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The Application and Discussion of Virtual Simulation Platform in the Teaching of Ship Handling and Collision Avoidance Course

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Abstract. With the development of the computer, virtual reality technology and "Internet+" concept, the virtual training system was used by all walks of life to carry out pre-job training, virtual simulation teaching has become an inevitable trend of the education industry. Through the analysis of the drawbacks of professional course on ship handling and collision avoidance, combining the advantages of virtual reality technology "Internet+" practical application in simulation implementation, the application superiority and significance of the application in the ship maneuvering collision course teaching is to be given in order to promote the development of virtual simulation teaching.

1. Introduction

As early as the middle of the 20th century, the research on ship handling and collision avoidance simulation was paid attention to by some shipping developed countries in the west. Abstract concepts of ship handling and collision avoidance were quantified and calculated by these countries to conduct in-depth research on decision generation and visualization of ship handling and collision avoidance. In the 1970s and 1980s, simulation research on ship collision avoidance system was first carried out at the Liverpool University in UK and Tokyo Merchant Shipping University in Japan. A ship collision avoidance expert system developed by Liverpool University and the research of collision avoidance decision system on the experimental ship called shihirokuaru in Japan was a pioneer in the simulation of ship handling and collision avoidance. With the development of China's shipping industry, it was not until the 1990s that the research on ship handling and collision avoidance simulation system was gradually paid attention to. At the same time, the ship handling simulator required by the training of seafarers was the only ship handling simulator of Dalian maritime University in China that was certified by Norwegian classification society class A. The application of large ship handling simulator in crew training has the disadvantages of high cost, few trainees accommodation and limited practice time and venue. If a pure virtual platform can be built to simulate typical scenes of ship collision avoidance rules, the above problems can be better solved. And as the system functions are upgraded and improved, the web-based online operation training platform can be realized, enabling students to practice anytime and anywhere.

Today, with the rapid development of information technology, teaching methods based on Internet virtual platform are becoming popular. When some boring knowledge is presented to students through virtual platform, it becomes easy to understand. The application of virtual reality technology in the field of education should be further developed to create a virtual learning platform for students to change the traditional thinking mode of stuffy teaching. As a result, the teaching effect can be

strengthened and teachers' teaching pressure can be relieved.

2. The Research Conditions at Home and Abroad

Virtual simulation technology has developed rapidly in foreign countries and has been widely used in college teaching, as well as in medical, military, aerospace and other fields. In China, although virtual simulation technology has been widely involved in some 3D modeling design or numerical control model teaching, in the application of driving professional training in ships, and other fields, only the large ship manipulation simulator has been currently recognized and widely used. The use of the device has many limitations, and the application of virtual simulation teaching is relatively simple. At present, when college students learn about ship collision avoidance, the use of large-scale ship manipulation collision avoidance simulator for teaching and training requires wider site and higher cost, more strict safety management regulations of the laboratory, which have many limitations and do not meet the actual conditions of most schools. Therefore, students' learning is still in the stage of theory learning in class and relatively weak practice.

3. The Existence of Problem

3.1. Uniformity of Teaching Models and Methods

Nowadays, the students of the domestic universities' navigation technology major are basically taught through the traditional teaching mode when learning the ship's manipulation and collision avoidance. The teacher explains the textbook knowledge on the podium while the practical simulation classes are not enough. What's more, exams in the internet have been used in the majority school which lead to a duck-stuffing type of learning. It not only reduces the quality of classroom teaching, but also affects students' learning enthusiasm and real practical application after boarding.

3.2. The Lack of Practical Training Positions

It demands higher requirements of Marine navigator and more power to break the forces, so the real operation risk factor is too large. In the face of the hull, the safety of the site operation is relatively high, and the cost of use and maintenance is relatively high. When the operation is touched, the operation for a long time and many times does not conform to the actual situation. It is unrealistic to actually carry out the training related to the operation and collision avoidance on the ship.

3.3. The High Cost of Training

At present, college students are mainly at the theoretical level in learning to avoid collisions, which is difficult to understand and accept at a deeper level, which is not conducive to students' mastery and understanding of knowledge. If training is carried out with a large simulator, the site requirements of the equipment and equipment are high, the cost is too high, and the safety management regulations of the laboratory, etc., have strong limitations and do not meet the actual conditions of most schools.

4. The Advantages of Platform in the Teaching of Ship Maneuvering Collision Avoidence

4.1. Make Up for the Shortage of Teaching and Training Equipment

With the rapid development of shipping market, the demand for crew members is increasing and at the same time, the related technologies of crew training are in advancing. In the process of training of related professional colleges and schools and training institutions, it is necessary to combine shipping development characteristics and the crew types, constantly updating teaching training, equipping with professional equipment for teaching and training, and then cultivating more professional talents. However, for some smaller navigation colleges and some training institutions, due to lack of space, insufficient funds and other factors, the training equipment cannot be updated immediately and meet the teaching needs. As a result, students or crew members have great problems in mastering new knowledge in the training process. However, the targeted introduction of ship maneuvering collision simulation platform can build a good learning environment for students, through the standalone version or web page version of the online virtual simulation platform, making students understand

how to conduct collision operation when the ship sailing on the sea, and how to solve various problems encountered in handling collision avoidance. These knowledge can be trained on the platform, helping them acquire knowledge and skills in the virtual practice and improving the teaching effect.

