ON INTEGRATION OF WEB-BASED APPLICATIONS INTO MARITIME EDUCATION AND TRAINING

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ABSTRACT

Education and training of maritime personnel is under supervision of many international and national organizations, i.e. IMO, IALA, EMSA, National administrations, etc. Syllabuses have to be developed according to the so-called "Model courses" of IMO/IALA and have to be approved by the National maritime administrations. The use of simulators in practical training is required by IMO, international and national rules and regulations, like SOLAS International Convention, STCW78/95 – Standards for Training and Certification of Watch-keeping officers, etc. Modern simulators are computer-based and allow web-based education and training. In this paper the possibilities of bringing into use of new web-based information technologies in practical education of deck cadets are analyzed. A methodology is described where simulators and real equipment have been used during last few years in Nikola Vaptsarov Naval Academy. Advantages and disadvantages of using simulators in Maritime education and training are analyzed in depth. Based on this analyze it is proven that the role and importance of the newest information technologies in the field of maritime education and training will rise up in the near future. Using of computer-based simulators will take significant part in this process and development and improvement of teaching methodologies will allow to upload a part of training in the net and to increase its efficiency. Many examples of using distance learning technologies are examined. Some ideas for uploading of theory education and some elements of practical training in the web using newest multimedia technologies are presented.

Key words: *Maritime Education and Training, Web-based Education*

1. INTRODUCTION

Nowadays the intensive development of the information technologies is a prerequisite for improvement of the educational methods, but it is also the duty of university lecturers to apply these methods in their daily work.

The rational and effective use of Internet-based systems for distribution of knowledge can eliminate a lot of limitations and outsource the training process far beyond the walls of the universities. In many cases the imagination and the potential of teachers and university administrations are the only restrictions for practical implementation of such projects. A good example in this matter is the union between Princeton University, Stanford University, the University of Michigan and the University of Pennsylvania in the mutual platform for distance learning Coursera [2]. The platform was recently started and united the best courses and teachers in one programme.

The use of the computer-based education, the virtual reality managed by the teachers with continued and objective assessment of each student's knowledge and progress is not new for Bulgaria and has already been applied to a different extent in some of our universities [13]. The innovations result generally from the development and including new pedagogical practices methods and technologies in the training process, for the provision of knowledge and assessment of the level of their learning by students. They are very popular in the economic programs, banking, social sciences, some of the fundamental theoretical courses. At the same time new computer-based technologies are rarely used in the technical (engineering) courses and in vocational training [1]. Maybe

the reason is that the quality of this kind of education is assessed not only with knowledge acquired during the lectures and seminars, but with practical skills, habits and abilities for work in specific conditions too, in which restrictions imposed by many factors both objective and subjective are predominant. Maritime education requires theoretical training, development of many practical skills, habits and behavior models, which are in accordance with the requirements for the professional realization of students. The major part of the practical training, which is in compliance with the international requirements, is carried out with the help of simulators, permitting the training conditions to resemble as much as possible real working conditions.

a)

b)

Figure 1. a) The GMDSS and b) The VTMS Simulators of N. Vaptsarov Naval Academy

The most up-to-date simulators for professional training are computer-based making use of the modern achievements of information technologies. Therefore by definition they are applicable for using in the virtual environment of Internet-based training. The problem is to be selected existing technologies or to be developed new ones for providing practical training (or part of it) in the network and to be developed methods for implementation of this training. The aim of this project is to research and assess the extent to which training in maritime communications in the Global Maritime Distress and Safety System (GMDSS) and Vessel Traffic Management Solutions (VTMS) is possible and effective in the virtual web-based educational space.

2. THE ROLE OF SIMULATORS IN PRACTICAL TRAINING

The use of simulators in the practical training in GMDSS and VTMS is regulated in many documents both national and international.

It is without a doubt that the use of simulators in the practical training process has a lot of advantages:

1. The simulator is computer-based and therefore it is closer to the students, who are mostly young people, students, studying to obtain the educational qualification degree of a "Bachelor" and "Master";
2. The simulator permits imitation and practicing of many situations, which can be of extreme importance, but occur rarely in practice. Thus the experience collected for years can be shared in one one-week course (The time shortening effect);
3. The simulator allows to overcome easily the psychological barrier of talking on air;
4. The use of simulator in the practical training does not pollute the air with unnecessary emissions;
5. The maintenance and updating of the simulator (both its software and hardware) is comparatively cheap and easy.

