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OBE-based Lab Opening Model Construction in Navigation Technology

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Abstract: ***Carried by the opening of maritime technological laboratories, depended upon technical means of informationalization, we try to realize the intellectual opening of laboratories. Meanwhile, we also, by the means of establishing scientific and high-efficient opening management systems, carry out classified and storied opening pattern, and implement the connotation of Obe concept, integrate OBE concept into the talent cultivation of navigation technology so as to fully develop the educating effect of professional laboratories and assis in the high-level talent cultivation in navigation technology.***

Keywords: Output-oriented; Navigation Technology; Laboratory Opening Management; Intelligent Management Platform.

1. PREFACE

OBE, short for Outcome-based Education, is now commonly recognized mainstream educational reform concept among economically developed countries. According to the perspective of its founder, Spady W.D, the acquisition of professional qualification is, in itself, a typical OBE. Compared with traditional education, the core of OBE lies in its designated process, the expected achievement and demands decides training objectives, training objectives decide teaching design. Such a concept concentrates on students' learning achievement and ability acquisition, student-oriented and taking students as the constructor of knowledge and abilities, so as to prompt their study quality and achievements at a step-up posture.

The mainstream specialty in Jiangsu Maritime Institute, Navigation Technology has an engineering and practible feature. The implementation of a large amount of teaching and scientific research work are relied upon the professional laboratories. Active boosting of the opening up of Navigation Technology laboratories will be of assistance to develop the supporting role of professional laboratories in teaching and scientific research. Meanwhile, along with the rapid development of marine communication, ship automation controling technology, as well as the emergence of "E-navigation", unmaned artifical ship and other concepts, modern navigation is far different from traditional navigation, it is now an in-depth combination between navigation and other information technologies. Therefore, in the actual professional education, we need to pay more attentionon students' exploration and innovation spirit as well as the cultivation of practical abilities which are also the basic requirements of OBE concept. The opening of Navigation Technology laboratories may better integrate OBE concept to the cultivation of professional talents.

2. OBE-BASED LAB OPENING MODEL CONSTRUCTION IN NAVIGATION TECHNOLOGY

Under the guidance of OBE concept, the opening of laboratories should be multi-dimensioned which means not only the opening of time and space but alsothe content and methods. Meanwhile, we should also supplement it by providing efficient opening pattern in consideration of individual differences among students as well as corresponding guarantee system. Laboratoies mainly serve the experiment teaching or professional training, social service and scientific research project in a short period. currently, the majority of laobratories are not in an open operation. Therefore, we mean to carry out a research on the laboratory opening management pattern from three perspectives, intellectual laboratory opening, scientific and efficient opening system, classified and multi-layered opening pattern.

2.1 Intellectual Laboratory Opening

OBE concept sticks to people first and student-oriented. The purpose of opening laboratoies is to introduce more students into laboratories. Therefore, in terms of form, we adopt an easily accepted form for colleges to hear and see. Based upon the actual situation, we rely on the technologies of computer network, Web of Things, etc to build

an Intelligent Management Platform so as to realize the intellectual opening of laboratories and futher comform to students' demands and interests.

2.1.1 Online Appointment

Relying on management platform, laboratories provide online appointment from both the end of website and the end of mobile phone. The laboratory manager can set behind the scenes the information of available laboratories and experiment projects. Students may operate from the website or the mobile terminals. After importing the basic information, students may voluntarily select laboratories, experiment projects and reserve to use according to the corresponding time periods.

2.1.2 Security Admittance

Navigation Technology laboratories assemble a large amount of apparatus, equipments, and consumbles which may involve into water, electricy and gas. Teachers and students should raise their safety awareness and prevent secrity accidents from occuring. Therefore, upon the first time of appointment, students should be checked with a test of security admittance and be empowerd to make appointments after he passes the test. Security admittance test contents mainly include the basic laboritory knowledge, equipment operation procedure and special attentions, etc.

In terms of failing to make a reservation, violation against lab rules and regulations, management plafform can record these unfavorable cases one by one and withdraw students' reservation authority according to gravity of the circumstances. Such students need to be retested on the security admittance and may regain their reservation authority which can help to improve students' sense of duty and cultivate a prudent and serious experiment manner.

2.1.3 Online Instructions

OBE concept promotes process evaluation, process instruction and may realize online instructions on the management platform. If students have any questions, they may have real-time communication with instruction teachers. Meanwhile, teachers may also conduct supervision upon students' experiment operations at any time, bring about improvement suggestions and prompt students to realize expected experiment results. The establishment of intelligent management platform breaks the boundary between inside and outside laboratory classes, establishes a seamless communication bridge between students and teachers. Teachers may log in from website or mobile terminals and watch students' whole experiment process through CCTV system. Each step and detail of students' operation may be clear at a glance.

