The New Role For Simulation In MET Distance Learning

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Abstract. Distance Learning has played an important role for many years in Maritime Education and Training, as demonstrated by the popularity over the years of letter and correspondence courses for sailors. New developments in Information Technologies and advances in simulation techniques now make it possible to deliver efficient, engaging and interactive distance learning programs for the MET community. This paper will briefly go into the new technologies that allow this to happen such as Web-enabled Simulation, e-Learning and the Course Management System. It will then explore more specific examples of how some MET schools and centers are using these technologies to expand their curriculum offerings and to reach out to their students; some of the schools that will be featured are AVTEC (Alaska, USA) and Holland College (PEI, Canada). The process that was followed will be illustrated and finally we will try to look into the future at the possible forms that simulation may take in MET.

1. INTRODUCTION

The nature of the business of sending people to sea has always meant that the learning and training of those mariners is challenging. In the olden days, young lads would embark on a sailing ship without receiving any sort of training. It was expected that they would learn the trade by watching the experienced sailors and doing what they saw.

But as technological advances, such as steam engines, wireless-telegraph and early radars, made their appearance on sea-going vessels, it became evident that formal training, early and continuing, was required. More changes occurred over time as the maritime industry built larger vessels, manned by smaller crews. These vessels stayed in port for shorter durations and the places they could dock were reduced due to the greater drafts of the vessels (The Seamen’s Church Institute 2007). Distance learning in the form of letter courses became an obvious choice for the mariners who wanted to further their careers while doing something useful during those hours off-watch. Then, as today, it was difficult to schedule ashore training during those short periods alongside.

So, in many ways, distance learning is really nothing new to MET. What is new, however, is the role that Information Technologies (IT), media rich learning environments and simulation are now filling in MET.

2. E-LEARNING

In this section we will broaden e-learning to include the use of various technologies for learning and what is also called Virtual Learning Environments.

2.1 Brief History of e-Learning

What is usually regarded as the first use of a machine for learning was devised in the early 1920s by Sidney Pressey, an educational psychology professor at Ohio State University, who developed a machine to provide drill and practice items to students in his introductory courses (Wikipedia.org 2007). But film was probably the first true modern learning technology. As the USA embarked in World War II, military planners and trainers realized how difficult it would be to prepare the millions of service men required around the world to ensure consistency and thoroughness in training (Rosenberg 2001). The solution came in the form of the army training film. These films covered everything from personal hygiene to weapons maintenance. The results were so positive that the use of the training film continued after the war, broadened outside the military and led to partnership with universities to conduct research into modern learning techniques (Government of Canada 2004).

PLATO (Programmed Logic for Automated Teaching Operations) was developed at the University of Illinois in the early 1960s. Decades before the World Wide Web was known, “the PLATO system pioneered online forums and message boards, email, chat rooms, instant messaging, remote screen sharing, and multiplayer games, leading to the emergence of what was perhaps the world's first online community” (Woolley 1994).

But it was television that really got educators excited. During the 1960s, it was believed that television could deliver all kinds of learning in the classroom while also reaching to all corners of the planet (Rosenberg 2001). But because it was very expensive to produce television learning content (Government of Canada 2004) and because we did not know how to make instructional television programs that were fun to watch, there were only a few successes such as Sesame Street. Television was not teaching but a one-way provider of information: it lacked the ability to interact with the student, to provide feedback and to make
changes on the fly to respond to students’ needs (Rosenberg 2001).

The shortfalls of television led to the rise of Computer-Based Training (CBT) in the 1980s. The need for student interactivity and the increasing availability of computers in the workplace and at home were the main drivers (Government of Canada 2004). But CBT has some major shortcomings (Rosenberg 2001) as described below:

- new technical issues such as incompatibility between the software and hardware and slow system performance;
- many of the CBT programs were basically electronic page-turners and as such were not stimulating; and,
- rapidly changing knowledge base meant that, as CBT programs were released, some of their content was already obsolete; the long production cycles and the fact that the content was “burned” on CD meant that it was difficult to provide updates and changes.

Since the late 1990s, many of the issues with CBT are being addressed through the rise of web-based learning. The term ‘e-learning’ was first used publicly by Jay Cross of the Internet Time Group in 1998 (Woodill 2007). Although the initial hype surrounding e-learning has somewhat lessened, there is now hardly a college or university course that does not include an online component.

In some ways it could be said that the history of e-learning has been a series of hypes and busts. But each cycle has brought the technology and techniques further in achieving real-life training and learning. The E-Learning Hype Cycle (Woodill 2007) shown at Figure 1 illustrates this. We are now in a maturity phase where e-learning has become mainstream and accepted, including in the MET community.

