

Enhancing Web Based E-Learning in Maritime Education – Experiences From Projects in Montenegro

Sanja Bauk ¹, Snezana Scepanovic ²

¹Faculty of Maritime Studies, University of Montenegro, Dobrota 36, Kotor, Montenegro

²Faculty for Information Technology, University “Mediterranean”, Vaka Djurovica bb, Podgorica, Montenegro

Abstract – This paper considers some beginning steps in introducing and developing web based e-learning resources into seafarers’ education, as additional mode of acquiring knowledge, at the Faculty of Maritime Studies, which is a part of the University of Montenegro. Some numerical and qualitative results of the polls realized among a number of involved students, teachers, and experts in the field, are presented and discussed in order to identify pros and cons of the issue, as well as the directions for further acting. Finally, some empirically based suggestions related to technical support in terms of software platform and tools for creating more interesting, engaging and inciting e-instructional materials are given, as well.

Keywords – Web based e-learning system (WELS), Maritime higher education and training (MHET), Distance learning, E-learning tools.

1. Introduction

The education and training of seafarers should represent very responsible posts, and consequently appreciated ones. However, it is evident that in the world, at the level of national legislation, there are large differences in the interpretation of the STCW (Standards of Training, Certification and Watch keeping) Convention and its realization through teaching programs at MHET (Maritime Higher Education and Training) institutions [1], [6]. This causes the issuance of a large number of certificates, which do not correspond to objectively sufficient knowledge, skills and competencies of future seamen, that is, of those who may in the perspective educate the next generations of seafarers. This is, of course, a serious problem that could be overcome only by serious top-down approach and far greater investment in education and training (speaking here in national/regional terms). It is necessary to engage and motivate competent teachers in the field of theoretical teaching (education) of seafarers (people with academic titles and corresponding references),

as well as, experienced (active) captains and officers in the field of practical teaching (training), then to establish active cooperation with referential MHETs in EU and worldwide, and also with reputable shipping companies that should provide students with the appropriate training onboard [9].

All mentioned above is far beyond the scope of this chapter in which the authors would like to focus on one small segment related to the improvement of education of (future) seafarers by the implementation of web based e-learning. So, the following subsections contain the discussion about the motives for the introduction of blended learning at the Faculty of Maritime Studies (FMS), University of Montenegro, and the potential benefits that students (including active and future sailors among them), then teachers, and consequently, the MHETs at which such kind of education is (shall be) realized, might have in the future.

2. Background: Some key points

The Faculty of Maritime Studies of Kotor (FMS), which is a constitutive part of the University of Montenegro, has long lasting tradition being founded even in the medieval times, when captain Marko Martinović has his own nautical school for Russian feudal lords (in 17th century) in Perast, a little seaside town near Kotor (today Republic of Montenegro). Later on, this nautical school continues to exist in Kotor, and it still works as FMS, educating students and seamen for variety of both ship and port vacations.

Graduated students can find employment in the agencies and firms which are focused on different maritime affairs. Although the tradition of nautical and maritime studies in general is long lasting and rich one in Kotor, and along the whole Montenegrin

littoral zone, the awareness of existing new and demanding requirements of the actual world living and working flows is necessary. Above all, this awareness is unavoidable since the current situation in Montenegro, in the sphere of maritime affairs, is not *flourishing* one. Accordingly, the management of the FMS recently came up to the idea of introducing web based e-learning environment for the needs of the students, especially seamen among them, and all other persons being interested in this mode of education and knowledge transfer. It is to be mentioned in this context that FMS, several years ago, has faced the necessity to adapt the curricula to the Bologna system, which recommends, among other things, presence of students at almost all classes during the semester. Though, if students are not present, or if they are usually absent from their classes, there is a risk that they will not pass the exams! - This is particularly case with students who have to sail, i.e. to work as seamen to earn their salaries, and to study simultaneously [2].

During the past few years, there were numerous requirements from their side to the FMS's management to organize for them condensed courses several times a year, or to develop and offer them e-learning educational modules. Consequently, the FMS's management, in consultations with colleagues from some other height-educational institutions in the Region, decided to meet their requirements and in fact objective needs, and to develop and implement an appropriate study program supported by web based e-learning system/resources [8],[9].

