

A Study on the Improvement of On-board Training Program through the Analysis of Satisfaction Level

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Abstract : The educational process and result of onboard training should be evaluated according to the 1995 Amendments to the International Convention on Standards of Training, Certification and Watch-keeping for seafarers(STCW), 1978. In particular, the revised Convention requires that a trainee's seagoing service must be recorded in each cadet's Training Record Book approved by the maritime administration responsible for the issuance of certificates of competency. Trainees for certification under regulation III/1 of the STCW Convention are required to complete an approved on-board training programme. The purpose of this paper is to understand the compliance of the education for an approved on-board training programme. The questionnaire was distributed among 110 cadets being trained on board the training ship of the maritime college of the Mokpo National Maritime University. In this study, we conducted the questionnaire survey which is related to the on-board training programme such as marine engineering; controlling the operation of the ship and care for persons on board; electrical, electronic and control engineering; etc. The survey revealed that onboard training program was normally satisfactory, however, lack of practical training tools and time have accounted for most of the reasons for dissatisfaction. Therefore, it is our goal to enhance the satisfactory value of onboard training education by analyzing the reason of the dissatisfaction.

Key Words : Standards of Training, Certification and Watchkeeping for seafarers, On-board training record book, Competence on-board training programme, Regulation III/1 of the STCW convention, Satisfaction of the education

1. Introduction

In the navigational operation of the automated and large ship, shipboard personnel are always required to have an outstanding ability as well as highly specialized knowledge and competent capability to handle situations during shipping crisis because there are always instances in shipboard life such as, danger, isolation and publicness. Therefore, marine officers need robust physical and mental strength through study of specialized knowledge and rigorous training in a systematic training program. The on-board training course is a very important process in terms of pre-training for ship embarkation.

The latest development in the automation system technology caused reduction of on-board personnel, increased tasks and workloads of the marine officers and their job performance ability is significantly required compared than before(Yang, 2012).

Meanwhile, responsibility of duty officer for safety of human life is aggravated and there are plenty of things to handle immediately the emergency situation by themselves. In order to perform their tasks, shipboard capacity building is needed through

training courses based on the spirit of self-reliance(Nam, 1995).

Recently, large marine accident probability is increasing because the shipping system has become faster, larger and more automated process. Specially, in various and peculiar risks to marine time, marine officer controlling the ship operation is required to be equipped with highly specialized knowledge and skills to resolve crisis in real-time scenario.

Such significant portion of these marine accidents is attributed to human errors hence the importance of education and training to personnel in the maritime sector was emphasized in a crew training, qualification, and on-call work, based on the International Convention 1978 (STCW, International Convention on Standards of Training, Certification and Watchkeeping for Seafarers).

As a result, for promotion of human safety and protection of the marine environment, STCW 1978 Convention revision was conducted by the International Maritime Organization(IMO, International Maritime Organization), in which amendments were confirmed by the General Assembly in June 1995, and amended convention was entered into force as of February 1. Through this revised convention, maritime training institutions should build the organized educational system and ensure excellence in

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A Study on the Improvement of On-board Training Program through the Analysis of Satisfaction Level

education(Cho and Kim, 1998).

In the convention as amended in 1995, ability assessment to perform the duties was also emphasized. In details, record for practical boarding exercise information of apprentices is required to the training log approved by the competent authorities to issue marine officer license. Trainees must complete on-board training program as approved in accordance with minimum requirements for the first chapter of the STCW A-III / 1. In addition, they are to exercise the systematic on-board training and acquire the experience under the guidance of qualified supervisor having marine officer license and this process should be recorded in an approved training record(Kang, 2009).

In this study, to identify the satisfaction for the approved training program of functional ability on-board training ship, a survey targeting the apprentice was conducted. There were many subjects including functional capacity related to practice course such as, vessel engineering, ship's navigation and shipboard life management control, electrical, electronic and control engineering. Based on this information, we analyzed the dissatisfaction of the existed education program and suggested the methods to improve the ability of seamanship.

