and methods of great significance to study the application of high-performance teaching methods in the Helmsman Manipulation courses.

Based on the characteristics of the Helmsman Manipulation course, this paper analyzes the teaching objectives, emotional attitudes and values, basic teaching concepts and ideas. According to the characteristics of high-performance teaching methods, the twelve high-performance teachings of the Helmsman Manipulation course are designed. Meantime, the link and the detailed evaluation of the evaluation method are used to evaluate the application effect of the high-performance teaching method in the Helmsman Manipulation course. Generally,

the evaluation results show that the high-performance teaching method can significantly improve the teaching performance and form a benign cycle training habit, besides, it enables students to accumulate valuable experience and form a positive steering concept.

II. HELMSMAN MANIPULATION COURSE ANALYSIS

A. Characteristics of the Course

1) Classification of the manipulation course characteristics

Equipment Manipulation courses can generally be divided into two categories: one is a process-based manipulation course. Be more specific, the main purpose of this type of course is to enable students to remember the operation process, usually requiring students to remember the button switch required to achieve a certain function, it mainly emphasizes the accuracy of the memory. For example, the start-up, shutdown, and parallel operation of the generator are process-based manipulations; the other is the skill-based manipulation course. The main purpose of this course is to cultivate students' experience, and the feeling, mainly emphasizes the skill and feel of the operation, such as car driving, cycling, driving and other operations are skill-based manipulation. Helmsman Manipulation refers to the purpose of manipulating personnel to control the maneuvering ship to achieve flexible maneuvering of the ship. Therefore, the Helmsman Manipulation course is a skill-based manipulation course.

2) Analysis of the regularity characteristics of the helmsman manipulative training course

In the course of the maneuvering skill training of the helmsman, it is necessary to cultivate students' ability to understand and grasp the law of manipulation. Primarily via a large number of repeated manipulation exercises, summarizing the regularity of cognition, this cognition can be called Helmsman Manipulation Experience. “Zhuangzi·Yang Sheng Zhu” records a story of “Pao Ding Jie Niu”, which illustrates the important characteristics of mastering the rules and forming experience in the skill training. In the “Pao Ding Jie Niu”, the Pao Ding (an old ancient appellation, refers to the profession of butcher for cattle) used the gap between the bones of the cattle to dissect the cattle, but did not directly and massively cut and chop like a normal butcher. This story shows that after repeated practice and

mastering the objective laws of things, then the students can improve their efficiency when operating and with convenience. Therefore, in the teaching process of the Helmsman Manipulation course, students must be trained to grasp the ability to manipulate the law.

3) *Analysis of muscle memory characteristics of helmsman manipulative training course*

Helmsman Manipulation as a skill training, muscle memory training and training is essential in the course of its teaching, which is similar to the training of sports skills such as shooting or ball. The writer of the Song Dynasty, Ouyang Xiu, once wrote in the article "Mai You Weng", the story of Chen Yao Zi's archery and the greybeard who sells oil, and the description of the skill of selling oil from the coin's hole and the way to obtain skills. Practice makes perfect and trains the theory of muscle memory. In the skills training course of Helmsman Manipulation, students also need to carry out a lot of exercises to cultivate muscle memory function.

4) *Analysis of the integration characteristics of the helmsman manipulation training course*

In the later stage of training, the maneuvering skills of the ship's helmsman require a variety of manipulation methods under various working conditions, and do not stick to the experience of the predecessors, forming their own unique feel and body and mind. This feature is just like the story recorded in "Zhuangzi · Tiandao" in "Lun Bian Zhan Lun". This story tells the true meaning of the heart by telling the experience of cutting the wheel, means it needs to break the experience and language of the predecessors, then the bondage brought by the text must be applied to achieve the target of comprehensive knowledge-integration by the students.

B. *Analysis of Teaching Objectives*

The overall goal of the Helmsman Manipulation course is mainly to enable students to learn the basic concepts and basic theories, and to master the knowledge and ability of the Helmsman Manipulation method, the rudder force analysis, and the state prediction of the ship in each subject.