3. Perpetuators: Conducted e-learning projects

What caused developing e-learning instructional modules at the Faculty of Maritime Studies (FMS), University of Montenegro, are the enthusiasm of few teachers at the Faculty, including some colleagues from other HE institutions (University Mediterran, e.g.) and their desire to enrich traditional channels of knowledge transfer - are three projects briefly presented below.

Project 1: The first one is the Tempus project (2010-2013): "Enhancing the quality of distance learning at Western Balkan higher education institutions" (www.dlweb.kg.ac.rs). The objectives of this project are: to improve the quality and relevance of distance education at Western Balkan higher

education institutions and to enable easier inclusion of partner country institutions into European Higher Education Area. These implies the specific objectives: to improve, develop and implement accreditation standards, guidelines and procedures for quality assurance of distance education study programs according to EU practices at national level in Western Balkan (WB) beneficiary countries; to establish the framework for improving distance learning (DL) quality assurance and e-learning methodology on higher education (HE) institutional level in WB countries; to provide training for relevant members of HE educational and public authorities responsible for accreditation and evaluation of DL programs and trainers involved in DL from each partner country, etc. The project leader is University of Kragujevac (Serbia). Owing to this large project, University's of Montenegro Center of Information System "set up" Moodle (1.9.4) server, what creates the opportunity for FMS to use its capacities in preparing and realizing web based educational activities. Through this project a few teachers and assistants from FMS also had opportunities to attend short training courses being dedicated to e-learning, several times, and to participate in discussion process along with the experts from EU in this domain.

Project 2: The second is the small project of bilateral cooperation realized between FMS and the Academy for New Media and Knowledge Transfer – ANMKT (University of Graz). This project entitled: "Developing an e-learning module at Faculty of Maritime Studies (Kotor, Montenegro) for the seamen educational needs" had as its main aim: conceiving a new web based educational program at FMS devoted primarily to the seamen (among the students) needs. However, this module should be used by all other potential users, besides seamen, who are interesting in such kind of acquiring knowledge. The University of Graz supported the project by bringing in perennial expert knowledge in novel e-based didactical methods and techniques. In return developed e-learning methods and tools were tested on the basis of a concrete case study. Within this project (2011-2013) experts from ANMKT transferred very useful practical skills on the use of Moodle Management Learning System (MLS) in the effective implementation of e-learning to the teachers and system engineers of FMS throughout several trainings.

Project 3: The third important project within this context is a follow-up of the previously mentioned project of bilateral cooperation between FMS and ANMKT. This project entitled: “Distant learning implementation at the Faculty of Maritime Studies, University of Montenegro, as the additional mode of education” aims effective implementing and developing of web based e-learning at the FMS as additional mode of knowledge transfer, devoted, again, primarily to the seamen needs. ANMKT was the partner in conceiving this e-based instructional module and through this project it will support its effective implementation. In the mean time, this e-learning module has been accredited by the Montenegrin National Council for High Education, and the study program started officially in September, 2012. This e-learning module is still implemented by Moodle platform, and currently it is available at the FMS’s web portal: fzp.moodle.ac.me/login/index.php.

The materials for some of the planned courses are uploaded at the platform, and they are currently available to the certain number of teachers and students who can test it on-line and suggest the improvements. In this second phase of the project, possibilities of enriching on-line resources by introducing audio/video/screencapturing records shall be considered, as well. The possibilities of extending this e-learning aid toward the mobile-learning one, by the Windows 7 Phone [12] and some other similar applications, for mobile devices like i-Phones, shall be considered as well. This project is approved and it will be realized within the ongoing two years period (2013-2014).

These three projects are in fact perpetrators of implementing and developing web based e-learning system and e learning resources at the FMS.

4. Indicators: Results of the survey analysis

From the beginning of the e-learning introducing and developing projects implementation at FMS, several surveys among the students (here e-learners) have been conducted in order to examine in a manner how their perceptions of the advantages and disadvantages of WELS correspond with the creators’ of the project(s) ones. In total, 110 students at the postgraduate level have been interviewed. Specifically, the students were supposed to identify the WELS advantages and disadvantages, according

to their perceptions, among the offered options (Table 1).

Advantages	Disadvantages
A1: The possibility of learning from home and working place (during the breaks)	D1: Lack of direct contact with teachers
A2: Reducing the traveling costs and time saving	D2: Inability to put a question, and get the answer immediately, when there is some ambiguity in knowledge transfer
A3: Easier access to the instructional materials	D3: A nonstandard form of learning that requires a strong will, self-discipline, and high level of concentration
A4: Possibility of self knowledge evaluation through on-line tests	D4: Some exams are taken on-line, which is sometimes stressful, due to limited time, and present fear if the technique will/will not function properly
A5: Ability to communicate via the net with teachers and other candidates	
A6: More effective learning	

Table 1. WELS’s advantages and disadvantages.