2. Qualities and abilities of marine officer

To perform the granted duties by marine technician who are responsible to ships and personnel, many high qualities and skills are required such as, specialized knowledge to manage the ship's operation, highly trained ability through repeated on-board training, caution for marine risk and quick reaction capability to deal with emergency, the cooperative spirit and leadership through the group life, mental toughness and physical fitness, and etiquette in human relations(Nam, 1995).

In international convention for training qualifications of the crew and standard for duty, some problems have been raised, such as western oriented training system for marine officers. In particular, after the accident of large marine facility, the international maritime organization started to focus on strength of material system to reinforce and improve the human element. In other words, in maritime activities, they recognized the need to amend the crew qualifications in human element and strengthen the minimum requirements to become a marine officer(STCW, 2011). Therefore, among the high-level training courses, the satisfaction during the training is very important to get the pride as a professional man and understand the concerns on uncertain future.

Table 1. Standard of competence for function

Function	Competence
1. Marine engineering at the operation level	① Use appropriate tools for fabrication and repair operation typically performed on ship ② Use hand tools and measuring equipment for dismantling, maintenance, repair and re-assembly of shipboard plant and equipment. ③ Use hand tools electrical and electronic measuring and test equipment for fault finding, maintenance and repair operations. ④ Maintain a safe engineering watch. ⑤ use english in written and oral form. ⑥ Operate main and auxiliary machinery and associated control systems. ⑦ Operate pumping systems and associated control systems.
2. Maintenance and repair at the operation level	Maintain marine engineering systems including control systems.
3. Electrical, electronic and control engineering at the operation level	Operate alternators, generators and control systems.
4. Controlling the operation of the ship and care for persons on-board at the operational level	① Ensure compliance with pollution prevention requirements. ② Maintain seaworthiness of the ship. ③ Prevent, control and fight fires on board. ④ Operate life-saving appliances. ⑤ Apply medical first aid on board ship ⑥ Monitor compliance with legislative requirements.

If the candidate is serving as a rating forming part of a watch in a manned engine-room, designated to perform duties in a periodically unmanned engine-room, on a seagoing ship driven by main propulsion machinery of 750 kW propulsion power or more, the candidate for certification as a qualified member of the engine department will have to identify their capacity as presented the standards of competence set out in STCW code A-III (STCW, 2006a). Functions of on-board training approved training records are marine engineering, maintenance and repair, electrical, electronic and control engineering, control of ship operation and management of life on board. In Table 1, the

functional ability of seamanship is contained in the first chapter of the STCW A-III / 1 are presented(STCW, 2006b).

The training-ships of Mokpo national maritime university consist of professors, assistants, a visiting professor, and the marine officers. This is in accordance to section 7 wherein qualified teachers are included on "designated educational institution standards" in enforcing law for ship vessel personnel from ministry of land, transport and maritime affairs. During boarding, the trainees are distributed to each engineer call of duty, and study works of the duty engineers and practice training educations. During anchor, an instructor in charge of the item is to conduct the practice trainings which are established by the class schedule depending on the training records. As shown as the Table 2, the lists for instructors in training ship are presented.

Table 2. Staff of training ship

No	Ranks	Staffs	Grade	Person
1	Professor	Chief engineer	Doctoral	1
2	Instructor/ Engineer	1st, 2nd, 3rd Engineer	Graduate school	3
3	Guest Professor	Chief engineer/ 1st engineer	-	1
4	Assistant Teacher	Engineer officer	-	1

3. Questionnaire survey method and its range

In this study, the questionnaire survey has been done for apprentice engineers (110 students) who boarded on a marine training ship of Mokpo national maritime university in 2011. First of all, it is necessary to prepare enough navigational quality to figure out satisfaction with training for apprentice engineers who boarded on a marine training ship to become a marine engineer. It is possible to supply useful and adequate training to apprentice engineers based on above navigational quality such as allocated jobs and compulsory standards.

A questionnaire has been made according to 5 points Likert scale(Kang et al., 2005) containing 15 questions which are based on functional navigational quality by the approved training records used on a marine training ship.