The classification objectives of the Helmsman Manipulation course are divided into two parts: knowledge and skill. The knowledge part can be divided into three parts: understanding content, comprehension content and application content. The skills part can be divided into two parts of operational skills and mobility skills. Operational skills mainly include each subject manipulates the steering skills of the rudder and the emergency maneuvering skills in the event of a crisis. Migratory skills mainly include the use of generalization, induction, reasoning, imagination and other thinking skills, as well as the use of mechanics, kinematics, dynamics, statistics, basic knowledge of mathematics, basic theory and basic methods, analysis and resolution of the Helmsman Manipulation encountered Ability to calculate actual problems such as state calculation, motion state prediction, and steering law summary.

III. ANALYSIS OF THE CHARACTERISTICS OF HIGH-PERFORMANCE TEACHING METHODS

A. *Inspiring People's Intelligence*

Being able to fully inspire human intelligence is one of the most important features of a high-performance teaching method. The US House of Representatives Education Committee has a research report that says how a school teaches courses is as important as the course it teaches [5]. This view illustrates an important evaluation principle of high-performance teaching: if the teaching methods are not effective and the students' intelligence is not stimulated, then students, society and the whole country will not have any substance because of such education. Sexual change. After discussing the same proposition, Chinese educators also believe that good classroom teaching can not only stimulate students' intelligence, but also pose great challenges to teachers' ability level [6].

B. *Student Participation*

The high-performance teaching method pays great attention to the degree of participation of students in the teaching process. Psychologists have discovered through research that students acquire knowledge in different ways, and the amount of knowledge that can be remembered and kept for a long time is not the same[7]-[9]. This finding shows that multi-sensory, participatory, action-oriented, concomitant thinking, communication, and active learning are more effective than single senses, bystanders, static, less thinking, poor communication, passive and passive learning.

IV. DESIGN OF HIGH-PERFORMANCE TEACHING LINKS FOR HELMSMAN MANIPULATION COURSES

In order to fully apply high-performance teaching methods in the helmsman manipulation class, in-depth analysis and careful design must be carried out. We designed the teaching of the helmsman manipulating course as the following twelve links.

A. *Preparation before Class*

The high-performance teaching of the Helmsman Manipulation course does not begin with the preparation of the Helmsman Manipulation the teacher, but begins with the students' high-intensity pre-course preparation. According to the students' classroom performance and the status of the students' steering skills at the time, students are assigned to participate in certain classroom presentations, group discussions, experience exchanges, summary reports, skill presentations, and judgment reflections. With the help of these designated goals, students feel pressure and make everyone afraid to neglect. Students often borrow a large number of books from the library during the preparatory stage, and even read through, read notes, prepare speeches, or dare not enter the classroom. The success of teaching is

inseparable from the teacher's full preparation before class, but the high-intensity and high-quality preparation of students has a more important role in the effectiveness of high-performance teaching. Without such high-intensity pre-course preparation, the understanding and acceptance of students in the classroom will be affected. Classroom questions, class discussions, group discussions, and team discussions will be difficult to carry out effectively. Therefore, whether there is high-intensity student preparation before class is an important difference between high-performance teaching and low-efficiency teaching.

B. Classroom Lectures

Listening to classes is an important form of classroom instruction. In the teaching process of the Helmsman Manipulation course, it is necessary to listen to the teacher's intensive lectures, so that students learn to use the dynamic thinking analysis to solve the rudder by learning the helmsman manipulating knowledge, the commonly used helmsman manipulation methods and the emergency maneuvering methods. The ideas and methods of manipulating the problem form the habit of thinking in quantitative analysis. However, classroom lectures under the guidance of high-performance teaching methods are different from traditional classroom lectures. In the Helmsman Manipulation classroom using high-performance teaching methods, teachers are not the main body of teaching. Their task is to stimulate students' interest and thinking under the guidance of teachers, causing students to discuss and contend, so that students are guided and Click to let students grasp the correct direction of learning. Teachers are required to teach, but they cannot take up too much time and effort. It is generally believed that the time taught should only be less than half of the total duration [10].