What is indicative, more than 50% of the respondents agreed that the suggested advantages of WELS: A1, A2, and A3, are “indeed” benefits of WELS, as it was assumed by the creators of the system (Fig 1).

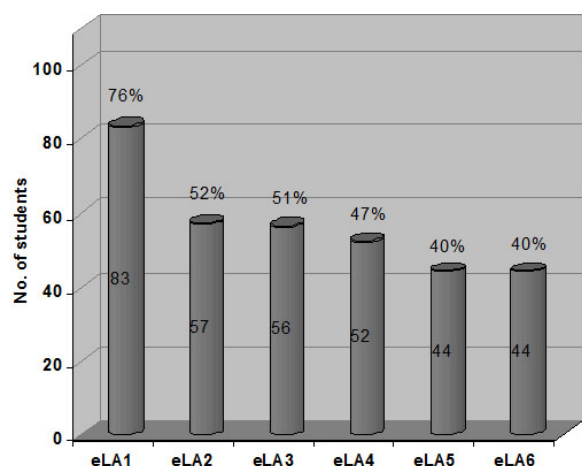


Figure 1. Number of e-learners who opted for the offered WELS’s advantages.

On the other side, among the disadvantages of WELS, more than 50% of respondents identified only predefined disadvantage D2 as “real” disadvantage (Fig 2). How the obtained results can be interpreted? - Most of the surveyed students are

still not convinced that the possibilities of self-controlling learning process, learning community activities, and more effective learning are the advantages of the WELS (A5 and A6 are lower than 50%). What does it imply? – It implies that students should be *convinced* into these WELS benefits, i.e. more intensive communication to the teachers and among the students themselves should be enabled, as well as more interesting and inciting self evaluation tests and educational games, etc. Consequently, the learning outcomes and the e-learners' satisfaction level should be greater.

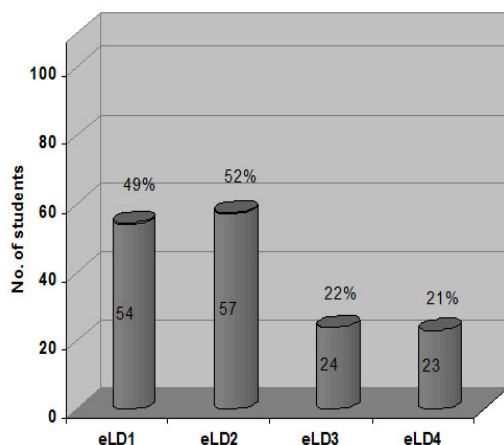


Figure 2. Number of e-learners who opted for the offered WELS's disadvantages.

If we analyze further the supposed disadvantages of WELS, the e-learners do not see as big problems: on-line testing, need for a strong self motivation, and lack of direct contact to the teachers, otherwise offered through the traditional classroom teaching/learning. But, what e-learners really need is undoubtedly more frequent consultations with the teachers, in accordance to *one-to-one* knowledge transfer approach, or more intensive teacher (supervisor)-student interaction. The last concluded directly corresponds to the previously identified disadvantage D2. On the other hand, by achieving the greater synergy on this relation, the WELS will give better results due to uprising learning effectiveness. Since this is only a preliminary study, it is to be extended throughout the future research activities planed by the authors, with the aim of scanning e-learners' satisfaction, and concerning the directions toward increasing the overall effects/outcomes of WELS based learning process.

In order to obtain as complete as possible feedback in the current moment on the realized WELS, besides the surveys among the students of the specialist studies at the FMS, one survey is conducted among teachers at the FMS and experts in developing new IT-supported didactic methods from the ANMKT. The poll conducted among the teachers and the experts has been based on the well-known and in literature extensively used Saaty's AHP (Analytical Hierarchy Process) method and the author's previous research papers [3],[5]. This approach enabled us to rank some WELS features, which have been in the context of this study identified as important ones (Table 2).

The ranks are determined by the values of normalized average weight coefficients being previously calculated for each considered criteria [3], i.e. WELS feature. Certainly, the readers should not be limited by them in the sense that it is here underlined the need for further, more extensive and rigorous research in this domain.