This questionnaire survey has been composed of 2 types of questionnaires to figure out satisfaction, dissatisfaction and its effect for training on a marine training ship. It has been

performed through an exclusive method by using the questionnaire. The functions of the on-board training program according to the approved training records of apprentice engineers used as analysis data of this study were marine engine, maintenance and repairing, ship handling control and life safety management, electrical engineering, electronic engineering and that of control engineering.

4. Questionnaire survey for the on-board training program

The competent authority that issues navigational quality license including an on-board training program shall perform thorough supervision and inspection through various kinds of navigational quality to complete the entire education and training programs are specified in the international convention on STCW for marine engineers. Even though the training records approved by the ministry of land, infrastructure and transportation which is the competent authority for certificate of competency issuance become a formal document proof according to the revised training records of the international convention of STCW of 1995, it is not easy to evaluate job performance quantitatively.

This study, therefore, intends to contribute to improve navigational quality of work performance by supplying systematic customized education through practical questionnaire analysis for an on-board training program.

4.1 Competence about function of marine engineering

Navigational quality standard which is required by maritime engineering function is divided into assisting class, ship handling class and managing class for engineers in charge of engines in an attended or in an unattended engine room. In this study, it mainly describes the ship handling class.

Navigational quality about marine engineering for ship handling class includes safe duty, writing and speaking in English, usage of internal communication system, the operation of main and auxiliary machines and related control system, operation of control system related to fuel, lubricant, ballast water, the operation of other pump system, electricity, electronic and control system. The minimum compulsory requirement of a duty engineer qualification is specified as a method and evaluation to prove knowledge, understanding and technology about operation and repairing, and navigational quality.

A Study on the Improvement of On-board Training Program through the Analysis of Satisfaction Level

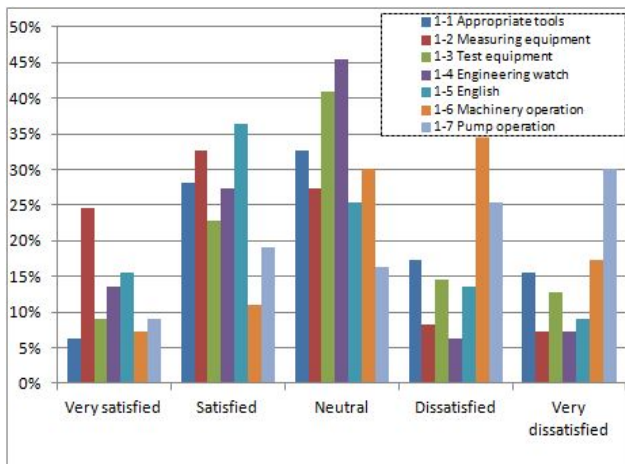


Fig. 1. Satisfactory value on marine engineering.

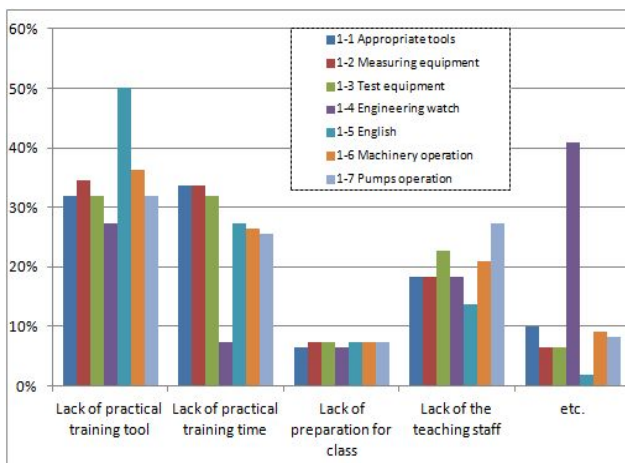


Fig. 2. Reason for unsatisfaction on marine engineering.

Fig. 1 shows satisfaction of marine engineering navigational quality such as adequate tool usage, operation of main machine, auxiliary machine and the control system to typically assemble and repair. It is shown that dissatisfaction was below 33% except in main machine, auxiliary machine, pump system and related control system, which means general satisfaction by reflecting satisfaction and dissatisfaction evenly. The reason of high dissatisfaction rate of 52% and 55% for the operation of pump and equipment are due to limited opportunity on-board training ship compared to that of contract with a shipping company.