C. In-class Implementation

The Helmsman Manipulation course, from the perspective of teaching content, focuses on manipulation. Cultivating students' maneuvering skills is the main task of the course teaching. In the course of the in-class teaching manipulated by the helmsman, the in-class practice accounts for a large proportion. Using the time of the in-class implementation, the teacher carefully demonstrates the normative steering process, allowing students to form a preliminary emotional understanding. This process requires a certain amount of memory. In the course of the Helmsman Manipulation course, the complex steering process of the subject is usually broken down into multiple steps, and the simulator's pause function is gradually familiarized and practiced. In the course of the class, the students will take turns to conduct steering exercises, repeatedly try to figure out and analyze in depth under the guidance and correction of the teachers, so as to master the steering process and understand the steering knowledge points.

D. Discussion and Communication

Theoretically, everyone's experience in learning the Helmsman Manipulation skills is different. It is natural

that students who have different feelings communicate and discuss each other. Under the guidance of high-performance teaching ideas, teachers need to grasp the orientation of communication and discussion. When discussion and communication are not smooth, they need to "ignite the wind when firing", inspire students' interest, guide students to think and discuss more deeply; discuss and exchange deviations. When the theme is, it is necessary to calm the students in time and return to the right track. During the actual teaching of the Helmsman Manipulation course, during the course of the theoretical and practical classes, choose the appropriate time to design appropriate questions, discussions and exchanges; at the end of most theoretical sessions and all the real at the end of the class, students are required to group by boat and exchange their experiences. The high-performance teaching of the Helmsman Manipulation course reduces the indoctrinating teaching, prevents the superficial learning of rote memorization and the low-efficiency teaching of the book. It makes teachers not only play the humble role of "Knowledge Porter", but also design more opportunities to engage in extensive and in-depth ideological dialogue and spiritual interaction with students and their teams, and even become their career guide and life mentor.

E. Group Discussion

Every time a period of study and practice is taught in the ship's helmsman manipulation course, students will be asked to group the boat to discuss the optimal steering plan. The general design interval is 3 lessons. After each 3 lessons, the students are inspired and guided to summarize the current manipulation experience, find out the steering methods that they personally think are most effective, and contribute to other team members. In order to encourage students to summarize and contribute their own experience, students will be organized to conduct a standard process design and experience summary report evaluation activities before the end of the Helmsman Manipulation course. The results will affect the final grade of the course. The standard process and experience summary report of the students participating in the competition will need to accumulate materials in the process of group discussion, gradually improve, and gradually optimize, and finally form a standard process and report that can participate in the evaluation. In this discussion, the teacher is just a moderator, constantly asking questions and guiding the deepening of the discussion. Students can't rely on the rules and steps in the book, because few people ask what is said in the book. The book has been read by everyone, and repeating the contents of the book is equivalent to talking nonsense. What they have to look at is what kind of skills they have gained through steering training, what experience they have, what advice they can give others, what defects can they find out from others, whether they have critical thinking skills, whether they can build on the original basis, then go one step further and point out more optimized steering techniques and experience. Some American military experts said: "The most effective form of learning is a small discussion group." [11]

F. Homework and Exercises

There has only a small amount of written assignments in the operation of the Helmsman Manipulation course, and most of the remaining operations are simulator manipulation training operations. However, the simulator manipulation training volume is very large, requiring each student to have more than 100 hours of actual operation on the simulator. When completing a large number of homework assignments under the class, students are required to repeatedly try to figure out, conduct theoretical analysis, and think deeply. They often describe their own steering feelings, present their own steering opinions, and form experiences and skills for subsequent communication and discussion. High-performance teaching, with high difficulty, great challenge and stimulating, can stimulate the passion of student participation. These assignments are often not only the personal behavior of the students, but also need to report to all the students in the follow-up class to show the feeling of steering, accepting questions from everyone. Sometimes it takes several students to form a research group. After thorough research and preparation, report the steering conclusions formed by the discussion to the whole class and discuss them. For students with higher levels, they are often asked to give a lesson to all students. These homework exercises are far from looking at the textbooks that are distributed, as simple as answering a few questions on the homework. If students do not make full use of the time of class, do not carry out a lot of practical training, and do not carry out in-depth thinking and research, it is difficult to pass.

