

**Expanding Frontiers -
Challenges and Opportunities in Maritime Education and Training**

**Technology challenges and opportunities in
the delivery of distance education**

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Abstract: Education is in an era of rapid and sustained change and the old paradigms are being replaced by new paradigms. The traditional primary medium for knowledge, books, is being rapidly replaced by information on demand from the internet; learning in a classroom is being replaced by the capability to learn anywhere; and technology is no longer viewed as an expense, rather it is viewed as a differentiator amongst learning providers and is also an important, almost essential tool for the facilitation of learning services. The objectives of this paper are fourfold, namely to:

- Briefly review the waves of change sweeping through higher education;
- Explain the fundamentals of flexible/blended/e-learning;
- Report the outcomes of the research which identifies the challenges and opportunities faced by educators in using technology to provide/enhance the distance learning experience; and
- Consider why the take-up of technology for the delivery of distance education has been slow in maritime education and training (MET).

This paper is based on research into recent trends in education and training, including the use of technology and flexible learning techniques to deliver programs and assess students. This research is underpinned by 30+ years of experience in the delivery of distance education at the Australian Maritime College (AMC). The structured research, which was heavily internet based and international in nature, was carried out during 2010-11. The core component of the research reported in this paper is a review of developments in distance education in the university sector in order to identify the challenges and opportunities faced by educators in using technology to provide/enhance the distance learning experience. From this base the paper also briefly considers why maritime education and training (MET) has been slow in its take up of these developments. The results arising from this research include:

- Universities need to adapt to the education dynamics of the new world. Universities are information businesses and when the way information is handled changes fundamentally, information businesses must change.
- Traditional approaches to education are being reconfigured by technology as digital devices empower amateurs to do what professionals once did.
- Providing the right technology and systems, and ensuring that academics have the knowledge and skills to choose and use appropriate technology to enhance the learning experience are significant institutional challenges.

- MET is conservative by nature, 'wrapped up' in quasi-legal and administrative constraints, provides limited support for teaching staff to learn/enhance teaching skills, and has a traditional 'teacher centred' approach to learning; all of which reduce its capability to provide what the student requires, when, where and how it is wanted.

Keywords: Education changes, distance learning, education technology, maritime education and training

1. Introduction

This paper summarises research into recent trends in education and training, including the use of technology and flexible learning techniques to deliver programs and assess students. The structured research, which was heavily internet based and international in nature, was carried out during 2010-11. A core component of the research reported in this paper is a review of developments in distance education in order to identify the challenges and opportunities faced by educators in using technology to provide/enhance the distance learning experience. The objectives of this paper are to:

- Briefly review the waves of change sweeping through higher education;
- Explain the fundamentals of flexible/blended/e-learning;
- Identify the challenges and opportunities faced by educators in using technology to provide/enhance the distance learning experience; and
- Consider why the take-up of technology for the delivery of distance education has been slow in maritime education and training (MET).

Education today is in an era of rapid change where the traditional educational paradigms are being superseded. The primary medium for knowledge, books, is being replaced by information on demand from the internet; learning in a classroom is being replaced by the capability to learn anywhere; and technology is no longer viewed as an expense; rather, it is viewed as an important differentiator in the provision of learning services. MET operates in this changing educational environment and, in this respect is no different from other providers of education and training services. To be educationally sustainable and provide its users with relevant services, education and training providers have to successfully negotiate a number of educational paradigm shifts, pedagogy and technology challenges.

2. Changing Paradigms

Education today is in an era of rapid and sustained change and the old paradigms are being replaced by new paradigms. These paradigm shifts were first reflected by Inglis et al [1] and are summarised in Figure 1:

Old Paradigm	New Paradigm
<ul style="list-style-type: none"> • Take what you can get • Academic calendar • University as a city • Terminal degree • University as ivory tower • Students 18-25 years old • Books primary medium • Tenure • Single product • Student as necessary evil • Delivery in classroom • Multicultural • Bricks and mortar • Single discipline • Institution centric • Government funded • Technology as an expense 	<ul style="list-style-type: none"> • Courses on demand • Year round operations • University as an idea • Lifelong learning • University as partner in society • Students all ages • Information on demand • Market value • Information reuse/exhaust • Student as customer • Delivery anywhere • Global • Bits and bytes • Multi-discipline • Market centric • Market funded • Technology as a differentiator

Figure 1: Old and new paradigms in higher education

Summarising the effects of these shifting paradigms:

- Education institutions are moving away from bricks and mortar towards bits and bytes;
- Educators are moving away from being a sage on the stage towards being a wiz on the web;
- Teacher centric learning is being displaced by student centric learning; and
- Students are moving away from being passive learners towards being active learners.