3. WEB-ENABLED SIMULATION

3.1 Origins

The development of maritime training simulators caused some major changes in the 1970s (The Seamen’s Church Institute 2007). The first maritime training simulators were logical developments based on the new engine control systems and ARPA that were deployed in the late 1960s. Computer systems were installed onboard ships for the first time and it was felt that they would require special training systems that were not in existence. For example, Norcontrol delivered its first navigation simulator, the NavSim (Figure 2), to the navigation school in Tønsberg, Norway, in 1974 and delivered its first engine room simulator based on the DataChief system at the same period (Høivold 2006).

Those early simulators had somewhat limited capabilities due to lack of cheap computing power. However, the further development in computer and image generation technologies, especially with the arrival of the Personnel Computer (PC), meant that greater performance at a fraction of the cost were possible by the late 1990’s. E-learning was also coming of age at the same time and it seemed logical to see if both technologies could be combined - using advanced maritime training simulators over the Internet for distance training. Kongsberg Maritime embarked on a pilot project, KOGNITIV, to research the feasibility of such a concept. This project also involved three maritime training centers in Scandinavia and received funding from The Research Council of Norway (Marintek 2002). The project concluded in

- The Marine Institute of Memorial University of Newfoundland (http://www.mi.mun.ca/) offers a Bachelor of Maritime Studies in a blend of classroom and online learning. Its Bachelor of Technology is available completely online.
- South Tyneside College (http://www.stc.ac.uk) has announced that it has developed an entry level e-learning course for aspiring Chief Engineers.

![Figure 1: e-Learning Hype Cycle](image1)

![Figure 2: NavSim 4](image2)
2002 and led to the commercialization of Kongsberg’s Web-enabled simulators.

3.2 Benefits
It is viewed by many that “distant learning combined with simulators makes a new and flexible training approach possible” (Buibas et al. 2006). The benefits of web-enabled simulation are:

- Students can run simulation exercises on their own in a self-study training mode. This provides flexibility with scheduling of training and the possibility of conducting training 24/7.
- Compared to CBT, web-enabled simulation offers high fidelity interactive simulator training. The students are engaged in an immersive environment.
- The built-in assessment and evaluation system provides feedback and guidance to the students. The assessment score is also available to the instructors.
- When connected to a Learning Management System (LMS), web-enabled simulation is presented in a managed learning environment where students and instructor can interact and the training adjusted to respond to the needs of the students.

3.3 Web-enabled Simulation in MET
One of the early adopters of web-enabled simulation was the Canadian Navy. The Navy had a requirement to support Naval Reserve Units across the country by providing basic and refresher bridge handling and navigation simulator training. Although the Navy owned two large full mission simulators, it was not feasible to provide access to all the naval reserve officers that required training. So in 2003 the Navy deployed web-enabled bridge simulators to each of the 24 naval reserve divisions spread across Canada. Each simulator is connected to the Navy’s LMS where each officer has his or her own training account. The Canadian Navy experience has shown that web-enabled simulation combined with electronic tutoring (e-Coach) is most useful for individual skills that require illustration or repetitive practice (Hardy 2005).

The Alaska Vocational Technical Center (AVTEC) is the leading maritime training center in Alaska. It provides maritime training and education to Alaskan mariners of all levels. AVTEC owns a comprehensive set of bridge simulators: three full mission bridges, one bridge in classroom, twelve desktop student stations and one GMDSS simulator. It was decided in 2006 that web-enabled simulation would be the best solution to provide distance delivery of training in support of existing courses (O’Halloran 2006) and also to lower student/instructor ratio during full mission bridge exercises. The first course that was selected was the Radar Observer Unlimited Recertification Preparation. This course stems from the US Coast Guard (USCG) requirement that every radar observer is recertified every five years. In order to prepare candidates for the recertification testing, AVTEC offered a three day refresher course at the school which was immediately followed by the test. This refresher course has now been placed on-line and is hosted on AVTEC’s LMS. Web-enabled simulation exercises are at the core of the course. The benefits for the students are that they are no longer required to spend more than half a day at AVTEC to stand the recertification test, therefore avoiding lodging and other traveling expenses. Since the on-line refresher course is available year round, it is easier for AVTEC to schedule the testing more often.