G. Adherence of Mutual Merits

There is no right or wrong in aspect of ship helmsman manipulation skills, different people's steering experience and steering experience are different. Confucius said: "Threesome, there must be my teacher existing among them," everyone's experience has merit. Students can learn from each other, explore and communicate with each other, and promote each other. Simultaneously, the helmsman's maneuvering skills are still different. As long as there is an opportunity, each student should be open-minded to those who have more steering experience than themselves. In addition to consulting teachers and experimenters, they can also go to higher grades and old students. Qualification students, promotion training students, etc., can consult and communicate, can communicate through language or text, or they can enter the classroom or training room to communicate, they can also come over for individual guidance.

H. Report Writing

In the later stage of the warship Helmsman Manipulation course teaching, a helmsman's experience report was designed to evaluate the viewpoints, steering experience, sentiment, skills, lessons, insights, etc. accumulated by the students throughout the course of the Helmsman Manipulation course. Via comprehensive analysis, then to extract the fine, to falsely save the truth, write a steering report, participate in the competition. The

results of the competition are included in the final assessment results of the Helmsman Manipulation course, meantime, reports and papers are important forms of teaching for high-end vocational training. During the selection process of the report, students, group members, and curriculum teachers will be consulted and discussed repeatedly, report writing must be in strict accordance with academic norms and even meet publication requirements. The US National Defense University even stipulates that students can use a special research report or academic paper to replace two or three electives, in addition, some institutions also publish student reports in a certain form.

I. Standard Design

When the Helmsman Manipulation course is advanced to a certain stage, the student's steering skills and awareness level have been greatly improved, and students are required to try to find the optimal steering plan for specific steering subjects. In this process, the one-step motion method in the queue training is often referred to, and the complex steering process of the subject is decomposed into multiple steps, and the simulator pause function is used to familiarize and practice step by step instead of pursuing the feeling of flowing water from the beginning. After a long period of trial, comparison, and thinking, students can be asked to start from their own, and for all the ship management subjects they have studied, design the steering process that they think is optimal as a written standard process.

J. Collective Judgement

Organize students to collectively discuss the reports written by each member, so that each student can make revisions to other people's steering experience reports and score evaluations based on their unique experience skills and quality expertise, contributing to the growth and progress of other students and even teachers' influences. In many leading universities, students are not only educators, but also extremely important educators; not only the beneficiaries of the educational process, but also the most important contributors to educational value.

K. Evaluation of Feedback

In the process of implementing the benign cycle teaching principle of "Learning - Practice - Assessment - Feedback - Re-training", feedback is a very important part. In the teaching of the Helmsman Manipulation course, students need to receive counseling, reflect on practice, sum up experience, and apply to the new round of practice on the basis of timely, effective and meticulous comprehensive evaluation feedback on daily performance and progress. keep improving. An important responsibility of the instructor is to be responsible for timely, effective, detailed and comprehensive evaluation feedback on each student's performance. In addition, other personnel in the college, such as student team leaders, senior students, etc., can also participate in evaluation feedback, forming a powerful educational guidance force everywhere.

V. ASSESSMENT METHODS

The exam is a baton, how to test the college, which largely restricts and determines how the teacher teaches and how the students learn. In order to effectively implement the comprehensive evaluation teaching link in the Helmsman Manipulation course and improve the teaching efficiency, the evaluation method of the Helmsman Manipulation course is designed as follows.

The duration of the usual ship simulator steering training is recorded in the Ship Maneuvering Time Record. The cumulative number of hours of steering is the upper limit of the final assessment of the course. That is, only students with a cumulative steering time of more than 100 hours (4,500 minutes, if the cumulative steering time is measured in minutes, divided by 45 to get the number of hours), it is possible to get full marks; if the cumulative steering time is less than 100 hours, when the course is assessed When the score is greater than the accumulated number of hours, the cumulative number of hours is used as the final score of the course. When the course assessment score is less than the accumulated number of hours, the course assessment score is used as the final score of the course; if the cumulative steering time is less than 60 During the class, regardless of the course assessment score, the final grade of the course is unsuccessful.

The assessment method of this course is divided into two parts: the theoretical closed-book examination and the practical examination. The scores are assessed by the percentage system. Among them, theoretical examinations account for 30% of the total scores, and actual examinations account for 70% of the total scores. If one fails, the assessment results are assessed as failing.

The actual assessment is divided into the results of the examination and the results of the examinations, and the results of the examinations are 60% of the total scores. The average performance of the examinations is 10% of the total scores.