In order to meet these education paradigm shifts/challenges, education providers have become more engaged with industry and their communities, customer oriented and flexible in the delivery of their educational services. In summary, education providers seek to provide their clients with what is wanted, when it is wanted, where it is wanted and how it is wanted.

As just-in-time learning replaces just-in-case learning and lifelong learning gains yet further acceptance, MET providers will change the way in which learning pathways are delivered to the student. It is inevitable that flexible learning techniques will play an increasing role and, provided conservative marine administrations agree, seafarer students will also benefit from these changes. Flexible learning, properly structured, is not a cheap option and it is therefore important for providers to determine whether to 'go it alone' or partner with others. The dangers of all providers 'going it alone' and trying to 're-invent the wheel' are obvious and collaborative arrangements between providers seems a sensible way to proceed in order to maximise the skills of the collaborators and also to maximise the benefits to students.

Education as a commodity is very much part of the new paradigms in education. MET operates in a specialised niche market which, traditionally, sells its services directly to its customers i.e. its students. Commodification leads to the consideration of what, apart from teaching services, can be bought/sold. [2] Research by Coaldrake and Stedman [3] into the suite of

tasks normally undertaken by academic staff shows that academic work can be commodified as illustrated in Figure 2:

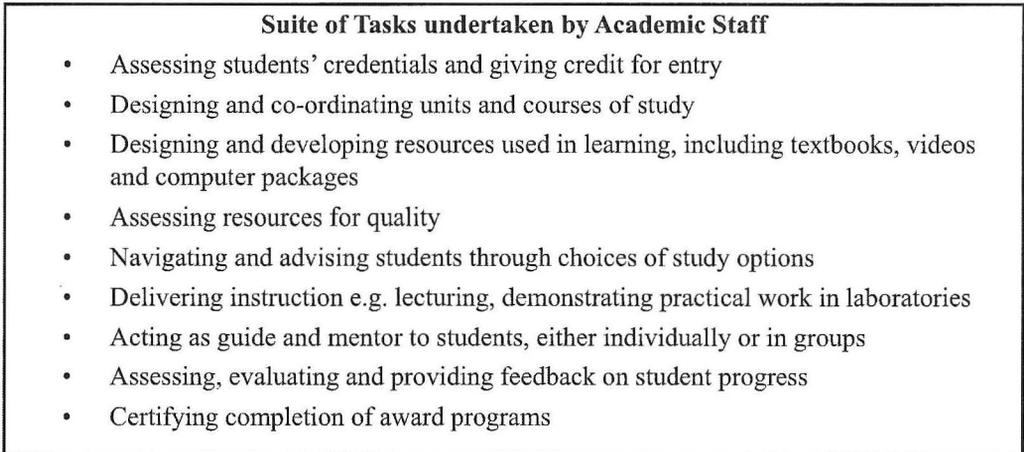


Figure 2: Disaggregation of tasks undertaken by academic staff [3]

Accepting that education is increasingly globalised and massified it becomes evident that the various elements of academic work could be disaggregated such that they could be carried out by different persons in different locations i.e. commodified. This is happening now, particularly in the context of online delivery of learning where the globalised communications systems are used to maximise learning opportunities for students. For example, the curriculum design may occur in two partner institutions that then employ content experts, learning resource material developers, tutorial support, assessment markers all in different locations but all connected via the internet and managed by the partner institutions. MET providers have not yet grasped the potential of conducting business in the manner described, but networks such as IAMU make this scenario increasingly possible. “The inertia of the existing system should not be underestimated but the question is not whether the nature and structure of academic work will change, but what the timing and extent of change might be”. [4]

3. Some distance learning fundamentals

3.1 E-learning

Synonyms for e-learning include Computer-Based Training (CBT), Internet-Based Training (IBT) and Web-Based Training (WBT). E-learning can be defined as follows:

“E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum.” [5]

E-learning is essentially the digital and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite, TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.

3.2 Blended learning

The terms ‘blended’, ‘hybrid’, and ‘mixed-mode’ are used interchangeably in current research literature. There is a range of different approaches to blended learning; it can take on many shapes or forms, depending on the teachers and learners involved. Consequently, there is no consensus on a single, agreed-upon definition for blended learning. However, Garrison and Kanuka [6] provide a straightforward explanation of blended learning which illustrates the simplicity of the concept and the complexity of its implementation.