Rank	Feature
1	Availability on-line and high quality of all necessary materials for preparing the exam in a subject
2	Stability and speed of the Internet connection (what is not always the case at the sea and in some ports)
3	The existence of the tests for self evaluation of the acquired knowledge
4	Possibility of regular communication with teachers via forum, chat and/or e-mail
5	Possibilities of doing and evaluating tests and final exam on-line
6	Conducting regular students' surveys

Table 2. The rank of the analyzed WELS features by AHP approach, on the basis of the survey among experts (ANMKT) and teachers (FMS).

The obtained ranks of in the paper analyzed WELS features could be qualified in following manner:

The teachers and the experts involved in this research assigned numerically by the largest marks, and gave consequently the greatest importance in the qualitative sense, to the availability on the web of the instructional materials (which implies their appropriateness and quality);

In the second place, they positioned stability of Internet connection, which is understandable, since here examined WELS is devoted mostly to the seafarers. Namely, it is often not possible to establish Internet connection on the vast sea, or it is usually unstable. Another interpretation should be that the teachers and the experts consider a stable Internet connection fundamental pre-condition for WELS establishing;

On the third position is the availability of tests for students' (here mostly seafarers') self-evaluation during the process of acquiring knowledge, what is also a very important segment of e-learning, which indirectly should involve the existence of *smart* educational games, as well;

The fourth position is reserved here to the possibilities for the students to communicate to teachers via forum, chat, e-mail, etc, which is of course very important segment of e-learning, but it is sometimes difficult to achieve this due to the previously mentioned problems with Internet connection and its stability at the sea (and sometimes in the ports). On the other side, teachers are usually too busy, and they are practically sometimes *physically* prevented to devote more time to the communication to students; and,

At the lowest positions are WELS technical possibilities of doing exams on-line, and conducting regular on-line (or classical) surveys among the students, related to their degree of satisfaction with offered e-learning services, respectively. This is understandable, since the Internet as an *open* communication channel is not *perfect* for testing students on-line. In addition, even surveys conducted among students are very important, in comparison with the previously considered components of e-learning they are for sure slightly less important. However, this does not mean at all that they should be ignored.

This conducted survey reflexes profoundly very subtle nuances in mutual positions of the analyzed e-learning features, and it remains us to associate them to the high degree of expertise and sensitivity of the responders in this domain [3].

Further analysis should be directed toward evaluating e-learners' satisfaction with offered WELS

and this will be realized by multi-criteria evaluation technique based on Saaty's AHP [11],[14],[15]. Since the large number of respondents is necessary for conducting such analysis, the possibility of involving some other institutions that offer WELS shall be included. Namely, a large number of responders is a kind of guaranty that the survey will be successful and reliable, i.e. that the largest number of responds will be consistent in accordance to the Saaty's AHP method requirements.

5. Technical components: Choosing right tools for creating e-learning resources

On the basis of the above presented rank of the analyzed WELS features, it becomes evident that the availability and quality of the instructional materials are rated as the most important factors by teachers and experts in WELS. Undoubtedly, the quality of the instructional material is one of the key factors for successful implementation of WELS. Since the appropriate IS/IT solutions and tools are necessary in their creating, in this part of the chapter is given a short overview of some available up-to-date software tools for creating interesting and engaging instructional WELS materials, along with the recommendations, based mostly on the authors' experience, which of them is the most appropriate for certain application.

Today, there is a quite large offer of different proprietary commercial and freeware application software which can be used for producing:

- **Audio:** Audacity, NCH Wave Pod, Adobe Audition, Cubase Steinberg, Logic Studio, Kristal Audio Engine, etc.;
- **Video:** Windows Movie Maker, Adobe Premiere, Avidemux, Magix Video, Video Spin, AVIedit, etc.; and,
- **Screencapturing:** Adobe Captivate, Capture Fox, Camtasia Studio, Jing, ActivePresenter, BB Flashback, BB Flashback Express, ScreenPresso, VirtualDub, etc.

Web can be used as a resource for further search [16],[17]. Though, there are large number of software tools available on the market, proprietary commercial, as well as, freeware and shareware. Of course, there is also a difference concerning the available functions but it is definitely possible to produce up to professional results with selected

freeware software. The following recommendations can be done according to the authors' experiences.