The scores of the actual implementation examinations are recorded as 10 points. The production methods are as follows: The students are divided into three groups according to the boat type. Each student participates in the group discussion according to their usual steering feelings, and then accumulates by the usual group discussion. The material of the collective report, at the end of the semester, writes a group report on the steering sensation of the group. The final rating is graded. The evaluation is based on the collective evaluation. The scoring staff includes all students and teachers. The team with the highest score is scored between 7-10. The team members with moderate scores scored between 3 and 7 divisions, and the team with the lowest scores scored between 0-3 divisions. The specific score of each group member was written by the teacher according to the group member before the end of the course. The quality of the personal steering report, the performance of the classroom discussion and exchange, the results of the quiz test, and the quality of the standard design of the steering process are given. Through the above assessment and evaluation methods, the usual practice time, written test results, practical examination results, quality of

writing reports, discussion and exchange, group discussion, and usual test performance of the Helmsman Manipulation course can be incorporated into the assessment system. The motivation for students to learn.

VI. EVALUATION OF APPLICATION EFFECT

In the teaching process of the Helmsman Manipulation course, after applying the high-performance teaching method, the teaching quality has been significantly improved, and a good teaching effect has been achieved, mainly in the following points.

Significantly Improved Teaching Achievements There were 9 students in the previous ship Helmsman Manipulation course in total, and 5 of them failed at the end of the course. After the retake, there were still 3 failures, with an average score of 71. In the follow-up courses, the steering skills of several students are not up to the job. There were 11 students in this year's class in the college. At the end of the course, only one failed the test scores. After the test, the pass was passed, and the average score was 85 points. In the follow-up course, all students' steering skills are sufficient for the job.

Formed a Benignly Cycled Training Habit Practically implement the benign cycle teaching principle of "Learning – Practice – Assessment – Feedback - Re-training", paying attention to the skill generation process of the ship's rudder manipulators that need to practice repeatedly to form experience and feel. Students learn skills and standards to be met before they participate in practice, and then apply the acquired knowledge and skills to practice; the practice process is supervised, and their performance is regularly evaluated according to established criteria, and specific feedback information is given; students Accept feedback and counseling, reflect on practice, sum up experience, and then apply to a new round of practice, so that it will continue to improve to a new level. This virtuous circle can accompany the student's working life and benefit his whole life.

Accumulated Valuable Steering Experience In order to participate in the steering experience report, students accumulate research ideas, steering experience, sentiment, skills, lessons, opinions, etc., which is a valuable asset that can provide useful reference for future students and can also provide reference for teaching. When the steering experience report is accumulated more, the selection of the machine is published.

Formed a Positive Steering Concept The high-performance teaching method has greatly stimulated the students' interest in learning, and the students have recognized the steering skill of the helmsman as the sense of honor and mission of the niche profession, and cultivated a careful and meticulous attitude and a patience-oriented character. The unpredictable state of mind gradually develops students' dedication, lean, dedication, innovative work attitude and meticulous work style.

VII. CONCLUSION

Based on the characteristics of the Helmsman Manipulation course, this paper analyzes the teaching

objectives, emotional attitudes and values, basic teaching concepts and teaching ideas. According to the characteristics of high-performance teaching methods, the twelve high-performance teachings of the Helmsman Manipulation course are designed. The link and the detailed evaluation of the evaluation method are used to evaluate the application effect of the high-performance teaching method in the manipulative manipulation course. The evaluation results show that the high-performance teaching method can significantly improve the teaching performance and form a benign cycle training habit. At the same time, students can accumulate valuable experience and form a positive steering concept. The high-performance teaching method has important application value in the warship steering class.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Haipeng Zhang and Xiao Zhang wrote the Helmsman Manipulation Course Analysis and Design of High-performance Teaching Links for Helmsman Manipulation courses part of the paper; Haipeng Zhang and Xiaoyu Ai wrote the Evaluation of Application Effect part of the paper; Xiao Zhang and Xiaoyu Ai wrote the Analysis of the Characteristics of High-performance Teaching Methods part of the paper; Xiangpeng Zhang wrote the ASSESSMENT METHODS part of the paper; all authors had approved the final version.

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