“Blended learning is both simple and complex. At its simplest, blended learning is the thoughtful integration of classroom face-to-face learning experiences with on-line learning experiences. There is considerable intuitive appeal to the concept of integrating the strengths of synchronous (face-to-face) and asynchronous (text-based Internet) learning activities. At the same time, there is considerable complexity in its implementation with the challenge of virtually limitless design possibilities and applicability to so many contexts.”

3.3 Flexible learning

Flexible learning is a term often used in New Zealand and Australia [7] and is sometimes also referred to as personalized learning. Flexible learning can be defined as follows:

“Flexible learning is a set of educational philosophies and systems, concerned with providing learners with increased choice, convenience, and personalisation to suit the learner. In particular, flexible learning provides learners with choices about where, when, and how learning occurs. Flexible learning approaches are often designed using a full range of teaching and learning theories, philosophies and methods to provide students with opportunities to access information and expertise, contribute ideas and opinions, and correspond with other learners and mentors. This may occur through the use of internet-based tools such as Virtual Learning Environments or Learning Management Systems, discussion boards or chat rooms; and may be designed as a ‘blended’ approach, with content available electronically and remotely, as well as ‘face-to-face’ classroom tutorials and lectures.” [8]

To date, most flexible learning programs utilise computer-based systems (‘E-learning’), but the rapid increase in the processing power and popularity of mobile digital devices is causing considerable interest in mobile learning i.e. the use of mobile devices such as mobile phones, iPods, and iPads which increase the mobility of learners and also enhance the flexibility of their learning. In providing learners with choices about when, where and how learning occurs, flexible/blended learning must provide the learner with valid and reliable learning experiences. This requires the correct mix/blend of location, study pattern, teaching technique, study material and delivery medium. [9]

3.4 Focus of e-learning, blended learning and flexible learning

These three learning approaches are closely related and partially overlap but are different as they focus on particular aspects of the learning experience. Figure 3 illustrates the primary focus of each of these approaches to learning.

Learning approach	Focus
E-learning	Electronically supported learning and teaching
Blended learning	Integration of classroom face-to-face learning experiences with online learning experiences
Flexible learning	Choices, convenience, and personalisation to suit the learner about where, when, and how learning occurs

Figure 3: Focus of learning approaches

E-learning is clearly part of both blended and flexible learning, whilst blended learning can be part of flexible learning. E-learning is primarily about choosing the correct media to support the delivery of the learning experience; blended learning poses the challenge of virtually limitless design possibilities; and flexible learning approaches are often designed using a full range of teaching and learning theories, philosophies and methods to provide students with enhanced learning opportunities. The use of these learning techniques clearly requires considerable instructional design skill (also referred to as educational design or learning design) if the learning experience is to be valid and reliable.

“The information age is making new demands on us all. Education must find ways to face these new challenges. We can no longer see learners as empty vessels that can be filled with information. The information now resides out there, distributed across a vast network and shared between all people. The challenge now is to help people to use this information safely, wisely and productively as they adapt to a rapidly changing world...The instructional designer is there to facilitate learning in this new epoch, the knowledge age.” [10]

Instructional design involves an analysis of learning needs and the systematic development of instruction techniques to meet those needs that will facilitate the transfer of knowledge, skills and attitude to the learner. Instructional designers develop instructional strategies that are tailored to learning objectives and the needs of learners which aim to make instruction effective, efficient, appealing and cost-effective by using a variety of interactive media to improve learning and meet the learning objectives. Traditional face-to-face teaching methods can be enhanced or replaced by innovative e-learning methods which use the right technology to provide good pedagogy.

This raises a fundamentally important issue. Maritime educators and trainers are generally hired because of their maritime skill sets and experiences, and reputable MET institutions generally provide some form of training to assist their employees to become good teachers. But how many MET institutions provide professional development for their employees in blended and flexible learning techniques, instructional design, and the use of appropriate technologies to enhance the learning process? Holt et al suggest that information literacy has been, and remains a fun-

damental skill for educators but digital literacy, as an essential skill, is still gaining momentum. [11]

Clearly there is a significant body of knowledge to support the use of distance learning techniques; however, for the educator a real challenge is deciding on which medium and technology to use.