The open source software *Audacity* is the most powerful freeware tool for audio editing. It offers various effects and analyzing tools for the signal processing, e.g. powerful noise reduction (even adaptive noise reduction) and dynamic processing as well as equalizing, multi-track editing for sophisticated mixes and of course supports recording from any microphone or signal source connected to the computer. Professional commercial audio editing software mainly aims at professionals like sound engineers or sound designers. These professional tools provide further interfaces to audio hardware and various 3rd party plugins for high end audio editing;

In the field of video editing it is the freeware *Lightworks* that offers the most functions and editing tools. Even commercial movies have been cut and produced with that software but however it is not especially designed for beginners, so it requires time to get familiar with the production workflow. A more intuitive way and therefore more appropriate for beginners is the *Windows Movie Maker* (last built version is No. 12). It does support most of the latest video formats and has also build in effects to make transitions and/or color effects and animated titles. It also supports most picture formats so that the producer can combine still and moving pictures in the project. Background sound or speech can be added and mixed;

Screenrecording tools have become very popular as it is very easy to make engaging tutorials or presentations of what is happening on the monitor. The freeware tools *Camstudio*, *Jing* and *AutoScreenrecorder* offer the general possibility to record the screen but do also include restrictions which can be watermarks, a limited time for recordings or not supported audio recordings along with the screenrecording. Also the choice of output formats is limited in freeware tools;

Two market leaders offer a professional tool that combines the above mentioned types of recording: *Adobe Captivate*, and *Camtasia Studio*. *Camtasia Studio* lets the user create professional screenrecordings, including other media like pictures, movies or sound. The footage can be arranged in multi track layers, with additional zoom or pan

effects as well as highlighting options you can increase the professional look of the production [4].

When we talk about to the technical dimensions of the issue, it is of course to be noted that the implementation of web based e-learning system at the FMS has been based on Moodle platform (1.9.4). Moodle is an open source course management system, also known as a learning management system or a virtual learning environment. It can be relatively easily used by teachers for creating online dynamic web sites for students. It is very sound tool to manage and promote learning. Some institutions use it as the platform to conduct fully online courses while some use it simply to augment "face-to-face" courses, i.e. as blended learning, what is in fact the case of the FMS as a MET institution. In other words, Moodle is used to support and combine "face-to-face" interaction with e-learning, mobile learning and other forms of learning [13]. Since the currently released version of Moodle is 2.4 it has to be explained why at the FMS there is still a rather old version of the platform in use. When Moodle was installed at the FMS release 1.6 was the current version. This version was regularly updated until version 1.9.4. Since the program surface of Moodle rather changed with the release of Moodle 2.x FMS decided to stick to the older version. Mainly this is due to two reasons: (a) teachers and students are used to the look and feel of the 1.9.x versions and it seemed problematical for them to grow accustomed to a new surface especially at an early stage of working with the platform, (b) and the installation of Moodle 2.x demands an enhanced technical environment which is not totally available at the FMS at the moment [3].

6. Conclusions

Within this chapter considered efforts over introducing/developing e-learning resources at the FMS should improve the overall educational quality standards at MHETs in the region of Balkans. However, the need for greater investment in seafarers' higher education in terms of personnel and infrastructure is indisputable. The networking is also very important, and not "networking just for networking", but a real one is necessary, being based on professional cooperation (on the EU and global level) among the MHET institutions, through more

intensive exchanges of teachers and students for the sake of mutual enrichment of knowledge and implementation of joint projects. It is necessary to establish permanent connections with the maritime industry, e.g. shipping companies interested in providing practical training onboard ships, as well. The national legislation has to be modernized in the sphere of higher education in terms of recognition and proper interpretation and implementation of the STCW (Standards of Training, Certification and Watchkeeping) requirements in terms of faster deployment of virtual learning as a supplement to the traditional education and training of the seafarers. The newest STCW Code amendments concern and recommend the introduction of modern training methodology including distance learning and web-based learning in seafarers' knowledge acquiring and upgrading. Within this context, it should not be lost the sight of the fact that STCW Convention itself (see for more data: "The Manila Amendments", Chapter II, Section B-II/1, Paragraph 14, 2010) calls (besides training) for a proper education - as the foundation of successful training and acquiring competences.

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- Corresponding author: *Snezana Scepanovic*,
Institution: *Faculty for Information Technology*,
University "Mediterranean", Vaka Djurovica
bb, Podgorica, Montenegro
E-mail: *snezanasc@gmail.com*