Training with a simulator imposes some restrictions:

1. The reality of the simulations is still restricted more or less by technologies used;
2. However good the software is, it still has mistakes (bugs). On the basis of the good relations with the producer Transas Ltd. the bugs found during the use of the simulator in Varna Naval Academy are described and sent

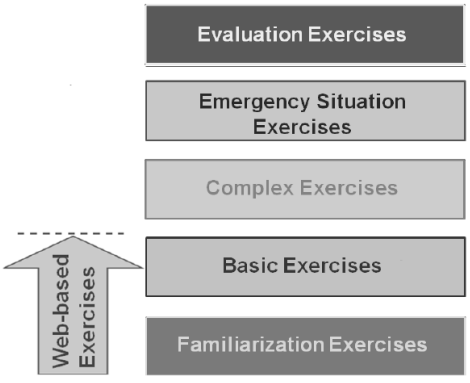
to the firm, where they are taken into consideration in the next versions;

3. For the computer generation the simulator is more or less a game, in which there is always “one more life”, i.e. the work with the simulator is not taken seriously by all students and most of all the exercises in emergency situation conditions.

The effective use of simulators in the practical training requires careful planning, developing and conducting different kinds of exercises. Generally they can be divided in the following types [3]:

- Exercises for familiarization with the simulator interface and abilities;
- Basic exercises;
- Complex exercises;
- Exercises in emergency situations;
- Exercises for testing and evaluation.

a)



b)

Figure 2. Types of exercises

Some of these exercises require some demonstrations to be made by the instructor while others include experimental work to be done by trainees as shown on fig. 2a).

Each exercise undergoes the following steps for training and conducting:

- Designing;
- Planning;
- Developing;
- Testing;
- Documenting;
- Using in the training process.

On each level of the training and practicing there should be feedback and the possibility for corrections in the previous stages. Thus the development of the exercise is an iterative process, which continues during the training process too. Based on some publications [9] it may be considered that the work in the first five stages takes up to 45 hours, while the exercise itself takes two academic hours, i.e. one and a half astronomical hours. This puts a special emphasis on training efficiency with the use of simulators and unification and automation of the creating exercises process.

It is possible however to reduce the number of exercises implemented into the simulator by using the web. For example familiarization exercises and some of basic exercises could be uploaded on the server of the university as web-based resources for online training, as shown on fig. 2b).

3. PRACTICAL TRAINING ON THE NET

The primary issue in the provision of GMDSS training on the net is which part of it can be moved out of the classroom, to what extent it can happen and how effective it will be. The theoretical part of the training and the means of evaluation of the teaching material connected with it are no longer a challenge for the contemporary virtual training platforms. Technologies allow its implementation and the methods are developed - it is a matter of time to be implemented, tested and put in operation in the virtual educational space. It remains to be discussed what part of the practical training and to what extent will be converted in distance learning.

Sites for GMDSS training already exist in the worldwide web while sites for VTMS training are still missing, perhaps because it is relatively new topic in the area of maritime education and training. One of the most popular sites E-gmdss [4] provides a rich theoretical basis, multimedia illustrations of some of the

basic communication procedures and opportunities for distance access to work with "real" equipment. In E-gmdss there are only four models – VHF radio station, HF radio station, shipboard station Inmarsat Std. C and NAVTEX-receiver. That is why the functionality of this equipment is extremely restricted. There is no opportunity for testing and evaluating the students' knowledge.

The site of the yachting fans [5] organizes and carries out GMDSS training for Short Range Certificates, SRC. A module for distance learning with VHF radio computer simulator is provided in the course but it is still under development.

The site for distance learning Videotel [6] provides distance GMDSS course, which covers only the theoretical training and test for evaluation.

The site of the Maritime Rescue Co-Ordination Centre Bremen, Germany [7] provides a full range of GMDSS theoretical material. However practical training cannot be carried out there.

One opportunity for introducing practical training on the worldwide web is by using special software for recording and subsequent playback on the computer screen. In this research some of the executions of basic procedures of GMDSS communications or VTS Operator's manipulations were filmed and uploaded on the web for subsequent and multiple reproduction. A small study among students showed that this experiment is considered to be very useful especially when combined with web based theoretical course [14] immediately before practical exams. It is possible for the reproduction to be accompanied with sound interference, which will increase the reality of the training. For this purpose careful consideration is required of the procedures and preparation of a detailed scenario for each exercise, experimentation and evaluation of the quality of the educational product offered.

4. CONCLUSIONS

The role of the virtual educational environment in the implementation of the qualitative and effective learning process is extremely important and its significance will increase with the development of information technologies and the educational methods and practices. It is applicable in many spheres of university education.

The tendency for expanding the implementation of new distance learning technologies both in engineering and vocational training is obvious. As a result of this the issues of distance practical training implementation are debatable. The degree of comprehensiveness and the proportion between distance and face-to-face forms of practical training are subject to assessment. However it is unquestionable that distance learning will enter more and more in the educational system and will take a more and more important place in its effective implementation. The development of information technologies is a prerequisite for this but there is a lot of work on the educational methods development which has to be done. The methods have to define which part of the practical training can be moved out of the simulator and to what extend and how effective this will be.

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