4. Technology challenges and opportunities

4.1 Technological progress

Technological progress presents both opportunities and challenges for educators to enhance the distance learning experience. In 1801 the blackboard revolutionized education. “In our present age of continually evolving desktop, laptop and palm computers, photocopy equipment, PowerPoint presentations, video displays, interactive whiteboards, and internet access, it’s startling to realize that the ‘technology’ to first influence education was the invention of these black slate writing boards, also known as chalkboards. [12] Arguably the next significant step was the use of radio with the world’s first School of the Air, based in Alice Springs, being opened in 1951. [13] Since the 1960s, the use of technology in education has evolved at an increasing rate, but it is the internet and associated access devices that have had the greatest effect on learning and teaching. Between 2000 and 2011 the worldwide growth in the use of the internet was 528.1%. The internet usage penetration rates in 2011 were: North America 78.6%; Australia/Oceania 67.5%; Europe 61.3%; Latin America/ Caribbean 39.5%; Middle East 35.6%; Asia 26.2%; and Africa 13.5%. [14] Unsurprisingly, many of the paradigm shifts illustrated in Figure 1 can be partly, or wholly, attributed to society’s adoption of the internet.

Progression of Technology				
Books	Radio	Audio tape	Desktop	?
Blackboard	TV	Video tape	Laptop	
Whiteboard	Video link	CD	Tablet	
		DVD	Smartphone	

Figure 4: Progression of the use of technology in learning and teaching

Finding one’s way through the maze of information resources and using the most appropriate technology is an increasingly major task for educators as students take greater responsibility for their own learning. The challenge for educators is to become digitally literate and decide how to best use technology to enhance the learning process.

4.2 Resources

The resources available to enhance the learning and teaching process are immense and continuously expanding. Internet based material, simulation games and Apps

all add to the rich and ever growing tapestry of available learning resources. Some examples follow:-

Examples of self study material-

- The online study database of 28,000 questions and answers covering all of the subject matter for both Deck and Engine Room used by the US Coast Guard for license examination. [15]
- Khan Academy where you can “Learn almost anything for free. With a library of over 2,700 videos covering everything from arithmetic to physics, finance, and history and 240 practice exercises, we’re on a mission to help you learn what you want, when you want, at your own pace”. [16]
- The Nautical Institute Alert! Vodcasts are short (approx 4min) films that can be viewed online or downloaded to a PC or Mobile device, aimed at anyone with an interest in the Maritime Human Element. [17]

Examples of simulation ‘games’-

- Ship Simulator Extreme €40. An add on Ferry Pack is €14.99 whilst the Harbour Pilot Pack is free. If you want a physical, rather than screen based controls, the Ship Control Unit is €395. [18]
- Ports of Call Simulator licence costs €4 – 40. Also available as an iPhone and iPod App. [19]
- Examples of Apps-
- “The iTunes U app gives you access to complete courses from leading universities and other schools — plus the world’s largest digital catalogue of free education content — right on your iPad, iPhone, or iPod touch. You now have a valuable tool to help you learn anytime, anywhere”. iTunes U also allows you to take notes and highlight text in iBooks, as well as browse collections from education institutions including Stanford, Yale, MIT, Oxford, UC Berkeley, and the Library of Congress. [20]
- Marine Navigation in USA charted waters App for iPhone, iPod and iPad, USD 49.99. [21]

The opportunities presented by the ever growing amount of learning resources, many of which are freely accessible, are almost endless. However, the challenges of assessing the validity of material and how to incorporate it into the learning experience are increasingly complex.

4.3 Learning management systems

The control and administration of distance learning is increasingly reliant on technology and Learning Management Systems (LMS), also known as course management systems. LMS are based on software which can be applied to a range of tasks associated with the control and management of distance learning as Figure 5 illustrates:

Learning Management Systems	
Applications	Common Attributes
<ul style="list-style-type: none"> Administration, documentation, tracking student progress and reporting of training programs 	<ul style="list-style-type: none"> Centralise and automate administration Provide self-service and self guided services
<ul style="list-style-type: none"> Classroom and online events/ activities 	<ul style="list-style-type: none"> Deliver learning events/ activities rapidly
<ul style="list-style-type: none"> Delivery of e-learning programs 	<ul style="list-style-type: none"> Deliver learning content rapidly
<ul style="list-style-type: none"> Development of learning content 	<ul style="list-style-type: none"> Assemble learning content rapidly Personalise content Enable knowledge reuse

