Educational opportunities in radiology a glimpse into the future

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ABSTRACT

Radiology is undergoing a digital revolution that is continuing to make fast strides. There have been a number of exciting breakthroughs made in the field of radiology informatics recently, many of which have the potential to have a substantial effect on the education and training of radiologists in the not too distant future. Extended functionality of handheld computers, web-based skill and knowledge assessment, standardisation of radiological procedural training using simulated or virtual patients, worldwide videoconferencing via high-quality health networks such as Internet2, and global collaboration of radiological educational resources via comprehensive, multi-national databases such as the medical imaging resource centre initiative of the Radiological Society of North America are some of the innovations that fall under this category. In this article, we will investigate the role that e-learning plays in radiology, discuss a number of web-based applications that are helpful in this field, and explain how the most recent technological advancements and those that are yet to come can be most effectively incorporated into radiological training.

Keywords: simulated patients, sonography simulator, E-learning, computer networking.

INTRODUCTION

The long-awaited radiography integrated training initiative (R-ITI; http://www.riti.org.uk), which will include an electronic validated case archive (VCA) and various computer-based study aids, is about to be made accessible as a ground-breaking teaching resource for aspiring radiologists in the UK. At the same time, nationwide radiology departments are now installing picture archiving and storage (PACS) systems. Digital radiography is here to stay, and radiology education needs to embrace these quickly evolving technology advancements.

For many years, informal tutorials during reporting sessions, didactic lectures, and interactive, film-based small-group instruction have dominated radiology education. The usage of digital photographs and computer-based presentations for education has rapidly increased with the transition from hard-copy to soft-copy reporting. In addition, there is a growing trend for independent study using a range of Educational websites, departmental or online digital teaching file databases, and CD-ROMs are all examples of e-learning resources.Several upcoming observational studies have studied the application of electronic and conventional teaching techniques in the instruction of medical students, and these comparisons have demonstrated that computer-aided learning is connected with better advances in class ranking and problem-solving ability [1,2].

Although these new digital learning technologies have a lot to offer in terms of prospective advantages, case-based teaching by knowledgeable instructors continues to

be a crucial component of the learning process. To keep the interactive component of medical education from disappearing, it is crucial that future radiological teaching tools be used in an inventive and creative manner [3]. Despite the extensive usage of PACS and other technical advancements in radiology departments in the USA, research has demonstrated that digital technology is commonly underutilised in radiology instruction [4].

In earlier articles in this series, we have addressed a number of significant facets of radiology informatics and talked about the function of various e-learning tools for radiologists, such as interactive teaching files and web-based training resources [5,6]. This article will examine additional exciting developments, such as the growing use of handheld computers in radiology education, the evaluation of radiological knowledge and skills using interactive teaching materials on the web, the practise of practical skills in radiology using virtual patients and simulators, and finally, globally cooperative applications like Internet2 and the Medical Imaging Resource Center (MIRC) of the Radiological Society of North America, which may have major implications.

Handheld computers in radiology

Personal digital assistants (PDAs), sometimes known as handheld computers, have grown in popularity since they were first introduced in the early 1990s for a range of medical uses. 7 The most recent generation of PDAs are multipurpose devices with a wide range of helpful capabilities, such as word-, spreadsheet-, and database-processing software, email and web-browsing tools, and digital media players. You may get more details on the many kinds of handheld computers out there as well as a thorough analysis of how frequently they are used in radiology online [8].

The standard PDA features, which often include an address book, calendar/scheduler (with an alarm reminder function), to-do list, and memo composer, which assist organise and prioritise work, are frequently very helpful to radiologists. To ensure data backup and maintenance of current information, data stored on the portable device should ideally be routinely synchronised with the user's desktop computer.

PDAs for radiologists include a number of extra beneficial capabilities in addition to their fundamental functioning. First, once a customised database has been set up on the PDA, handheld computers can be utilised as a versatile research data entry tool. Using a conventional spreadsheet or database programme like Microsoft Excel or Access, this is easy to accomplish. The data can then be downloaded to a personal computer for data processing and preservation. Comparably, portable computers can be quickly set up to let trainees compile crucial radiological logbook data. For anyone considering this choice, a database created by two Scottish radiologists based on the Royal College of Radiologists logbook is available for free download at http://www.burgul.com/logbook. This is simple to instal, with the only drawback being the need to buy additional software in order for it to function, however this only costs a few pounds.