4.2. Optimizing Classroom Teaching Effect and Stimulating Learning Interest

At present, there are a lot of schools or training institutions offering navigation majors, but there are only 7 colleges and universities on a large scale, such as dalian maritime university, Shanghai maritime university, jimei university and wuhan institute of technology. Among them, only dalian maritime university is affiliated to the ministry of communications, other institutions and institutions have relatively low reputation and are less attractive to students, which makes it difficult to attract more students. Besides, aging equipment and other factors make students less interested in learning. After using the virtual simulation platform for teaching, a large number of ship collision avoidance knowledge in the textbook can be digitized, visualized and video, and the three dimensional model can make the rigid knowledge points in the book more concrete. Deepen students‘ understanding and mastery, improve student’ learning efficiency. In addition, it can also be used as a publicity point to attract more students *to* the school and increase the competitiveness of students.

4.3. To Improve the Teaching Quality through the combination of Theory and Pratice

Due to the lack of equipment in some smaller universities and training institutions, there is a delay in the implementation of courses on ship handling and collision avoidance. Such being the case, students can only finish the theoretical knowledge, and there is little chance for them to use the largescale ship handling and collision avoidance simulator for practical operation training, so they cannot master relevant knowledge well. After boarding the ship, most of the knowledge learned in the school was forgotten, which greatly reduced the enthusiasm and efficiency of learning.

The teaching of the application of virtual simulation platform can effectively avoid the occurrence of these problems, in the process of classroom teaching theory. Through the direct using of the virtual simulation platform of ship maneuvering collision process and the specific operation for intuitive demonstration, the possible problems in a timely manner can be presented in front of students. Students, through the observation and started training operation, can directly grasp the relevant knowledge of ship collision avoidance, achieving the objectives of the synchronization of classroom teaching.

4.4. Enhance the Enthusiasm of Participation and Meet the Overall Teaching Requirements

In the process of training crew, students can not carry out the experiment of independent ship handling and collision avoidance due to the limitation of equipment conditions, so they can only drill in the large-scale operation simulation room in the form of groups, leading to the fact that the actual operation ability is not satisfied, which affects students' understanding and mastering of collision avoidance knowledge. However, using virtual simulation platform can directly control computer to conduct ship collision avoidance training operation, improve the practical ability of students, strengthen their mastery of knowledge level, and meet the overall requirements of teaching. The specific operation measures are as follows:

Firstly, create a good learning atmosphere. The virtual simulation platform will not be widely promoted and used without following supports. On the one hand, it needs the government's policy support, which can be widely promoted in a short period of time. On the other hand, the school should increase its support for the simulation teaching, constantly carry out the teaching renewal reform, make most of the teachers familiar with the virtual platform, try best to stimulate the enthusiasm of the teachers, and make the virtual platform virtual. Then the use of simulation platform in teaching will be much faster.

Secondly, expand channels and resources. Resources are the basis of virtual simulation platform teaching. If we want to fully carry out virtual simulation education, we need to arrange and utilize resources reasonably. For example, by increasing cooperation with the same type of colleges and universities and with shipping companies, we can find a practical operation platform for students, so

that students' practical ability can be exercised, nevertheless, the virtual simulation platform can play a greater role to improve the overall quality of students. On the basis of the virtual simulation platform, combined with Internet, we can make a web version of the ship collision avoidance related professional control system, which can make students more convenient in practice.

Thirdly, driven by radiation from point to area. In essence, at the technical level, the teaching of virtual simulation platform belongs to computer science. While vigorously promoting the teaching of virtual simulation platform in navigation related colleges and universities, it also needs the support of computer science in technical maintenance, so the computer related majors will also get corresponding development. After the success of the experiment in our own college, we can also introduce and promote it to other same colleges, so as to popularize the navigation training related industries and adhere to the teaching method of virtual simulation technology in the way of driven by radiation from point to area.

5. The Significance of Virtual Simulation Teaching in Ship Maneuvering Collision Avoidence Course

The development of operating software for the typical meeting scenarios in the international maritime collision avoidance rules can make the knowledge of collision avoidance rules easilier learnt by the students, and make the pilots of the pilots more proficient in the collision avoidance operation. The purpose of the dangerous probability of voyage is to ensure the safety of the ship. Therefore, the virtual simulation platform that which has been introduced the stand-alone version or the online version of the ship in the ship collision avoidance course has high application value.

(1) Development of ship collision avoidance simulation software can reduce ship maintenance costs and ship damage probability. In the actual collision avoidance operation, the hull navigation consumption is too large, the cost too high, and the operation mistakes of the hull will require a high maintenance cost.

(2) It can be learnt by students more easily. Only through personal operation can correct abstraction and generalization be made. It is difficult to master such abstract knowledge without the experience of one's own operatio.

(3) It is a good operation and learning opportunity for the social crew. The social crew can only conduct training on the ship when learning to avoid collisions, having few opportunities but frequent accidents. After the several-time practices, the grasp of collision avoidance is more firm and accurate, and it also makes the future navigation safer.

(4) Security is guaranteed. In actual operation, if the ship fails to avoid accidents, it may cause damage to the hull and cause damage to the personnel on board. This is a serious hazard. However, when practicing with the ship collision avoidance simulation system, the error will be promptly prompted or judged. If you fail, there will be no loss. You can have the students or the social crew perform multiple safety trainings until they have completely mastered.

6. Conclusion

Rmarkable effect will be achieved when the single or online virtual simulation platform is applied to the teaching of the ship maneuvering collision course, which is developed according to the international regulations for preventing collisions at sea in a typical encounter scenario. For instance, the teaching field and the teaching equipment investment cost will be reduced. The platform is also easy for maintenance and content updates, which will be beneficial to student’s autonomous learning, practice of ship collision avoidance operation demonstration study and the improvement of efficiency of teaching resources. Moreover, a new teaching practice platform will be established when the application has been used to the professional teaching of ship handling and collision avoidance. The comprehensive teaching level of the platform also will be improved thoroughly, which is of great help to train high-quality and professional ship driving talents.

7. References

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