However, the reason of relatively high dissatisfaction rate of 41% and 52% for safety duty on the engine and the writing and speaking in English about navigational quality seems to be the merit of on-board training.

Fig. 2 shows the cause of dissatisfaction with navigational quality of marine engineering, which represents minimum standard of navigational quality for specified engineer on duty by functions in an attended or in an unattended engine room. This questionnaire asked whether navigational quality for safe engine duty can be maintained or not.

At this point, many other opinions are not included in the questionnaire survey resulting to dissatisfaction includes lack of training equipment, training time, lecture preparation, ability and that of the number of teachers. On the other hand, training students were relatively satisfied with knowledge, understanding and technology about safe maintenance of engine duty than other navigational quality.

4.2 Competence about maintenance and repairing

Navigational quality about maintenance and repairing required in ship handling class evaluates ability of usage of each tool and measuring instrument for assembling and repairing, ability of maintenance and repairing of machinery in a ship itself.

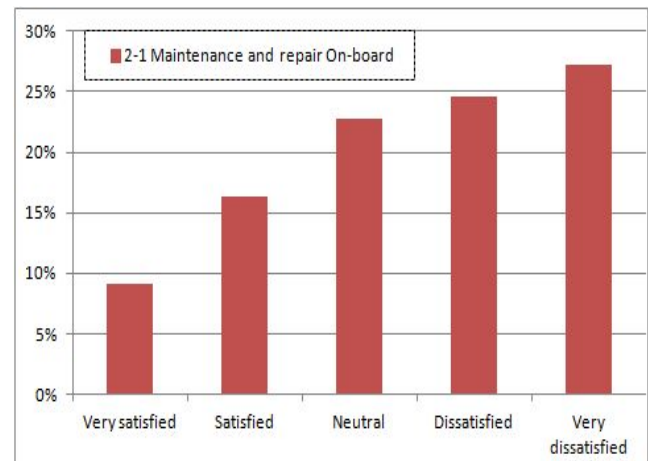


Fig. 3. Satisfactory value on maintenance and repair.

Fig. 3 illustrates satisfaction with navigational quality of maintenance and repairing of marine engine system including control system. It is shown that dissatisfaction rate is of 52% which is remarkably higher than other on-board training program evaluation. This seems to be unavoidable phenomena from relative evaluation which was derived from experience from training ship through hearsay experience of environment from senior engineers and other contract training students.

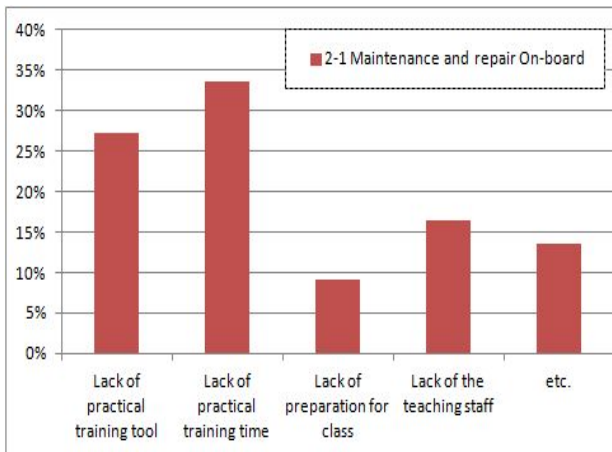


Fig. 4. Reason for dissatisfaction on maintenance and repair.

Fig. 4 demonstrates the cause of dissatisfaction with on-board training program evaluation about maintenance and repairing.

Most of the dissatisfaction was due to lack of training equipment and that of training time which were 27% and 34% respectively. Lack of teachers contributes to 16% of dissatisfaction which shows relatively high portion compared to that of other evaluation items. This seems to be the limitation from group training which means the number of training students is much more than that of teachers and instructors.