Figure 5: Learning management systems; applications and attributes [22]

Apart from the magnitude and complexity of the tasks able to be carried out by LMS, there are two fundamentally different approaches to the provision of LMS software. Licensed software is institution-based whereas open software is provider based. Licensed software clearly comes at a price, frequently in the form of an annual fee. It provides an institution-based system which means that its use across the whole university would be common, as would the training in its use. It also gives the University greater control over its distance education programs. On the other hand, open software is 'free' but it does not give the institution the same level of control. It puts the emphasis on the individual user to develop and use it the way they want and this can take time and effort. In addition to costs, when deciding whether to adopt licensed or open software LMS, a key issue in the decision making process must also be the level of IT intellect/digital literacy of the intended users and their ability to develop the system to meet the goals of the university. There are at least forty different LMS available. This makes the challenge of which LMS to adopt a reasonably complex exercise. To assist in deciding the most appropriate LMS there is a considerable amount of internet based data available and some of the more useful sites contain detailed comparisons. [23]

5. MET, distance learning and technology

Ten years ago Newhouse [24] suggested, "We need to prepare students to learn, work and live successfully in a knowledge-based, global society." The question for MET is, have we done this?

A similar question was raised at GlobalMET Ltd's 2011 annual conference, where it was pointed out that "There are plenty of new technological gadgets such as TV/videos, internet, and other handy tools including the iPod, tablet, cell phones and various other handheld devices, if capitalized on in education and training, these could make a deep impact. The classroom

with walls need not be the set up for education training. We need to enter into a dialogue with students. Are we willing to walk that extra mile?” As a result, GlobalMET decided to reposition its training strategy to adjust to the paradigm shift in the learning processes appropriate for the ‘Y’ generation. Additionally, GlobalMET intends to submit a request to ILO/IMO for a review of the implications for maritime education and training with respect to the technical revolution underway. [25]

According to Fonseca [26], E-learning has several advantages but its user-friendly approach still has a long way to go before it can make a real break into maritime education and training. As an approach to educational delivery it should be attractive to today’s digitally savvy youth. However, considerable attitudinal change and effort is needed to replace the traditional teacher-centred, classroom-based approach to learning. In the context of using e-learning in maritime education and training in India, he reports: “In his presentation, *E-Learning: The virtual world awaits*, Capt. Yashvir Saran, Director of Mast Ship (an India based, international shipping and logistics agency), made a passionate plea for its recognition and acceptance by the maritime training fraternity. However, he failed to cut ice, with both seafarers and trainers alike, present in large numbers at the conference organized by the Company of Master Mariners of India, not on account of e-learning’s celebrated virtues or unlimited benefits but merely because the establishment is reluctant to accept revolutionary concepts that are far ahead of their time”.

However, e-learning is no longer a revolutionary concept; rather its use is rapidly increasing across the primary, secondary and tertiary sectors. E-learning places the student at the centre of the learning process and helps to cater to the different requirements of students i.e. e-learning is not teacher centred, rather it is student centred. However, the uptake of e-learning in maritime education and training for seafarers is painfully slow, mainly due to factors such as conservative marine administrations, poorly trained teaching staff, lack of suitable technologies, resistance to change etc.

A recent survey of industry crewing experts identified the increasing requirement for Internet access to be readily available on board ship. Without Internet access, many seafarers see this as an employment disincentive [27]. Much learning now requires Internet access and it is now technically feasible to deliver e-learning programs worldwide, including to seafarers wishing to study whilst at sea e.g. Inmarsat FleetBroadband service is available worldwide. However, even though Inmarsat services are eminently useable for the delivery of educational services to seafarers at sea, the issue for ship operators is costs.

Inmarsat Fleet Broadband services	
Internet access*	Company intranet access*
Email and webmail*	SMS and instant messaging*
Videoconferencing*	Store and forward video*
Large file transfer*	Secure communications*
Real-time electronic chart updates	Real-time weather updates
Vessel/engine telemetry	

Figure 7: Education service delivery at sea* [28]

Goldberg [29] suggests that the accelerating availability of onboard Internet is heralding new opportunities for mariners in terms of anywhere/anytime learning, informal education, professional advancement, and the establishment and maintenance of virtual maritime learning

communities. Most importantly, onboard internet needs to be seen less as a ‘nice to have’ but more for what it really is - a tool that vessel operators can employ to create a better trained, safer crew. The implications of broadband availability on board for training are significant, particularly in the context of delivering distance education services to serving seafarers.

