Evaluation of Disaster Medicine E-Learning Webs in Taiwan

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Abstract

E-learning has become the most popular topic in medical education including disaster medicine. Because of advances in e-learning, generalization of disaster medicine education should take various modes of e-learning as the method. In Taiwan, there are some important websites concerning disaster medicine. We'd like to review these websites to evaluate if these sites provide good e-learning environments. We searched the official websites concerning disaster medicine in Taiwan and reviewed the websites according to the established protocol. Each website has been evaluated by two independent reviewers. The average scores were obtained by averaging the two scores. Of the available 6 websites, the total scores of these 6 websites varied from 42 points to 28 points (average 34±12 points). The most unsatisfactory performances among these websites were multimedia preparation and interaction possibilities ($P<0.05$ by ANOVA). In conclusion, this report demonstrated that the e-learning of disaster medicine was still primitive in Taiwan. It should be the first priority to implement a well-established e-learning environment to provide good disaster medicine information and education.*(Ann Disaster Med. 2005;3:76-83)*

Key words: Disaster Medicine; E-learning; Education

Introduction

E-learning has become the most popular topic in medical education with the advance of computer and information science. Driven by the communication and information technologies there is structural change from all of the related fields. In the era of information, students have to face floods of data of which the relevant information has to be selected and applied. The internet and the new media are major players in this process. More and more physicians unravel e-learning as a new tool and as attractive adjunct to the traditional face-to-face teaching in medicine. Therefore, many people think that we are currently witnessed of another paradigm permutation in medicine: a paradigm which sets the internet and the new media in the center of interest.

There are a lot of applications for the use of the internet in medicine. According to all estimations of e-learning experts the internet will play an enormous role for the provision of learning contents in education. E-learning modules can be used as adjuncts to traditional face-to-

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face teaching for supplementation and enrichment. Complete online programs can be provided for further and continuing educational purposes.

There are a number of promises associated with e-learning. The exponential increase of knowledge in most scientific disciplines keeps the doubling times of knowledge shorter and shorter. Graduates with many years occupational practice are increasingly confronted with a necessary for continuing education demands. The updating of teaching content in the net is possible in a much more rapid manner than in books. The time span from the one book edition to another is frequently one or two years or more. Changes of e-learning contents can be made daily. E-learning provides good opportunities for explorative learning. The disposition of learning modules in the internet should allow a switch to learner-based concepts. The teacher acts as adviser and presenter. This pedagogical concept is termed constructivism and is currently intensively discussed.

One of the most obvious advantages of the internet in general and especially of e-learning is the unrestricted access to learning content independent of the time and place of the learner. Furthermore, learning modules with different degrees of difficulty and the unrestricted repeating of learning modules by the learner allow a good adaptation to the foreknowledge of each individual learner. The multimedia-based preparation of content supports the understanding of complex facts, i.e. three-dimensional portrayals or time-kinetic processes. A disadvantage of e-learning is the lack of social contact and "human touch". E-learners may miss the personal contact to teachers and other students. Nevertheless, the communication tools of e-learning such as discussion forum, chatroom, e-mail, and whiteboard enable considerably improved possibilities of interaction as compared to traditional distance learning media.

Because of advances in e-learning, generalization of disaster medicine education should take various modes of e-learning as the method. In Taiwan, there are some important websites concerning disaster medicine. Two of them are official websites of national disaster medicine assistant team (DMAT). Our society also has an official website that has been posted important education and training protocols and contents of disaster medicine. Other related websites include education webs concerning emergency care and life support. We'd like to review these websites to evaluate if these sites provide good e-learning environments.

Methods

Study websites

We searched the official websites concerning disaster medicine in Taiwan and reviewed the websites according to the established protocol. Each website has been evaluated by two independent reviewers. The average scores were obtained by averaging the two scores. If the difference of any score concerning a specific category was more than 5 points, the third reviewer was invited to re-evaluate and re-score. The average would be the result of the two closest values.

1. The category of disaster medicine, family medicine and community medicine. http://ceiba.cc.ntu.edu.tw/fm_clerk/dizaster/catalog.htm
2. Disaster Medicine. http://sts.nthu.edu.tw/twmed/Subjects_and_Issues/Medicine_of_Disaster/

3. Official website of Taiwan Society of Disaster Medicine. http://www.disaster.org.tw
4. Official website of Southern National DMAT, Taiwan. http://140.116.58.126/toxincen/index.html
5. Official website of Northern National DMAT, Taiwan. http://dmat.mc.ntu.edu.tw/
6. Official website of e-Government. http://elearning.nat.gov.tw/
7. Official website of Formosan's e-Medical School. http://fms.cto.doh.gov.tw/DOH/index2.jsp

Review protocol

E-learning should provide rapid correction and addition of teaching content; explorative learning; ubiquitous access, time and place independency; individual adaptation to foreknowledge of students; enrichment of traditional teaching modes by multimedia-based preparation of contents; and improved interaction possibilities compared to traditional distance learning media. We thus explored that if the disaster medicine-related e-learning websites in Taiwan can provide such requirements. These categories are evaluated by three independent experts who gave the scores for each of the following categories (from 1 to 5).