The platform also provides transcribe and playback functions on the experiment process. This function empowers the teacher to rewatch the video of students' operations and forward feedback to students through Wechat group, QQ group and other new media channels.

Online instructions make laboratory opening more flexible. Instruction teachers may also conduct instructions even though they are not on the site. The communications between teacher and students may not be restricted by time and space. Such a manner draws the distance close between teachers and students and fully emobies OBE's student-oriented concept. Teachers are both instructors and cooperators, assisting in students' accomplishment of expected experiments.

2.2 Scientific, Efficient Opening Management System

OBE concept holds the idea that students' learning results should be close to reality, both lasting and enduring and be not easily forgettable information and one-sided knowledge. To ensure students get lasting and efficient real learning achievements in the lab, and form a virtuous circle of opening system of Navigation Technology laboratories, we establish scientific and efficient lab opening management system. Aside from further completing the original management systems and security contigency plan, we should take full consideration into the features of an open lab, match the lab with efficient management means.

2.2.1 Trilateral cooperation

Professional laboratory of Navigation Technology relies on the base of intelligent management platform and needs specialized administrator. Besides, due to a high level of lab's professional apparatus and equipments, tutorial system should be introduced in the opening process. Students must have their designated instruction teacher in experiment-reservation. Students, administratior and instruction teachers play different roles in the opening of laboratories. It should be clearly designated the duties and responsibilites of each part,construct a firm and sound triangle collaboration system, promoting the orderly opening of labs commonly.

The relations among the three parties are as the following diagram.

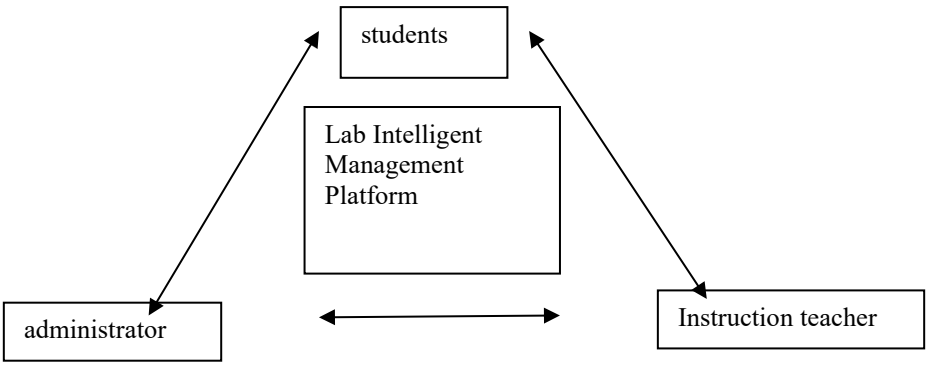

Figure 1: Trilateral Collaboration in Lab's Opening Management

Students are experiment operators and lab users and should comply with administrator arrangements, abide by the concerned management lab rules and regulations, normatively use the intelligent management platform, raise their experiment security awareness, keep apparatus and equipments complete and lab clean. Meanwhile, they are supposed to prepare for the experiments actively according to the teacher's instructions, hand in corresponding experiment results and reports in time.

The administrator is the server of lab opening. First, he should conduct the lab opening and the maintenance of management platform, guarantee the smooth operation of the lab and the platform. Second, he should accord to the demands of students and teachers, adjust and configure incessantly more reasonable lab soft and hardward resources and concerned consumbles. He should also be in charge of the accounting and filing of concerned data in lab opening.

Instruction teachers are the supervior of students' experiments, exerting a leading role in platform reservation, security admittance and online instruction. Instruction teachers should also assist students to make correct and efficient experiment plan, supervise students to complete experiment report and hand in experiment results actively. Meanwhile, instruction teachers should collaborate with administrator, instruct and regulate students' conduct during experiments.

2.2.2 Optimize Assessment

Instructed by the OBE concept, we should focus on result assessment, optimize students' individual assessment. We could refer to Navigation Technology students' experimenting process, reports and results, carry out review appraisal judge, support and reward those who get excellence in terms of awards, scholarship, and recommending for further study, and encourage professional students to carry out experiment activities in a feasible and practical way.

The administrators and instructions in the lab are mainly from teachers. The opening of lab will undoubtedly bring about more work load to these teachers. Therefore, more treatment bonus should be guaranteed to these teachers. Meanwhile, the department should also optimize and complete teacher appraisal system, highlight teachers' contributions in lab opening and formulate a series of inspiration and encouragement policies so as to raise teachers' activity in participating in the work of talent-cultivation in the lab.

