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PERSPECTIVES

Web-based learning and technology — Chinese Orthopaedic Association and World Orthopaedic Association Beijing Summit task group☆

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Summary Orthopaedic translation is a dynamic process. It entails an ever changing working relationship among the various key professional groups, namely, orthopaedic surgeons, scientists and engineers, industries, and regulatory bodies. Interactive sharing of information among these groups is the key to the fast development of orthopaedic translation in the past decades. There is an enormous pool of information on the Internet, which may pose a puzzle to the readers. It is therefore imperative for the *Journal of Orthopaedic Translation* to examine the power of web-based learning technology at the onset of the journal's launch.

☆ This perspective article is a summary of a panel discussion by the task force formed at the annual meeting of the Chinese Orthopaedic Association in 2012.

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Introduction

New and cutting edge information is now made accessible with online publication and is available quickly on the public domain unless restricted by consideration for patent registration. Therefore, an enormous pool of information is available on the Internet, often with much diversifying views, which may pose a puzzle to the readers.

The importance of translational research is being recognised rapidly by all spectra of the scientific community. The *Journal of Orthopaedic Translation* is purely dedicated to the art of translational research, and will be a monumental step in the advancement of musculoskeletal care by bringing cutting edge knowledge to the forefront and allowing the pioneers of orthopaedic translation to exchange and mutually enhance expertise. The proper development of web-based learning and technology may lead to incredibly promising advancements in orthopaedic translational research; it is therefore imperative for the *Journal of Orthopaedic Translation* to examine the power of web-based learning technology at the onset of the journal's launch and to consider its merits and limitations.

Background

Traditionally, doctors have learnt from lectures, textbooks, syllabus materials, and journals. Rapid technological advances increasing the usage of the Internet has caused the traditional learning environment to incorporate virtual/web-based learning characteristics. During the Beijing Summit of the 2012 Chinese Orthopaedic Association Congress and World Orthopaedic Alliance, a speciality task group was assigned to discuss this rapidly developing technology that may be a significant milestone in the spectrum of medical education. Expert views were solicited from key opinion leaders in order to form a coherent and critical view of the advantages and limitations of this new technology.

Current scene

Web-based learning utilises the vast usability of the Internet to create a "learning community". Web-based education has shown promising potential in improving medical students' learning by demonstrating high levels of functionality and effectiveness. Medical students have also shown a significant level of acceptance for this type of education [1]. Modern physicians learn differently, and therefore new approaches to learning need to be developed. Younger surgeons want "bite-sized" and concise information that is easy to access and find. They want immediate answers to current clinical questions and do not wish to spend long hours researching. New-generation surgeons also prefer more individualised learning formats that will allow them to learn at their own pace, help them achieve their learning objectives, and are tailored to their learning styles [1].

Web-only contents including podcasts, on-line meetings, and on-line libraries, are more commonly used by younger orthopaedic surgeons than those who are more accustomed to "traditional" methods of teaching such as textbooks and lectures. An incredibly popular example of web-only content is wikis, consisting of expandable collections of interlinked web pages in which any user can add, remove, and edit information. Wikis for doctors and researchers include Wiki Surgery [2], Healtheva [3], Ganfyd [4], and Sermo [5]. Some of these sites allow only doctors who can prove their medical credentials to edit information in order to guarantee quality assurance and accuracy of data [6].

Podcasting is another popular web-based technological advancement that is rapidly being adopted in medical school curricula for student lectures. Students are able to access chapters from textbooks and download libraries of respiratory sounds online, a concept that was not heard of in the past. Notable examples of podcasts are *New England Journal of Medicine* podcasts, *Johns Hopkins Medicine* podcasts, and the ABC Radio's podcasts [6].

Social networking is also becoming increasingly popular and can be a novel method for sharing information regarding difficult or unusual cases. New technology also allows active integration of educational initiatives from orthopaedic centres around the world. Doctors care about two major issues: whether the knowledge is cutting edge and whether it is reliable. These two issues need to be considered carefully to ensure a proper balance between them.

Advantages and limitations

Web-based learning allows for a large amount of information to be searchable easily and available to users around the world, making it a user-oriented knowledge acquisition process. This type of learning overcomes physical barriers and also offers flexibility of scheduling for participants [7]. It provides a platform for a diverse group of users, both locally and globally, to share and exchange knowledge and findings conveniently, which makes it a rich and diverse learning environment [8].

Although the web-based learning environment increases the availability of vast and diverse information, it also results in information overflow. The amount of information can be overwhelming if not organised and delivered properly. A study conducted by the American Academy of Orthopedic Surgeons found that learners of a virtual learning environment want answers for their key questions in the most efficient manner possible without wasting time on unrelated information. Therefore, a balance needs to be established between providing a vast amount of information and filtering resources to find the target information.

Web-based learning is focused on learner-driven approaches and can be presented in multimedia formats, which allow learning to be interactive, engaging, and dynamic. Web-based learning delivers on the promise of increased individualisation of learning by offering participants a greater degree of control of their learning pace and options; however, the contrary can also occur. In the traditional setting, an effective teacher will be able to gauge the performance of their students, but a web-based education system may not be able to respond to the individual needs and concerns of the students [7].