Hence, it shows that dissatisfaction is caused not only by lack of working space and shortage of teachers for maintenance and repairing work but also from limited work sharing.

4.3 Competence about function of electrical, electronic and control engineering

Navigational quality evaluation for on-board training program about operation of an alternating current generator, a direct generator and control system is clearly described in the Fig. 5.

It can be seen that the rate of satisfied students over average evaluation was very high and marked 76%. This may result from the fact that training of electrical engineering, electronic engineering and control engineering was mainly performed in class and the usage of some equipment such as an electromagnetic contactor and a tester was quite easy.

It seems, therefore, that there are more practical knowledge and experience to acquire than lecture based learning. In addition, learned theory of sequence control was applied in field instruments, and periodical inspection and participating in practicing for the instruments failure were relatively easy. This is supposed to result in more opportunities for practical learning.

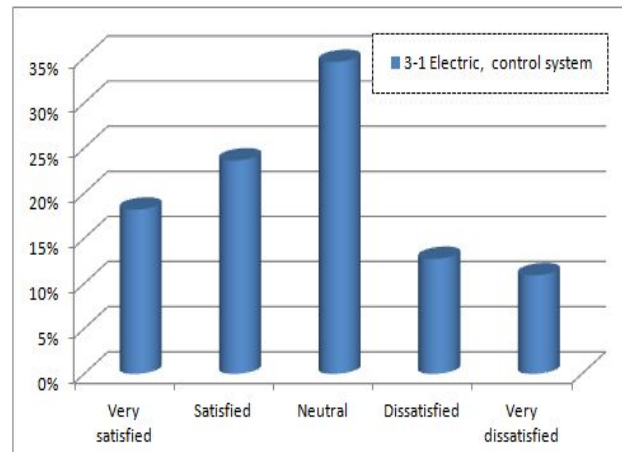


Fig. 5. Satisfactory value on electrical, electronic and control engineering.

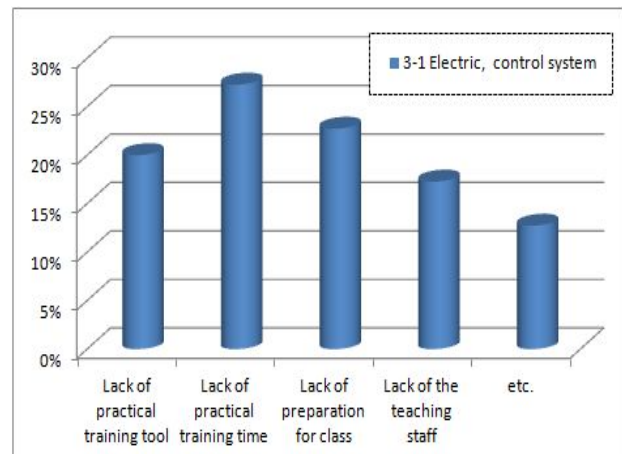


Fig. 6. Reason for dissatisfaction on electrical, electronic and control engineering.

Fig. 6 whereas explains the cause of dissatisfaction. Lack of training equipment and lack of training time showed 18% and 27% respectively. Especially, the dissatisfaction practicing about operating of alarm apparatus in an engine room and taking action for current leakage of main switch board is 12% among minor opinions.

4.4 Competence about function of controlling the operation of the ship and care for persons on-board

Satisfaction about navigational quality for contamination compliance of ship handling control and life safety management on-board, compliance of vessel seaworthy, fire control in a ship

A Study on the Improvement of On-board Training Program through the Analysis of Satisfaction Level

and an extinguisher, operation of life guard equipment, first aid in a ship and that of regulations are shown in Fig. 7 among minimum level of knowledge, understanding and technologies required to related certificate. Satisfaction rating shows an above average 85% for the compliance of vessel seaworthiness, fire control and that of regulations.

