

An Approach to Effective Model of Radar Training

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ABSTRACT: This paper relates to comparison of different model of radar training in maritime universities/academies in world shipping.

1 INTRODUCTION

Vessels operated in the world's fleet are technically more sophisticated. The skills to operate these vessels have become more advanced.

Introducing ship's officers to operation of high level technical equipment must be provided by all means and training methods that increase safety levels of life at sea and environmental protection. [2,3]

The main role in navigation model on the navigation bridge plays the navigator. It has been proved (and published) that over 80 percent of all maritime casualties are a result of human error.

These casualties arise mainly by errors in decision making. On errors in decision making the following have an influence:

- inexperience
- inability to handle stress
- a poor attitude.

Elaborating a system of training these three elements should be taken into account. Here the period of training using different means plays an important role. Also, number of repetition of some exercises is important. Complex situations during

training have influence on results of teaching. Selection of candidates in recruitment purposes will help in the method chosen as well as effectiveness of training method.

This paper is a kind of approach to compare the shipboard and simulator training.

The following diagram (Figure 1) shows optimum preparation for the task of the O.O.W. on the bridge of seagoing vessels.

This training model in Gdynia Maritime University has been developed since 1945. From the beginning the training model was based on theoretical and practical training on training vessels and simulators.



Figure 1. Optimal Training Model

2 DEVELOPMENT OF SAFETY MODEL OF TRAINING

Polish Model of training is based on fact that school of navigation is professional type, taking into consideration the following features:

- changes in the techniques and technology in shipping and sea transport
- changes in management, organization systems in the shipping companies.

As a consequence of these items have been introduced changes in the ways and methods of training. Educational and training model is based on the following stages:

- basic training on tall ships (tests)
- theoretical training in the classroom
- laboratory training (ashore and on board)
- specialized training on training vessels
- professional 9-month training on company vessels
- thesis preparation
- final examinations.

The Maritime University is preparing seafarers with broad technical knowledge with ability of easy professional adaptation on a concrete post. Our graduates employed at sea at various stages of their professional career will be able to raise their professional skills and refresh their knowledge.

In the educational model this problem is also taken into consideration:

- the graduates have basic and professional studies during 3 years theoretical and practical training
- higher specialist studies giving the professional title M.Sc.eng.
- postgraduate studies giving defined professional qualification Chief Officer, Master Certificate and refreshing the acquired knowledge
- it is a possibility for a doctor's degree course (2 years) which acquaints the student with the use of scientific methods. This is the way of recruiting the lecturers to the university.

3 ADVANTAGE OF SIMULATOR TRAINING

The use of simulators has the following advantages:

- simulators are always available at a certain locality
- the simulation can start at a certain situation, if wanted a dangerous one too, which will happen in reality only seldom and which cannot be induced for training purposes, only
- with a simulator you can train even beyond the limit of risk
- a mistake on a simulator leading to a collision or grounding can be analysed in order to avoid similar faults in future. The psychical pressure of a real accident is often a strongly marked insecurity, which will avoid a learning effect
- simulators are more cost-effective than training ships.

The training on each simulator has the following aims:

3.1 *Radarsimulator*

The students should be able to work the radar displays in a safe way. They have to know the different plotting proceedings and how to handle them. They should detect dangers of collision and use the information about other objects being important in the special case. They should safely use the ARPA display and know the advantage of a quick information. They should be aware of the dangers of ARPA e.g. accepting too small approaching distances or not taking notice of targets if the screen is overloaded with other information. They should avoid close quarters situation by manoeuvres according to R. 19 KAR.

In coastal waters they should not neglect the problems of navigation, traffic separation and communication. Exercises should show the possibilities and the limits of communication from ship to ship. SAR exercises require a very intensive use of ARPA and radar information and communication.

3.2 *Navigational Light Simulator*

The three-dimensional imagination for estimating distances and courses of vessels during night time is more problematic than during day time. If the student is able to define the kind of vessel, to appreciate the risk of collision and to decide if his ship is the give-way or stand-on vessel and at what distance action must be taken during night time, he normally will have no problems during day time. The students learn to manoeuvre successfully according to the give-way rules and, being on a stand-on vessel, to act according to Reg. 17 too, in order to avoid a collision by using a "last minute manoeuvre".

The simulator further allows to navigate according to the information given by light bouys and coastal lights. A simple radar display provides bearing and distance.

3.3 *Ship Handling Simulator*

In former times the navigator learned to handle his ship in practice. Beside practical experience a certain feeling for the ship was necessary. This was not enough to manoeuvre super tankers and large container ships in a safe way. Ship handling knowledge was trained by means of models (Grenoble) and simulators.