Advancement in medical knowledge and feedback from medical students often cause professors and authors to amend and improve teaching materials and resources. With

the utilisation of web-based learning, amendments can be made in a much more efficient manner with a simple click of the mouse. This new information can then be shared among the network of students quickly [7]. Nevertheless, improved convenience also results in the problem of quality assurance. The Internet is a vast network of participants, and it is difficult to control the content that people post and to regulate the quality of information posted. It is also difficult to validate the legitimacy and qualification of the person who claims expertise in the field [6]. It is important to obtain information from a website that is respectable and reputable. Web-based learning resource centres, therefore, need to develop protocols and strategies of peer review to authenticate information and validate the reputation of their contributors.

Intellectual property right, accessibility of information, and privacy of patients are also issues that need to be taken into account. With a large number of people utilising the Internet, confirming authorship for a particular piece of information can become difficult. One has to develop a mechanism to determine the ownership of intellectual property and terms of access. Web-based learning institutions that are reputable for providing quality information will attract a large audience and should develop a system to determine who has access to their resources. An online learning platform that provides users with orthopaedic resources also needs to ensure that it is providing relevant and useful information to its users without compromising the privacy of patients.

Technical issues such as language barriers and the optimal formatting web learning technology in orthopaedics are other areas that require special attention. The Internet reaches millions of people around the world; language barriers can limit the usefulness of web-based education, and the different needs of various people should be defined carefully in order to maximise the potential benefits of web-based education.

Stakeholders and the possibility to define a common goal

In order to develop the most efficient web-based learning technology, one must identify the key groups that utilise web-based learning the most.

Currently, four groups of users have been identified to utilise web learning technology in orthopaedics. Orthopaedic surgeons are looking for a user-friendly and client-oriented platform that provides reliable and up-to-date information. Surgeons want to be able to access information that is related to clinical questions and patient management without being constrained by time, geography, and formatting.

Research scientists want a similar resourceful platform in which information relevant to their research questions can be accessed easily. Researchers also want the resource to be accessible without limitations of time and geographical location. Patients want easy-to-understand and reliable information about prevention of injuries and diseases to be available at an affordable cost. Industries want a platform that provides them with useful market information, allowing them to gain an advantage over their competitors [8].

Differences between stakeholders are dependent on the needs of their own community, legislation, credentialing bodies, training bodies, and resource availability. Among medical professionals, the desire to learn about their medical profession is universal. How that learning is accomplished depends on skill levels, relative levels of access and infrastructure, and the entire philosophy within specific cultures and/or medical specialities.

Reliability and accessibility are the primary concerns of stakeholders. Online education resources affiliated to major associations, such as the Chinese Orthopaedic Association, Japanese Orthopaedic Association, and The International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine, can be the first choice to doctors, researches, or even patients as they provide quality assurance and are affiliated reputable and established societies and institutions.

A common goal among the stakeholders is also to have easy, affordable access to reliable information about specific problems or conditions. As web-based education is a relatively new endeavour, it is important for stakeholders to know that resources are used properly to develop this new initiative and technology. The ultimate common goals of web-based education are that it is effective, changes physicians' behaviours and attitudes, and ultimately results in improved patient outcomes.

Role of industries in the marketing of web-based learning technology and supporting related educational activities

Web-based learning technology can be a major stream of medical learning in the future. As industry is one of the major four stakeholders that utilise web-based learning, its involvement will have a major impact on the development of web-based learning. Industry will produce new devices such as the iPad, which can connect doctors and patients. It also plays an important role in funding research works, which are generally supported as contract studies or awarded through grants by medical societies or Orthopaedic Research and Education Foundation. Industry is also important in supporting the cost of society meetings, education of members, and websites of societies.

Industry must play an important role in providing access to surgeons who are trying to upgrade their knowledge or skill, but must not increase financial burden through price increases of implants or instruments.

Industry must also ensure that its products and devices are used appropriately, safely, and within the approved uses, according to regulatory bodies. However, educational formats should remain bias free and transparent. Industry can and should partner with physicians for the benefit of patients, and not for personal gain or monopoly. Industry-supported educational activities should be product based and not curriculum driven.

Looking to the future

A promising system that can be utilised to optimise the usage of web-based learning is the "5S" principle of

management, which is a significant model that should be studied and developed in regard to the development of web-based learning. The "5S" refers to structuralisation, systematisation, standardisation, sanitisation, and self-discipline. A successful web-based learning system should contain nontraditional resources such as tutorial videos and interactive skill practices, along with a reinvention of traditional education materials such as online textbooks and recorded lectures. The information should be customised to the needs and demographics of the target audience [8].

Way forward for World Orthopaedic Association and web-based learning

Following this momentous gathering of experts at the Beijing Summit, it is imperative to continue with the momentum to push the development of World Orthopaedic Association forward. In particular, views will be solicited from other developing regions such as the pan Arab region and other Asian countries.

The emergence of web learning technology marks a significant step in orthopaedic education and has promising potential [1]. Careful planning and consideration of all the factors are crucial to optimising the benefits of web learning technology [6]. The fundamental problem, relative to the changing print and electronic publishing environment, is how to develop a strategic plan that will bridge the gap, provide professional sources of information for all stakeholders, and yet, be a successful business and revenue-generating model. In order to allow web-based learning and technology to reach its full potential, it is important to continue collecting views for further understanding and optimal utilisation of this new technology. Instead of allowing web-based learning to replace traditional methods of medical education, the optimal strategy is to analyse efficiently the advantages and disadvantages of both schools of education and to merge them in an efficient manner, creating optimal learning for future medical professionals for the benefit of patients.

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