1. Rapid updating of teaching content and material;
2. Explorative learning;
3. Independent time, place and access;
4. Individual adaptation;
5. Multimedia-based preparation;
6. Interaction possibilities;
7. Continued medical education (CME) tests;
8. Certification;
9. Post-test evaluation and grading;
10. Multi-language approach

Statistical analysis

Demographic data were analyzed by *t* test and chi-square test where appropriate. The comparative results were presented as point estimate and interval estimate (eg, the difference of the proportions, means, and 95% confidence interval [CI] for difference). The ê statistic was used for calculating the degree of agreement in selecting high-risk ED discharged patients between the reviewers. All data were abstracted from records and keyed into and analyzed in Excel 2000 (Microsoft Co., Redmond, WA, USA). A *P* value less than 0.05 was considered as statistically significant.

Results

As mentioned in the section of method, we reviewed the available 7 websites by items in detail. Among them, the Official website of Taiwan Northern National DMAT has been quitted and could not be evaluated. The remaining six websites were reviewed and discussed by three independent reviewers.

As to rapid updating of teaching content and material, two of the websites (33%) were updated per week (5 points), two (33%) were updated per month (3 points) and the other two were updated irregularly (1 point).

Two of the websites (33%) had good explorative learning (5 points), whereas the other 4 websites (67%) had only unidirectional lectures (2 points). All of these websites (100%) had independent time, place and access (5 points) and individual adaptation (5 points).

As to multimedia-based preparation,

there were primary availabilities in 3 websites (50%; 4 points), whereas the other half did not have adequate multimedia preparation (2 points in 17% and 1 point in 33%). In a similar manner, there were primary interaction possibilities in 3 websites (50%; 4 points), whereas the other half did not have adequate interaction preparation (2 points in 17% and 1 point in 33%).

There was only one website (1/6, 17%) that has continued medical education (CME) tests (5 points), post-test evaluation and grading (5 points), and certification (5 points) whereas the other 5 websites did not have such services (1 point).

There was also only one website (1/6, 17%) that had multi-language approach (including English and Mandarin) (5 points) and the other 5 websites has merely Chinese version (5/6, 83%; 1 point).

The total scores of these 6 websites varied from 42 points to 28 points (average 34±12 points). The average scoring of the subcategories were as follows: (1) Rapid updating of teaching content and material: 3.0±0.8 points; (2) Explorative learning: 4.3±1.2 points; (3) Independent time, place and access: 5.0±0.0 points; (4) Individual adaptation: 5.0±0.0 points; (5) Multimedia-based preparation: 2.3±0.8 points; (6) Interaction possibilities: 2.3±0.8 points; (7) Continued medical education (CME) tests: 1.7±1.5 points; (8) Certification: 1.7±1.5 points; (9) Post-test evaluation and grading: 1.7±1.5 points; (10) Multi-language approach: 1.7±1.5 points.

The most unsatisfactory performances among these websites were multimedia preparation and interaction possibilities ($P<0.05$ by ANOVA).

Discussion

This study demonstrated that there was still no satisfactory e-learning environment concerning disaster medicine in Taiwan. Because of its popularity and generalization, disaster medicine should be incorporated into friendly e-learning websites immediately to provide good information and concepts to the public. In addition, the rating of the websites depends not only on the experts' opinions, but also on the rating from the students. Our data is limited in that fact that it lacked student attitude in understanding of basic concepts and utilizing these learning sources. In general, the acceptance of a course was largely due to its congruence with principles of adult learning such as self pacing, reflective learning, and collaborative learning from peers.[1] It is necessary for the participants to note a number of advantages of online learning. Although there are only rare examples in the literature of online courses on communication skills for medical professionals or students,[2] this study does add to the growing literature in medicine and in fields outside of medicine,[3-5] suggesting the effectiveness of Internet-based distance education. However, more rigid evaluations with control groups and a larger number of participants are required to establish which factors and participant characteristics are determinants of effective learning. Previous studies generally show that Internet-based instruction is at least as effective as conventional methods[6-8] and in some cases superior.[9-11] A recent meta-analysis of Web-based learning in medical education, however, did acknowledge that studies are needed that better compare instructional methods rather than comparing instructional media although it still did not find this method superior to conventional methods.[12] A

carefully-designed, instructed, and evaluated online course may effect better learning outcomes than face to face instruction.[13] Based on the limitations of research to date, it is clear that further work is needed to assess the impact and acceptance of small group online education, and the role of faculty or other moderators in online medical education courses.[9,14-16] The acceptance of this method in a broader, unselected student population will be of interest. Evidence suggests that most learners will ultimately be successful online learners.[17] We also note that self report of learning is less reliable than direct measurement of knowledge acquisition. However, there was consistency of findings from the mixed-method approach used to evaluate this course. Given the favorable results from this elective, we plan to integrate elements of this online course into the preclinical-years' communication-skills curricula for use by all first-year students.