However, most MET teachers are ‘digital immigrants’ whilst many of our students are ‘digital natives’. According to Prensky [30], the ‘digital natives’ are those who have always known the internet whilst the ‘digital immigrants’ are those that are coming to this new ‘digital land’, some kicking and screaming and others eagerly exploring and learning the new skills, language, and culture needed to travel in this ‘digital world’. In this ‘digital land’ the natives have an advantage over the immigrants which stems from the immigrants’ lack of cultural context with which to judge, and perceive experiences, while the natives grew up in the new land and have assimilated to the environment.

This presents another challenge for educators because the ‘digital immigrant’ instructors tend to speak an outdated, pre-digital age language which means they may struggle to teach and communicate effectively with the ‘digital natives’ who speak a new and different language. However, regardless of this it is reasonable to conclude that the role of the professional educator/teacher has expanded to include knowledge of how the technologies can be effectively used to enhance the learning and teaching process. This implies that professional development for educators, including MET teachers, is a necessity for education and training providers to deliver effective e-learning services. Whilst many MET providers have professional development programs for their academic staff, this is not always the case. However, for the committed educator there are internet based avenues for professional development e.g. Magna Publications, Professional Development for Higher Education. [31]

6. Conclusion

Universities need to adapt to the education dynamics of the new world. Acceptance of change is but the first step; actually adopting new paradigms is the second, and putting them into practice is the third. Users of education services are frequently driven by issues of time, place and cost whilst providers of education services are frequently driven by academic discipline, traditionalism and cost. The successful merging of these different drivers is one of the challenges faced by education today. [32]

Universities are information businesses and when the way information is handled changes fundamentally, information businesses must change. For example, the University of Leicester, U.K. has replaced printed distance education resource material with eBooks. It estimates that the cost of providing a student with printed resource material is GBP 500-600 whilst the cost of providing a student with a basic eBook reader is only GBP 150. A further benefit is that eBooks are also readable with iPads and smart phones. [33]

Traditional approaches to education are being reconfigured by technology as digital devices empower amateurs to do what professionals once did. Three examples serve to illustrate:

- “Last year (2010), Los Altos, California decided to use the Khan Academy videos and software in its public school classrooms. Doing so turns the educational model on its head. In the traditional model, students sit in class and receive information from their teacher while they busily take notes – a passive process that wastes valuable classroom time. They do the most challenging work – solving problems – at home without help. Under the new system they watch the Khan Academy videos at home and solve problems in class, where the teacher’s talents can be put to work

most fruitfully. In addition, students can learn at their own pace – rewatching videos – until they actually understand the material. The early results show huge leaps in student skills. Technology is being used to create customised, interactive education that is both novel and powerful”. [34]

- “It’s now possible to study a Yale or MIT course online without enrolling or paying for it. If you visit the MIT website it even tells you what online interactivity options are available in each course. You pay to be assessed and credentialed”. [35]
- “Calibre is a free and open source e-book library management application developed by users of e-books for users of e-books”. [36] It has six main features; library management, E-book conversion, syncing to e-book reader devices, downloading news from the web and converting it into e-book form, comprehensive e-book viewer, and a content server for online access to the book collection. It can also email books, download news automatically, and supports mobile devices including smart phones, Kindle, etc.

Providing the right technology and systems, and ensuring that academics have the knowledge and skills to choose and use appropriate technology to enhance the learning experience are significant institutional challenges. But any decision on just what is the right technology depends entirely upon having academic staff with sufficient knowledge and skills of both the technology’s capabilities and limitations, and the pedagogy of e-learning. Bearing in mind that many, if not most, educators are ‘digital immigrants’ the need for institutionally supported professional development should be axiomatic. The application of technology is about the people and the process rather than the technology itself.

MET is conservative by nature, ‘wrapped up’ in quasi-legal and administrative constraints, provides limited support for teaching staff to learn/enhance teaching skills, and has a traditional ‘teacher centred’ approach to learning; all of which reduces its capability to provide what the student requires, when, where and how it is wanted. Distance learning is no longer a revolutionary concept as it is now used across all education sectors and, in particular, e-learning caters to the different requirements of students i.e. e-learning is not teacher-centred, rather it is student centred. However, the uptake of e-learning in maritime education and training of seafarers is painfully slow, mainly due to factors such as conservative marine administrations, poorly trained teaching staff, lack of suitable technologies, resistance to change etc.