3. CLASSIFIED AND MULTI-LAYERED OPENING MODEL

Under the idea of OBE concept, the lab opening model should combine with the characteristics of Navigation Technology and consider the individual differences of students. An open lab environment should be created and

promoted under different dimensions to assist students in carrying out experiment activities and attain expected result. Simutaneously, we should hold the belief, also the connotation of OBE, that every student can succeed, and enlarge success opportunities and help students establish a firm belief that they are sure to be talents.

The following chart is a general model of classified and multi-layered opening in the lab.

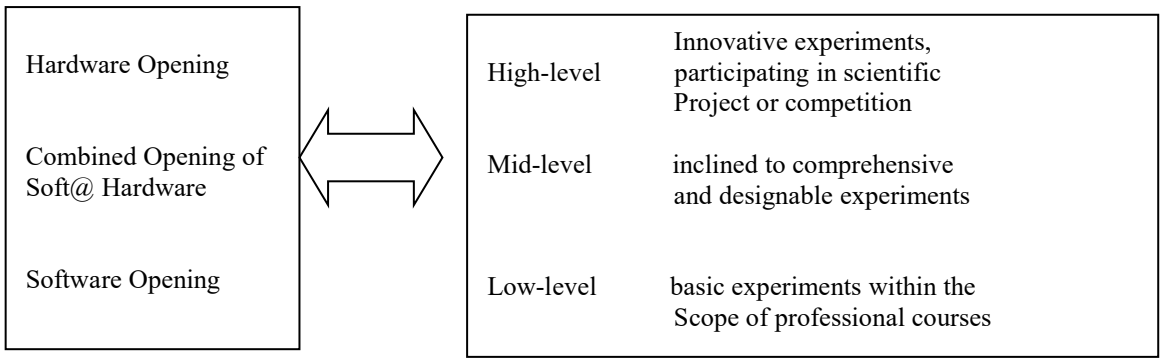

Figure 2: Classified and Multi-layered Opening Model of the Labs

3.1 Classified Opening

Professional labs in Navigation Technology involve a large amount of navigation simulators and other VR equipments including hardware and softmare. All these apparatus and equipments are installed in the lab, with their corresponding controlling software installed within the lab control room. Instruction teachers may realize the editing and setting of experiment projects and exercise contents in the control room. To fully develop lab's function in talent-cultivation, and raise the efficiency of equipments, adminstrators and instruction teachers can carry out classified opening of lab equipments and apparatus in different periods.

Through this classified opening of equipments, students can both accomplish designated experiments and edit or design new experiemnts. Such a pattern can better activate students' enthusiasm in carrying out experiments and acquire professional knowledge. They can better designate their own direction according to graduation requirements.

3.2 Multi-layered Opening

There are differences among individual students. Navigation Technology education means to cultivate refined personnel on varied positions such as Ocean-going Vessel Handling, Maritime management, Ocean engineering Construction and Maritime Education Research, etc. This accords to OBE concept's enlarge success opportunity. Therefore, professional labs should also fully embody such a principle in its opening. Multi-layered opening model may be adopted and divide all the experiments into three layers, low, medium and high levels. Each layer correspons to certain soft and hardwares and equipments. Students may do their own choice under the instruction of teachers.

Preliminary experiments are mainly the content within professional teaching syllabus, inclined to replication experiments. The are the compulsory contents of graduation. Medium –level experiments are more likely comprehensive and design experiments, higher than the course demands and approprite for those autonomous and capable students. While high-level experiments are mainly those involve complex system or innovative experiments, such as navigation safety demonstration, wharf construction, etc. These experiments can be created from teachers' crossing researh projects or scientific and technology contests. Comprehensive application of professional knowledge and principles, plus with innovative addressing of the problems can help accomplish such experiments. The setting of high-level experiments can be the incubator of innovative excellent students, beneficial to the cultivation of excellent and comprehensive maritime talents.

4. CONCLUSION

Navigation Technology lab opening based on OBE concept can greatly promote the implementation and landing of OBE concept, break the limitations of time and space, and extends the effect of cultivating talents through practices of labs. Relying on the intelligent management platform can promote labs' intellectual opening; Being

teacher and students-oriented can provide better and more convenient services to teaching research work. Through the establishment of scientific, efficient and open management system, we can establish a serious while active lab opening environment, guarantee the orderly and lasting effect of lab opening. Adopting classified and multi-layered opening pattern is apt to raise students' learning enthusiasm, activate innovation spirit and facilitate the elaborate cultivation of professional talents.

Currently, JMI lab intelligent management platform has been in operation for a period, with a fine result. Through practice, we also find there is a need to further research on the points of network security, system formulation, and implementation of opening patterns. From today on, we should base on the characteristics of Navigation Technology teachers and students, learning experiences from concerned colleges and universities, incessantly perfect the management pattern of professional labs' opening.

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