The ability to save electronic books on mobile devices is another useful feature. Michael D'Alessandro and colleagues laid the groundwork for the use of portable digital books in radiography in the mid-1990s [9].

Many modern PDA models are equipped with wireless networking features that

enable remote access to departmental intranets and PACS databases [8]. Using this cutting-edge feature, radiologists from the Beth Israel Deaconess Medical Center in Boston, Massachusetts, developed a PDA-based platform for managing radiological material and training residents [10, 11]. Other cutting-edge applications for PDAs in radiology have been discussed, such as their expanded role in regulating the display of patient and imaging data on high-resolution monitors, and their usage as projectors for Microsoft PowerPoint presentations [12, 13]. These uses highlight the variety of PDAs' potential roles in radiology teaching and learning in the near future.

Web-based assessment of radiological skills and knowledge

The R-ITI and VCA in the UK list developing learners' ability to analyse and interpret radiological investigations as one of their declared goals. 14 Once the system is operational, it is claimed that radiologists would be able to use these resources to conduct self-evaluations to gauge their radiological knowledge and deduction abilities.

A free, web-based tool for evaluating radiological knowledge and skill has also been developed by radiologists from the University of Erlangen-Nuremberg in Germany. This tool allows for both intra- and inter-subject comparison [15]. With the use of a regularly updated database including more than a thousand cases, this resource aims to replicate the typical tasks performed by a general radiologist. The application can evaluate performance over a single session, over numerous sessions, or in comparison to other users. It can measure the user's capacity to identify anatomical structures and disease patterns in a number of various imaging modalities [15].

Radiology practical skill training using simulators and virtual patients

It can be technically challenging to acquire some radiological abilities, so simulation-based training is being employed more frequently to maximise patient safety and ensure learner competency. For instance, learning ultrasonography can be challenging since it requires a delicate balance between manual dexterity and visual interpretation skills. One team tested the efficacy of evaluating trainees using a sonographic simulator before they used the procedure unsupervised. The test was made up of 10 instructional cases carried out using a sonographic simulator (Ultrasim, Med Sim, Fort Launderdale, Florida, USA, http://www.medsim.com/ products/products.html) using three-dimensional patient data to gauge interpretative skill and imaging work-up [16]. This made it possible to evaluate the situation objectively and identify any flaws that could be fixed before to going on call.

Worldwide collaborative radiology teaching applications

The potential instructional applications of Internet2 and associated international research and educational networks, such the Medical Imaging Resource Center from the RSNA, may go unnoticed by many radiologists.

Internet2

Hundreds of academic institutions from across the world collaborate with governmental and commercial partners as part of the Internet2 consortium (http://www.internet2.edu) to build cutting-edge network applications that can provide very high bandwidth connections between educational institutions. These networks are a feasible alternative to traditional in-person lectures and tutorials because they can send broadcast grade video conferencing feeds. A

software programme called Internet2 Detective can be downloaded for free at http://detective.internet2.edu in order to find out the status and capabilities of your own departmental network. You can use this tool to check whether your local network has enough connectivity and capacity to support high-quality web-based video conferencing [17].

Within the Internet2 community, a variety of cooperative educational projects with a medical focus have been created, enabling communication between groups in geographically distant places. A complex digital anatomy teaching tool and a test of medical students' knowledge and abilities employing problem-solving and the treatment of fictitious patients are a few examples. Additionally, medical education sessions between training facilities in Bangkok and Honolulu have been effectively performed via videoconferencing [2].

Medical Imaging Resource Center

The RSNA launched a project called the Medical Imaging Resource Center, or MIRC, to make it easier for researchers and educators to share the huge amount of radiology-related data created globally. The project's full potential is still untapped, and the software is now updated frequently.

A straightforward technique for locating, indexing, and retrieving pictures, instructional materials, and other radiological data from an expanding number of institutions is offered by MIRC. Users can also search across many image collections as if they were just one large library. Additionally, a potent authoring tool is offered to make it easier to create radiology instructional files and other electronic documents in a variety of formats with a standard underlying structure. Finally, the initiative enables the management and interchange of research datasets and images for radiology clinical trials.