The delivery of distance education is undergoing significant changes and there is more to come. The vice-chancellor of Britain’s Open University, Martin Bean, suggests that “the next wave of change in further education will be fast and incredibly disruptive. It will happen when education meets social networking and it will be exciting as well as scary”. [37]

To conclude; a comment from famous New Zealand yachtsman, Sir Peter Blake: “New technology is common, new thinking is rare”. [38] Put another way; the technology provides the opportunity but how we use it is the challenge.

References

- [1] Inglis A., Ling P. and Joosten U., “*Delivery digitally - managing the transition to the knowledge media*”, Kogan Page, (1999) cited in Lewarn B., “Flexible learning systems and their role in meeting the changing needs of ports-from sage on the stage to wiz on the web”, *Proceedings of “17th International Port Training Conference”*, Hamburg, (2003).

- [2] Lewarn B., "Maritime education and training - the future is now!", *IAMU Journal*, Vol. 2, No. 1, (2002), pp 19-24
- [3] Coaldrake P. and Stedman L., "*On the brink: Australia's universities confronting their future*", University of Queensland Press, (1998).
- [4] Coaldrake P. and Stedman L., "*Academic work in the twenty-first century: changing roles and policies*", Higher Education Division, Department of Education, Training and Youth Affairs, (1999).
- [5] Wikipedia, "E-learning". Wikipedia the free encyclopedia. 20 January 2012. Wikimedia. 24 January 2012 <http://en.wikipedia.org/wiki/E-Learning>
- [6] Garrison D. R. and Kanuka H., "Blended learning: uncovering its transformative potential in higher education". Science Direct. 2011. Elsevier BV. 25 July 2011 <http://www.sciencedirect.com/science/article/pii/S1096751604000156#sec2>
- [7] Shurville S., O'Grady T. and Mayall P., "Educational and institutional flexibility of Australian educational software", *Campus-Wide Information Systems*, Vol. 25, No. 2, (2008).
- [8] Wikipedia, "Flexible learning". Wikipedia the free encyclopedia. 4May 2010. Wikimedia. 17 August 2011 http://en.wikipedia.org/wiki/Flexible_learning
- [9] Lewarn B., "Keeping ports pcopled: the role of sustainable maritime training", *Proceedings of "Regional Ports Conference 2011"*, Launceston, (2011).
- [10] Devilee A., "What do instructional designers do?". Instructional Design Australia. 21 September 2011. Instructional Design Australia. 15 November 2011 <http://instructionaldesign.com.au/>
- [11] Holt D., Smissen I. and Segrave S., "New students, new learning, new environments in higher education : literacies in the digital age", in Markauskaite L., Goodyear P., and Reimann P., (eds), *Who's learning? Whose technology? : proceedings of the 23rd annual conference of the Australasian Society for Computers in Learning in Tertiary Education*, 3-6 December 2006, the University of Sydney, Sydney, Australia, (2006), pp. 327-337.
- [12] "About Blackboards - Blackboard Technology and Chalkboard History Advances". ERGO in demand. 2012. Ergo in demand Inc. 20 March 2012 http://www.ergoindemand.com/about_chalkboards.htm
- [13] School of the Air, "History". School of the Air –Alice Springs. 2006. School of the Air. 20 March 2012 http://www.assoa.nt.edu.au/_HISTORY/history.html
- [14] "Internet Users in the World". Internet World Stats. 15 February 2012. Miniwatts Marketing Group. 20 March 2012 <http://www.internetworldstats.com/stats.htm>
- [15] "Multiple Choice Quizzes with Illustrations for United States Coast Guard License Exam Preparation Assistance". SeaSources.net, Training for Mariners. 11 March 2012. SeaSources.net. 22 March 2012 <http://www.seasources.net/index.html>
- [16] "Watch. Practice. Learn almost anything for free". Khan Academy. 2012. Khan Academy. 22 March 2012 <http://www.khanacademy.org/>
- [17] "Alert! - Improving awareness of the human element in the maritime industry. A unique resource of professional maritime articles and bulletins, FREE to all". The Nautical Institute. 2010. A Nautical Institute project, sponsored by Lloyd's Register Educational Trust. 22 March 2012 <http://www.he-alert.org/>
- [18] "Ship simulator extremes." ShipSim.com – Home. No date. ShipSim.com. 22 March 2012 <http://www.shipsim.com/>
- [19] "Ports of Call 2012". Ports of Call. No date. Ports of Call. 22 March 2012 <http://www.portsofcall.de/>

