

Joint Production of Web-learning Material by IAMU Member Universities

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Keywords: e-learning, web-learning, IAMU

ABSTRACT

Joint production of web-learning material on maritime cyber security management was carried out by three IAMU member universities: Gdynia Maritime University (GMU), Satakunta University of Applied Sciences (SAMK) and Svendborg International Maritime Academy (SIMAC) as part of the IAMU research project CYMET. The IAMU e-learning platform and Moodle open source code software was used in producing and publishing the training material.

There is unexploited potential in producing training material in collaboration between MET institutions. The convention on Standards of Training, Certification and Watchkeeping (STCW) forms a natural basis for this collaboration.

Even though combining material from different sources into a high-quality training material can be challenging, the international community of MET institutions could benefit from the exchange of special expertise. It is proposed that the quality of education and training of seafarers globally could be enhanced by increasing collaboration between IAMU member universities in joint production of web-learning material.

1. INTRODUCTION

In all areas of higher education, the use of the internet and web-based learning have gained much attention, for several reasons. Firstly, the internet is a source of useful material for educational purposes. Secondly, affordable and versatile software tools are available for development and running web-based courses. Thirdly, conducting lectures online for a larger number of students is cost-effective. Fourthly, web-based courses can be followed online by students anywhere in the world.

The convention on Standards of Training, Certification and Watchkeeping (STCW) by IMO [1] forms a useful basis for collaboration between maritime education providers. Since STCW forms the minimum standard for training of seafarers, the essential contents of training material should be similar all over the world. Naturally, this does not fully apply due to linguistic and cultural differences, variation in the educational system between countries and different pedagogical methods applied. However, there may be unexploited potential in producing training material in collaboration between MET institutions.

The objective of the CYMET project, initiated by the International Association of Maritime Universities (IAMU) is to increase the knowledge and awareness of cyber safety issues within the seafaring industry and to enhance proper consideration of these issues in education and research activities of the IAMU member universities. One of the concrete outcomes of the CYMET project is a package of web-learning material, developed by the partners SAMK, GMU and SIMAC and made available for all IAMU member universities.

Even though it is challenging to compose a uniform and unified set of high-quality training material from texts and presentations produced by teachers from different universities, this kind of collaboration can be very beneficial and rewarding. The Basic Agreement of IAMU states: *The members shall cooperate with each other in a range of scientific and academic studies, developments, and practical applications associated with Maritime Education and Training and endeavour to achieve measurable and worthwhile outcomes for Maritime Education and Training through IAMU activities* [2]. Thus, active promotion of the collaboration between the member universities in joint production of web-learning material should be considered in IAMU to enhance the quality of education and training of seafarers globally.

2. SOME PEDAGOGICAL ASPECTS

The world-wide-web became popular in the early 1990's. The potential of the internet in higher education was immediately discovered by education professionals. Exploiting of the new possibilities started in different variations of e-learning and web-based learning.

One can't say that the results of web-based training are worse or better than the results of traditional face-to-face classroom training. There are more factors affecting the learning process than just the applied technology. Figure 1 shows that even though we can place the technology to the center of the educating process, pedagogy, implementation and even institution play an important role in this process.

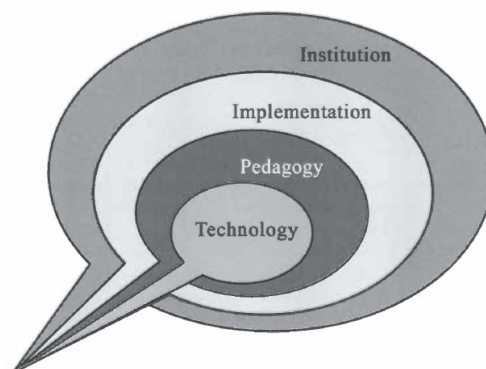


Figure 1 The four components of flexible learning in higher education [3]

Learning is a complicated process affected by a large amount of factors, such as the motivation of the student - and the teacher- , experience and the learning style of the student, learning environment, readiness to utilize the technology, language skills, timing, structure of the material, visual outlook of the training material, stress, fears, other emotional factors and so on. Efficient web-based -training, especially when it is based on self-education, is based on different pedagogy than traditional face-to-face classroom lecturing. Web based learning

methodology, practices and pedagogical principles have been a subject to discussion and active research for decades, see [4], [5], [6] and [7]. Although deeper analysis of these matters is beyond the scope of this report, there are some aspects worth mentioning, which should be considered in development of web-based and self-learning courses:

- In the beginning of the course, wake up the motivation to learn and the curiosity of the student towards the subject in concern. This can be done for instance by presenting a video of an eye-opening case from real life. Wondering is a key to learning.
- The self-learning course should be organized so, that the student can study it in smaller pieces. The material should be divided into lessons or chapters. It should be organized in a logical order guiding the student to build his/her knowledge effectively.
- Each lesson or chapter of the self-learning course should end with control questions or exercises which provide the student with feedback about his/her progress.
- The typical amount of student's working hours should be in balance with the amount of credit points earned from passing the course.
- The English language of the material should not be too difficult to understand. It must be kept in mind that the students of the self-learning course come from different parts of the world and that many of them do not speak English as their native language. All difficult terms and phrases should be explained for instance by using pop-up type help texts.
- A good web-learning course is exciting. If there are enough resources available, the attractiveness and effectiveness of the self-learning course can be enhanced by using simulations and challenging interactive functions, like in video games, into it.

The internet offers an enormous number of ready-made videos, lectures, presentations, articles, photos, graphics etc. that could be useful for the self-learning course. However, the teacher must keep in mind that the international and national copyright laws shall not be violated.

3. SELECTION OF THE WEB-LEARNING PLATFORM

Before the web-learning material could be developed and made available to IAMU member universities, the software tool for producing, sharing and using the material in teaching had to be selected. The platform to be chosen should meet at least the following criteria:

- the material should be available to IAMU member universities
- the platform should be commonly used
- it should be easy to use and simple to maintain
- it should contain key functions and features of an advanced web-learning platform

An important aspect is also the price of using the platform. If possible, it should not be too expensive, preferably free.

There are number of web-learning platforms, services and systems available on the market. Based on a preliminary study about the supply the project group decided to have a closer look at two alternatives: **Moodle** and **Itslearning**.

Moodle has been a very popular web-learning environment worldwide among institutions of higher education. Moodle is a free open source code software system, originally developed

by Martin Dougiamas. The first version was released in 2002. The Moodle Project is led and coordinated nowadays by an Australian company Moodle HQ and it is financially supported by a network of Moodle Partner service companies worldwide. Moodle has at the moment (May 2019) over 160 million users in 227 countries [8]. Moodle is widely used also by the member universities of IAMU.

IAMU has established an e-learning portal on its web pages. It is based on Moodle. The member university wishing to use a course available at the IAMU e-learning portal, needs to download and install the course to its own server. This is because IAMU does not have the possibility to take care of thousands of student enrollments from maritime universities or the necessary resources for online maintenance required to provide the users with a proper and reliable service. This kind of service does not belong to the core activities of IAMU.

As an alternative to Moodle, the cloud based learning platform *Itslearning* was studied by the CYMET project group. Itslearning is a commercial service, maintained and distributed by the company Itslearning AS, Norway [10]. Itslearning was developed in Bergen, Norway, in 1999 and it is said to have over four million active users worldwide [11].

Itslearning is a comprehensive learning management system offering tools for curriculum management, objective-based course plans and assessments in one online location. The platform gives easy-to-use tools for creating online courses, for collaboration and sharing materials, and it automates routine tasks within the education processes of the institution.

From IAMU's point of view, there would be some advantages of using a cloud based system like Itslearning:

- the courses are available worldwide without the need to download and install material to the university's own IT system
- enrollment of students from different universities is managed by the system
- development and maintenance of the course material in collaboration of several teachers is easy

On the other hand, since the service is not free, the costs of using Itslearning may reduce the willingness of using the service. However, pricing today (May 2019) is rather moderate and it is based on the number of students. Moreover, it includes full maintenance of the system, which reduces indirect costs on the IT management side.

After studying the two alternatives, Moodle at the IAMU e-learning platform was chosen by the project group for producing and publishing the web-learning material. The main reasons to this selection were:

- Moodle is more widely used, and it is already familiar to the member universities of IAMU and it is free
- the e-learning portal on the web site of IAMU is based on Moodle

Although Moodle has some weaknesses compared to Itslearning regarding the management of student enrollments and the need to download and install the course material to the IT system of each university, it clearly fulfills the requirements for a functioning web-learning platform.