Governments should focus on their role as sponsors of basic scientific and technological research, bridging the digital divide, fostering public-private partnerships, managing international cooperation efforts, and establishing the regulatory and incentive components. All stakeholders must work collaboratively to grapple with the many standardization and infrastructure development issues and the transnational and global e-learning aspects that must be addressed in a comprehensive manner. International aspects of e-learning services form a critical and urgent area still to be addressed by the World Trade Organization and regional trade blocks. Legislation proposals should be initiated to ensure that the technology does not abridge patients' rights to confidentiality or security of medical records, and that agreement on practice parameters be developed to include aspects related to informed consent, physician liability, nonphysician liability, reimbursement, practice standards, and physician-patient relationships.

The public sector, the industry, and partnerships have the responsibility for assuming an active leadership role in educating the medical community and in coordinating and encouraging the effective implementation of relevant applications. Health organizations must be provided with information about the opportunities as well as the risks of e-learning solutions. Technology-evaluation sources and results must be made available and health managers must be guided in the difficult process of specifying systems, procuring, acquiring, and contracting for ICT products and services. Knowledge repositories must be established in cooperation with the industry, centers for technology evaluation, academic research groups, and centers of excellence.

Organizational and human-resources development through awareness programs, education of health staff, continuous training, and career opportunities must be institutionalized from the inception of the developmental effort. Transference of technical expertise and the appropriation of knowledge by health personnel are necessary for the full participation of end-users in the development process and the best insurance for successful implementations. Success in the deployment of institutional e-learning applications depends on the existence of staff with the right mix of skills in all functions and levels. Recommended strategies include:

1. A structured human-resource development program defined with the goal of increasing awareness of e-learning oppor-

tunities and training health professionals to assume a leadership role and actively participate in all aspects of systems design and implementation.

2. The training strategy will take into account issues associated with the development, the organizational environment in which systems are expected to operate, and the specific circumstances of the local health system. The following guidelines for training should be implemented, such as identifying target groups based on functions and training needs; developing training programs to meet identified target groups' needs; and establishing a network of training focal points, taking into account the specific organization and circumstances of national characteristics and local health-unit requirements and undertakings.
3. Target groups to be considered are those who originate, collect and supply data; operational decision makers (direct health care professionals and administrators); managers, planners, and policy makers; information systems managers; information technology and computing specialists; data analysts; and statisticians and researchers.
4. Each country will develop its own strategy for initial and continuing training in health-information systems, considering the overall development of health information systems and its particular health care, educational, research, and market environment.

The internet will radically change medical education. The next decade may see the emergence of a new type of medical school. It will not be made of bricks and mortar, but based mostly in the hard drives of computers, accessible by thousands of students all over the world. New investment trends are driving this efficient, cheap, and convenient way of delivering information. While patient contact will remain integral to learning medicine, perhaps what will emerge is a way to personalize education, reduce costs for students, and prepare them more thoroughly for contact with patients.

E-learning potentially offers huge benefits for users. It includes self paced courses, available anytime and anywhere, guaranteed consistency, personalized and relevant, easily updated, easy tracking and reporting, and reducing logistical costs (travel, space, materials).

International recognition of training will also be assured since companies will demand international collaborations. This is because national systems will always be perceived as being of variable quality. U21 includes universities in Europe, China, North America, Australia, and New Zealand. Other universities, such as Oxford, are setting up their own international consortiums. It is a convenient medium for ongoing education, a necessity in the medical field.[19]

There are other obstacles. Some estimates suggest that it takes 200 hours to produce one hour of online tuition, invoking the need for huge investment. Despite the current investor frenzy, online learning has not yet produced commercial success. The University College of Los Angeles school of dentistry spent $750 000 (£535 000) over five years developing an online course to train periodontists. It has been a commercial failure. [20] So it seems that the correct business model has yet to be found. But with such large potential revenues from electronic education, it is only a matter of time before the

right solution makes e-learning a reality.

Clearly e-learning will not wholly replace teacher led or hands on training. We still need patients. But patients should not be our guinea pigs. Online scenarios can allow us to gain confidence and appropriate background knowledge before the hands on portion of learning, replacing time spent learning theory, with more time mastering the skill.[19] For instance, a simple program can test competence on applying leads when performing diagnostic electrocardiography. Crucial supervised practice can then follow to gain essential clinical experience. Furthermore, certain areas lend themselves more easily to online teaching. Multimedia instruction is particularly well suited to help students learn physical diagnosis, with visual and audio aids enhancing recognition of heart and lung sounds, physical examinations, and pathology.[21]

New models of medical education will continue to emerge as the qualities and knowledge required by juniors is constantly reviewed. But there seems little doubt that electronic learning will be right at the centre of its future. However, this report demonstrated that the e-learning of disaster medicine was still primitive in our countries. It should be the first priority to implement a sound e-learning environment to provide good disaster medicine information and education to promote the preparation of disaster response in the public in this country.

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