- [20] “iTunes U by Apple”. App store iTunes U. 2011. Apple Inc. 22 March 2012
<http://itunes.apple.com/us/app/itunes-u/id490217893?ls=1&mt=8>
- [21] “iNavX™ - Marine Navigation App for iPhone, iPod touch and iPad”. iNavX. No date.
iNavX. 22 March 2012 <http://www.inavx.com/>
- [22] Wikipedia, “Learning management system”. Wikipedia the free encyclopedia. 28 February 2012. Wikimedia. 26 March 2012
http://en.wikipedia.org/wiki/Learning_management_system
- [23] “Edu Tools Course Management System Comparisons- Reborn”. Wcet edutools providing decision making tools for the edu community. 25 March 2012. Edu Tools 2012. 26 March 2012 <http://www.edutools.info/static.jsp?pj=4&page=HOME>
- [24] Newhouse C.P., “*A Framework to Articulate the Impact of ICT on Learning in Schools*”, Western Australian Department of Education, (2002).
- [25] Fonseca J., “GlobalMET to meet needs of Y-generation”. Maritime Professional-the industry online. 5 December 2011. New Wave Media. 26 March 2012
<http://www.maritimeprofessional.com/Blogs/GlobalMET-to-meet-needs-of-Y-generation/December-2011/GlobalMET-to-meet-needs-of-Y-generation.aspx>
- [26] Fonseca J., “Long way before E-Learning gains entry in maritime training institutes”. Maritime Professional-the industry online. 17 August 2011. New Wave Media. 28 March 2012 <http://maritimeprofessional.net/Blogs/Long-way-before-E-Learning-gains-entry-in-maritime/August-2011/Long-way-before-E-Learning-gains-entry-in-maritime.aspx>
- [27] BIMCO/ISF., “*Manpower 2010 update*”, BIMCO/ISF, (2010).
- [28] “Maritime Services”. Inmarsat. 2012. Inmarsat PLC. 28 March 2012
<http://www.inmarsat.com/Services/Maritime/default.aspx?language=EN&textonly=False>
- [29] Goldberg M., “Onboard Internet and the Implications for Maritime Training”. Maritime Professional-the maritime industry online. 7 December 2011. New Wave Media 2011. 26 March 2012
<http://www.maritimeprofessional.com/Blogs/Maritime-Training-Issues/December-2011/Onboard-Internet-and-the-Implications-for-Maritime.aspx>
- [30] Gibson T., Koontz D. and Van Den Hende M. “The digital generation: teaching to a population that speaks an entirely new language”. 2009. 28 March 2012
http://david.koontz.name/digital/Presentation_files/THE_DIGITAL_GENERATION.pdf
- [31] “Teaching and Learning, Strategies for teaching face to face and online”. Magna Publications. 2012. Magna Publications. 23 April 2012
<http://www.magnapubs.com/teaching-and-learning/>
- [32] Lewarn B., “Flexible learning systems and their role in meeting the changing needs of ports—from sage on the stage to wiz on the web”, *Proceedings of “17th International Port Training Conference”*, Hamburg, (2003).
- [33] COFA online UNSW, “Creating eBooks for distance education - Case study”. You Tube. 16 February 2011. You Tube. 22 March 2012
http://www.youtube.com/watch?feature=player_embedded&v=54vIwP-Dd00
- [34] Zakaria F., “Why can’t the U.S. learn?”, *Time Magazine*, 14 November 2011.
- [35] Tanner L., “Will the internet kill universities?”. Campus Review. 31 October 2011. Campus Review. 23 April 2012
<http://www.campusreview.com.au/blog/news/will-the-internet-kill-universities/>
- [36] Goyal K., “About Calibre”. Calibre e-book management. 16 March 2012. Kovid Goyal. 22 March 2012 <http://calibre-ebook.com/about#features>

- [37] Blackwell A., "Resist social networking at your peril". Campus Review. 2 April 2012. Campus Review. 23 April 2012 <http://www.campusreview.com.au/blog/international/resist-social-networking-at-your-peril-open-university-vc/>
- [38] Blake P., "Educational Quotes for the 21st C". Leading Learning Co. NZ. No date. Future Edge Publications. 26 March 2012 <http://www.leading-learning.co.nz/original-quotes.html>