As a platform for compiling teaching scenarios, setting up a MIRC server on your own departmental network (or a single computer) has a lot of possibilities. In our experience, the setup procedure is a little complicated and need for assistance from a helpful network administrator or nearby IT specialist, as well as a certain level of computer literacy. Additionally, there are some technical issues, especially when updating to newer versions of the software, as the product is currently under development. Despite these small concerns, the MIRC project is highly commended and represents a significant advancement in enabling global collaboration of radiological data for use in research and education. Users have the option of keeping the data simply for personal use on a computer or sharing it with colleagues via a department intranet and the rest of the radiological community over the internet, ideally. The principal creator of the MIRC programme, John Perry, is in charge of the RSNA's MIRC online forum, which is accessible at http://forums.rsna.org. If you have any questions about how to deploy or utilise the software, turn to this resource.

CONCLUSION

The rapid technical advancements in medical imaging and radiology informatics are putting radiologists in a prime position to take advantage of the enormous potential benefits to teaching and educating future trainees. This potential is all too often not fully realised, and knowing the various ways digital radiology education can be used may help focus future efforts. Nevertheless, it is crucial that the interactive component of conventional face-to-face instruction is preserved as we move toward electronic

learning. There have been and should continue to be creative solutions to this issue. This article has looked at a number of fascinating topics that will have a big impact on radiology education in the future. This essay is intended to encourage readers to experiment with the technologies at their disposal in order to enhance radiography teaching.

REFERENCES

1. Makeck M, Fischer MR, Kammer B, et al. Do computers teach better? A media comparison study for case-based teaching in radiology. RadioGraphics 2001;21:1025e32.
2. Healy DG, Fleming FJ, Gilhooley D, et al. Electronic learning can facilitate student performance in undergraduate surgical education: a prospective observational study. BMC Med Educ 2005;5:23.
3. Shaffer K. Radiology education in the digital era. Radiology 2005;235:359e60.
4. Durfee SM, Jain S, Shaffer K. Incorporating electronic media into medical student education: a survey of AMSER members on computer and web use in radiology courses. Acad Radiol 2003;10:205e10.
5. Scarsbrook AF, Graham RNJ, Perriss RW. The scope of educational resources for radiologists on the internet. Clin Radiol 2005;60:524e30.
6. Scarsbrook AF, Foley PT, Perriss RW, et al. Radiological digital teaching file development: an overview. Clin Radiol 2005;60:831e7.
7. Fischer S, Stewart TE, Mehta S, et al. Handheld computing in medicine. J Am Med Inform Assoc 2003;10:139e49.
8. Flanders AE, Wiggins RH, Gozum ME. Handheld computers in radiology. RadioGraphics 2003;33:1035e47.
9. D'Alessandro MP, Galvin JR, Santer DM, et al. Hand-held digital books in radiology. Convenient access to information. AJR Am J Roentgenol 1995;164:485e8.
10. Bursch JM, Barbaras L, Wei J, et al. A mobile solution: PDAbased platform for radiology information management. AJR Am J Roentgenol 2004;183:237e42.
11. Nishnino M, Busch K, Wei J, et al. Use of personal digital assistants in diagnostic radiology resident education. Acad Radiol 2004;11:1153e8.
12. Ratib O, McCoy JM, McGill DR, et al. Use of personal digital assistants for retrieval of medical images and data on highresolution flat panel displays. RadioGraphics 2003;23:267e72.
13. Yam C-S. Projecting PowerPoint presentations with a PDA. AJR Am J Roentgenol 2005;184:1356e9.
14. Radiology-Integrated Training Initiative Website, Available at http://www.riti.org.uk (Accessed March 30th 2006).
15. Grunewald M, Heckemann RA, Wagner M, et al. ELERA: a WWW application for evaluating and developing radiologic skills and knowledge. Acad Radiol 2004;11:1381e8
16. . Monsky WL, Levine D, Mehta TS, et al. Using a sonographic simulator to assess residents before overnight call. AJR Am J Roentgenol 2002;178:35e9.
17. Solez K, Hales M, Katz SM. Electronic strategies for information and research. Kidney Int 2005;68:S89e94.