Recognizing the importance and benefits of maritime training simulators, the Constanza Maritime University (CMU) Rumania, has procured several advanced simulators since 2003 and has also joined an EU sponsored project with the goal of creating web-enabled simulation programs for junior officers onboard tankers (Barsan et al. 2006). The main emphasis of the project is to re-introduce the lost apprenticeship of entry-level officers in Europe and will focus on tanker operations where seafarers must handle dangerous liquid cargo (Buibas et al. 2006). The结果ing set of courses will take in consideration experimental learning (onboard), immersive distance web-enabled simulation (onboard and ashore) and formal teaching and training in the classroom or in the simulator (ashore).

4. THE FUTURE
The next wave of web-enabled simulation products will push the boundaries of contemporary on-line learning. To this end, Holland College, Canada, has recently submitted a project proposal (Sweet et al. 2007) with the goal of fusing e-learning courseware with simulator technology, electronic tutorial exercises and gaming applications to create an Immersive Learning Simulation (ILS) product. Under this project, Holland College will be drawing from its knowledge in maritime training as well as the technical expertise it created in the Justice Knowledge Network (http://www.justicenework.com) for the design, development and delivery of e-learning courseware.

Some of the key success factors of the project will the implementation of a secure portal with an approved authentication protocol as well as certification from national and international regulatory agencies.

5. AND BEYOND
It is risky and difficult at best to predict what the MET learning environment will look like in ten to twenty
years from now. But the signs of things to come can be found. It has already been a few years since the term Web 2.0 was coined by Tim O’Reilly and there is a lot of buzz around this: in October 2007 the Fourth Annual Web 2.0 Summit (http://www.web2summit.com/) will be held. The text book definition of Web 2.0 is as follows: “Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to to get better the more people use them.” (O’Reilly 2006). Examples of the Web 2.0 platforms are listed in Figure 3 (O’Reilly 2005).

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<tr>
<th>Web 1.0</th>
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<td>DoubleClick</td>
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<td>tagging (“folkonomics”)</td>
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<td>stickiness</td>
<td>syndication</td>
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Figure 3: Web 2.0

So Web 2.0 means that users are no longer passive readers, but are actively creating content and using applications that harness the collective intelligence.

E-learning is also evolving. “The result looks more and more like a world of distributed multi-channel learning, using resources and requirements in a mix that will be different for each person […] to create personalized collaborative learning management systems (PCLMS).” (Oliveira and Woodill 2006)

Web-enabled simulation fits right into this change: it well meets the requirements and expectations of the under forty generation, which has grown up with the computer, video games and other digital media. “Reading a lot of text on screen simply doesn’t cut it for them.” (Oliveira and Woodill 2006) If e-learning is to be successful, the content must be appealing to the end-learner; learning is being forced into new directions such as computer games. Simulation meets that challenge (Aldrich 2004).

This shift from instructor-centric curricula toward learning-centric searches for relevant learning resources in an interactive environment is already taking place. Second Life (http://secondlife.com) is a 3-D virtual and interactive world entirely built and owned by its “residents”. Users build their own avatar, their 3-D virtual self, that will interact socially and economically with other users’ avatar. Since opening in 2003, it is now inhabited by over 8 million residents (http://secondlife.com/whatis/). Forward-thinking educators saw immediately the potential that such an environment offered:

The possibilities for creating effective Second Life learning opportunities seem to be immense. […] Several things about Second Life strike us as extremely positive. First is the sense of sharing among the groups we have met online. [...] It has been amazing to see the strong sense of collaborative community that Second Life helps support. Second, Second Life provides an environment that enhances sharing through interoperability. [...] Third, Second Life makes it possible to create interactive learning experiences that would be hard to duplicate in real life. [...] Finally, Second Life provides the kind of environment that can allow true collaboration which makes all of us better. (Kemp and Livingstone 2006)

A number of real-life organizations have built campuses on the Second Life Learning Island: The New Media Consortium, The International Space Flight Museum and the National Oceanic and Atmospheric Administration (NOAA) to name a few (Kemp and Livingstone 2006). Even IBM is now conducting its employee mentoring - experienced managers sharing their experiences with younger employees - in Second Life (McKerlich 2007). All of them offer real-life learning, although it takes place in Second Life.

6. CONCLUSION

E-learning has had a bumpy road, but it is clear that it is here to stay. It has in fact become mainstream and it is losing its “e” prefix. Every year more MET centers are implementing e-learning programs to support their traditional classroom and simulator training. The addition of web-enabled simulator technologies ensures a captivating and stimulating learning environment, something that is needed if the trades of the sea will continue to attract young people. Shall we take bets on when a recognized MET center will open a training facility in Second Life?

REFERENCES