It would be a strategic decision by IAMU to establish or buy a cloud based service for development and maintenance of jointly developed e-learning courses instead of the present IAMU e-learning platform.

4. JOINT PRODUCTION OF THE TRAINING MATERIAL

A web-based training package on cyber security issues for maritime professionals was created jointly by the partners of the CYMET project. The material consists of texts, images and links to relevant material in the Internet. Personal exercises were included to provide the students with feedback of the progress of their learning. It was agreed by the producers of the material that each member will produce the material for one whole chapter and then the chapters are put together to form the whole course. In other words, there was no group work was done during the production. However, the producers had the possibility to study and comment the others' texts.

This may not be the optimal way of working together from the point of uniformity of the result. But due to limited resources of CYMET project this was the only practical way to get the work done. It would be better in the future to have a named editor, or a group of editors, having the responsibility of checking the material and editing it into a standardized format. Also updating the course material in the future must be planned. The editor could assure the correctness of the contents, the correctness of the English language and the uniformity of applied expressions and terminology.

Another important area of consideration is copyright regulation. There might be differences in Copyright rules and practices from country to country. The material must be produced in such a way that it will not violate any international copyright legislation.

The Maritime Cyber Security learning package was developed by the members of CYMET project for 100% self-education and it was organized into seven consecutive lessons: 1) Introduction, 2) Understanding cyber threats, 3) Awareness across the organization, 4) Elements of cyber security management, 5) Good practices, 6) Rules, standards and guidelines and 7) Examples from the real life.

The material consists of plain text with links to videos and articles in the internet and multiple choice questions in the end of each lesson to give the student some feedback about learning of the contents of the lesson. No new animations or videos were developed within this project. The training material contains also additional special chapters on Network integrity, GPS jamming & spoofing and Safe information exchange, which were not included into the basic course. They can be used in the advanced courses mentioned above.

The web-learning course was pilot tested by students of the participating universities in Finland, Denmark and Poland. The Students were asked to study the Moodle course and after completing the course to express their opinion about the course by answering ten open questions.

The response indicated that the course was found useful, interesting and suitable for self-learning. Some of the students felt that the topics were somewhat too general, i.e. they would prefer more examples from the shipping industry and about ship equipment, even though the real life examples of cyber-attacks were taken from the shipping world. Some of the students had difficulties in understanding the English language, which is quite understandable, since none of the students were native English speakers.

Another important source of feedback would be teachers of IAMU member universities. However, collecting of this feedback was not included in the CYMET project.

5. CONCLUSIONS

Maritime universities and other MET institutions around the world have shared needs to develop courses on seafaring and marine technology. However, teachers do not often use texts, PowerPoint presentations, exams etc. made by someone else. They prefer to use their own material. Lecturing is a very personal matter. It can be compared to coaching or performing arts. An experienced lecturer may not want to follow the logic of another lecturer's presentation, because he/she may prefer another approach to the subject in concern or he/she wants to put emphasis and priority on matters differently than the colleague who made the presentation. The reason for omitting the ready-made material could also be the English language.

Despite of these challenges, there is room for joint development of training material on selected topics. Management of maritime cyber security is one of those topics. Maritime cyber security is a highly critical area for the shipping industry and there is an acute need for training of seafarers to be aware of and to cope with cyber threats.

One conclusion of the the CYMET project by IAMU is that jointly developed web-learning material should be as easy to use as possible. A good solution from the teacher's point of view would be to have it available through a cloud service. However, it does not fall in the area of core activities of IAMU to maintain such services. The solution could be to outsource the cloud service for IAMU web-learning courses. In that case all IAMU member universities would have to become customers of this service provider.

Another solution would be to use IAMU web pages as a storage of material that could be downloaded and installed to the member university's own computer network. This approach was selected in CYMET-project. The web-learning course was pilot-tested at GMU, SIMAC and SAMK. The feedback from students was positive. However, maintenance of the developed course must be arranged in the future in some way or other. The contents of the web-learning course on maritime cyber security needs to be updated on a regular basis.

It is obvious that the international maritime education community could benefit from collaboration in the area of training material development. IAMU could promote the quality of MET globally by utilizing the expertise within its member universities in the form of collaboration in production of high-quality web-based training material.

ACKNOWLEDGEMENTS

CYMET project was carried out on the support and financing by International Association of Maritime Universities (IAMU) and the Nippon Foundation in Japan.

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