At the simulator, our students are trained to transfer their theoretical knowledge about manoeuvring of ships on simulated situations. They collect data of turning circles and stopping distances and use this information for anchor, pilot and man-over-board manoeuvres. They train ship handling in narrow channels under different conditions of wind and current, especially using radius constant turns (see Table 1).

Table 1. A list of Subjects in which different Training Methods could be used [1]

No.	Subject	Simulator	Training vessel	Company ship	Computer aided Training
1	Navigation	x	x	x	x
2	Collision avoidance (radar)	x	x	x	x
3	Bridge proced	x	x	x	
4	Communication	x	x	x	x
5	Cargo handling	x	x	x	x
6	Collision Regulat				
7	Celestial Navigation	x	x	x	x
8	Docking, Mooring, Anchoring	x	x		
9	Emergencies: Collision, Fire, Grounding, loss of power		x	x	
10	Environment Effects		x	x	x
11	Manoeuvring	x	x	x	x
12	SAR				
13	Ship Business		x	x	
14	Stability and Ship Construction	x	x	x	x
15.	Safety		x	x	
16	Pollution Control		x	x	
17	Use of life-saving equipment	x	x	x	x

4 ADVANTAGE OF SHIPBOARD TRAINING

Even a perfect simulator cannot replace the reality on the bridge of vessel.

Weather conditions, movements of the ship, vibration, engine and exhaust noises and even the typical smell of a ship cannot be simulated. The movements of a ship has its effects on each human being in different way. Seasickness may put someone nearly out of action. He has to learn to overcome the sickness and himself. Another one might have less problems, but nearly no one will be free of any effects.

The psychical situation on board a ship is different from that in school. You cannot leave the ship and you have to go your watch. The relatively small training ships require an officer not too much affected by seasickness. Whoever is able to do all work necessary to navigate the ship under these conditions will have no problems later as a duty officer.

Horyzont II – training vessels of Gdynia Maritime University – originally had been planned and used mainly for practical radar training. Captains and duty officers were very cooperative. We agreed that the students should take over the whole task of navigation and collision avoidance, being supervised by the duty officer who only in critical situations would take action. Those situations were very rare. The operation area and the general course, of course, had been planned before.

A problem of shipboard training is that a danger of collision or a critical situation even an area with dense traffic will not happen too often. For instance, there was no poor visibility during the whole training time. No one could respond and no one would accept manoeuvres with the intention to take a ship on a collision course only for training purpose.

We had four or two students on each watch, beside that the duty officer and the helmsman from the crew. They took over the following tasks: track guidance, navigation and radar observation. Two students observed the radar displays. All manoeuvres intended were discussed with the duty officer before.

In a special training room, an additional radar display could be used by students being off-watch.

The navigator used the aids of the traditional terrestrial navigation. Positions were controlled by GPS (ECDIS) and radar. The training on the bridge was not a part task training. All information collected had to be used to navigate the ship. The difference to the real situation later was only that to navigate a ship is a job for only one man.

The training of radar observance was successful, too. The effects of sea clutter or rain, the detection of small objects, unwanted echoes and effects can hardly be simulated.

The manoeuvring characteristics of the training ships are of course different from those of larger ships. We trained turning circles, stopping manoeuvres, man-over-board manoeuvres and compared them the simulated manoeuvres.

5 CONCLUSION

- 1 Confirmed passage of staff between school and industry (company ships) has shown that the training model for deck officers cannot be based on one method as shipboard or simulator training only.
- 2 The didactical experimentations in the vocational training have shown that different approach is needed but the practical training during operational phases is the best method.
- 3 In many cases the economical effect plays the main role of using the ship for training purposes.
- 4 It is not possible to elaborate a good system of training using one method which will give full success in improving skills, experience abilities to handle stress and good attitude.
- 5 The current maritime simulators can be considered in terms of the capabilities and limitations, and its training effectiveness (see Table 1).
- 6 Deck officers perform a wide variety of task and it is important to achieve a level of skills during a given training period.

- 7 Each period of training comprises two elements:
 - conditions which describe the circumstances under which behaviour is performed
 - behaviour which is the specific skill and knowledge to be attained by each deck officer as a result of training and/or experience.These elements cannot be achieved on board or in simulators only.
- 8 Costs of each model of training based on training vessel is higher than simulator training model.
- 9 The best way to achieve good results in training level is to combine both simulator computer aided training and shipboard training as well.

REFERENCES

- [1] Jurdziński M., Lubers H.D., Experiences by comparing shipboard training and training on part task simulators, Handout 1986.
- [2] IMO STCW Convention 2010 as amended, Table A-II/1 and section B-1/12.
- [3] MO STCW Convention Regulation I/12 and section A-1/12 of STCW Code.