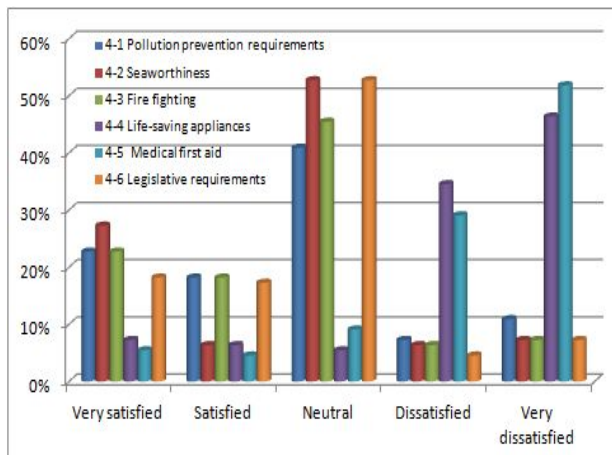


Fig. 7. Satisfactory value on controlling the operation of the ship and care persons on board.

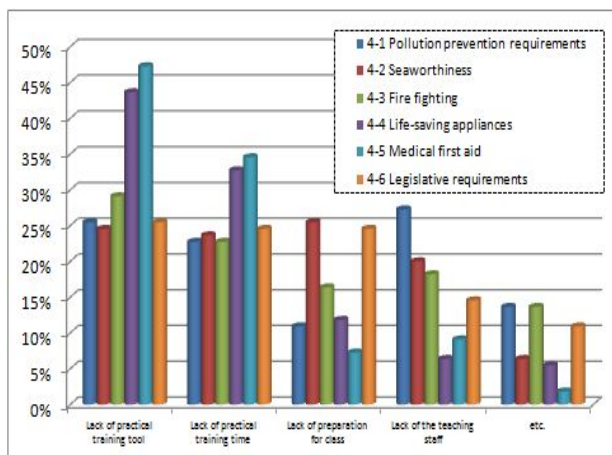


Fig. 8. Reason for dissatisfaction on controlling the operation of the ship and care persons on board.

This is supposed to happen because of the fact that repetition of theoretical education and application of mass media was preceded through classroom theory before the practical training. However, it is noted that in evaluating the satisfaction level of navigational quality for life safety and first aid, 81% of training students were unsatisfied. This implies that training students

requires not only adequate education and practical training for life safety but also they felt anxious by seasickness and maladaptation to marine environment which was derived from unaccustomed atmosphere by being isolated from the land.

Fig. 8 shows the cause of dissatisfaction with navigational quality evaluation for ship handling control and life safety management on-board. The main cause was the shortage of training equipment and lack of training time which showed 76% and 82% of high dissatisfaction respectively.

5. Conclusion

The results obtained from the analysis of satisfaction and dissatisfaction for on-board training program based on each navigational quality function according to the approved training records which was carried out under the training on a training ship are summarized as follows.

1. More than half of the training students were satisfied with navigational quality for marine engineering function. Especially, satisfaction with duty on engine, writing and speaking in English were 41% and 52%, whereas the cause of unsatisfaction was lack of training equipment and lack of training time which marked 61%.

2. Dissatisfaction with navigational quality for maintenance and repairing showed 52% and the cause was the shortage of training equipment and lack of training time. The percentage of each cause showed 27% and 34% respectively.

3. Satisfaction with navigational quality for electrical engineering, electronic engineering and control engineering was relatively high and the value was 76%, whereas lack of training equipment and lack of training time were 18% and 27% respectively.

4. Most training students were satisfied with navigational quality for ship handling control and life safety management function over average level. However, dissatisfaction with navigational quality for life safety and first aid action was 81%. The cause of dissatisfaction was lack of training equipment and lack of training time, and showed relatively high values of 76% and 82% respectively.

As shown above, over half of the training students were satisfied with on-board training program according to the approved training records, whereas the cause of dissatisfaction was mainly due to lack of training equipment and lack of training opportunity. Especially, the questionnaire survey shows

that many training students wanted technical education and that of on-board life safety management.

It is considered that in the training ship, not only training space gaining and equipment expanding but also supplement of specialized teachers for training should be preceded to make the training opportunity effectively for future trainees.

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Received : 2013. 05. 23.

Revised : 2013. 06. 19.

Accepted : 2013. 06. 25.