Chapter 3.3.3

E-LEARNING:
A BASIC APPROACH FOR RURAL CLINICAL EDUCATORS

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Introduction

Although there is still discussion about the exact meaning of the term, e-learning is essentially learning which occurs through electronic means, using computers - generally understood to mean the internet or the web. Since the internet only came into being in 1991, web-based education is of recent origin, an important point to consider when exploring its use or efficacy.

While the term 'e-teaching' has also been used, given that this is simply the other side of the educational coin, 'e-learning' is now generally used to cover both teaching and learning. What is not included are the administrative aspects of education managed through computers, such as student admissions, course entries and fee payments.

One of the most compelling reasons for using e-learning is to overcome geographical or temporal separation between teachers and learners. This is particularly evident in rural or remote areas, where professional isolation and a relative lack of opportunity for continuing professional development are well recognised features of medical practice. The challenge of providing clinical training at a distance for medical practitioners or students undertaking their studies away from major centres is a compelling reason for seeking effective strategies to overcome the educational inequality arising from specific problems generated by lack of direct contact between teachers and learners. These include an inability to obtain advice or guidance in a timely manner, an inability to interact and exchange ideas with other learners, and the loss of direct transmissive teaching exemplified by the highly valued apprenticeship model of clinical teaching. Using electronic technologies to provide clinical education through web-based programmes is therefore being increasingly adopted as a major component of distance clinical training at both undergraduate and postgraduate levels.

Rationales for e-learning

There are two basic rationales underpinning e-learning. The first is *efficiency*. Replacing traditional teaching with e-learning to overcome barriers of time and distance, provides the opportunity to develop and use new educational strategies, and leverage economies of scale while providing organisational cost savings. This has become increasingly important to teaching organisations which urgently need to find ways to teach more students with fewer teachers (1). A focus on reach or quantity can however be at the expense of richness or quality.

The second is *effectiveness.* By combining e-learning with traditional methods of education, improved learning may be obtained (2).

Clearly there are tensions between these, with efficiency likely to prove popular with management, and effectiveness with teachers - although infrastructure issues are much more important to teaching faculties in the Third World compared to the First, in which accreditation and assessment are the major focus (1).

Educational benefits of e-learning

In medical education, e-learning has been used at both undergraduate and postgraduate levels across a wide range of preclinical and clinical subject areas - including anatomy, physiology, pathology, pharmacology, radiology, dermatology, medicine, surgery, anaesthetics, emergency medicine, obstetrics and gynaecology, psychiatry, paediatrics, public health, and general practice. At the present time however, there is very limited evidence to support the educational benefits of e-learning compared to traditional methods. Many published articles have small sample sizes, outcome measures unrelated to course objectives, lack of controls, reliance on self-reporting, and a wide variety of unintegrated confounding variables (3). There is currently no data on its impact on patient or healthcare outcomes, and very little information concerning changes to clinical practice (4, 5). What is clear, however, is that with certain types of situations or learner personalities, e-learning does produce better learning, while with others, traditional methods are superior (2, 6, 7, 8).

It is also important to recognise that a blended approach, in which e-learning complements rather than supplants traditional teaching, has had better educational outcomes than programmes comprised solely of e-learning, such as in typical distance learning (9, 10, 11,12). One of the main reasons for this is the difficulty in gaining student motivation for, and participation in, e-learning. Time or technical constraints, disinterest, lack of commitment to training, poor course design, lack of computer skills or preference for traditional teaching are some of the key factors responsible for this often frustrating aspect of e-learning (15). Placing all educational eggs in the electronic basket may therefore be a risky manoeuvre (14, 15, 16).

It is also evident from the literature that e-learning is frequently used in educational settings on an untested or heuristic basis, where the opportunity to try new ideas or reach wider audiences is a potent attraction (17). Given the usual outcome of adding human nature to new technology, this is expected and understandable but it may result in learners using novel training methods with no alternative, which may prove unsuitable or inadequate for their educational needs. This is further exacerbated by the lack of peer review of e-learning materials, which should include a review of its underpinning educational theory, design structure, user friendliness, online accessibility, and technology requirements, including website maintenance (9, 18). Face validity therefore frequently forms the basis upon which e-learning is adopted.

Assessing suitability

The first step in e-learning should therefore not be deciding *how* to introduce it into an educational setting, but *whether* it should be introduced, as it has the potential to worsen as well as improve learning depending on a complex range of factors (1, 19). Defining the learning outcomes first, then evaluating the strengths and weaknesses of e-learning can assist in this important initial decision (6). A list of these, which is undoubtedly not exhaustive, is summarised below (2, 9, 19, 20).

Strengths

- Reduced distribution costs or increased numbers of users can give economies of scale.
- Lower fixed infrastructure requirements such as classrooms, with cost savings.
- Fewer teaching staff and less time needed for direct teaching.
- Opportunity to introduce new teaching strategies and methods.
- Flexible learner access temporally and geographically.
- Self-paced, individually tailored, adaptive student-controlled learning.
- Content control and sequencing of training.
- Improved data storage, analysis, reporting and tracking.
- Collaborative student-centred learning.
- Convenient means of providing uniform and equivalent training at distant sites.
- Numerous research opportunities.

Weaknesses

- Social isolation.
- Increased initial costs.
- Cost-shifting to learners – equipment, printing, internet providers.
- Technical problems and IT infrastructure needs.
- Built-in obsolescence of software and hardware.
- Staff or student lack of e-learning knowledge or experience - including management of altered teacher-student and student-student relationships such as reduced hierarchies, lack of direct interpersonal interactions or responses.
- Resources, time and skills needed to develop and update e-syllabi and curricula.
- Facilitates plagiarism and copyright infringement.
- Raises security, data protection, confidentiality, consent, and identity verification concerns.
- Heightened visibility and accountability including professionalism and ethics.
- Ongoing management and maintenance of online content and quality requirements.
- Organisational change necessities – teacher selection, recognition and support, e-learning system implementation, management and maintenance, cultural adaptation.

If the decision is made to use e-Learning, it is imperative that the teaching objectives, learner actions or interactions, and technology are carefully considered. While the focus is on the development of clinical competence, sound educational theory and practice must also form the basis of the programme (21). (Adult learning principles are regarded as a key component of good e-learning, but a focus on relevance and learner engagement is just as integral to the standard pedagogy used in primary and secondary education). The aim is therefore to achieve deep patterns of learning, encourage reflection, self-efficacy, effective application of knowledge and its integration with prior experience (19).

Synchronous and asynchronous options

Since constructive student interaction and participation are crucial to successful e-learning (13), a useful way of deciding what type to use is to separate it into *synchronous* and *asynchronous* (22), as these embody student relationships and activities with peers, teachers and the learning environment.

Synchronous

Synchronous learning - when learning occurs in real time - is characterised by on-line audio-conferencing, video-conferencing, tele-conferencing., web-conferencing and chat rooms. As this allows students to interact directly with peers and teachers, this can strongly encourage cohesion, collaboration, knowledge transmission, development of new ideas, problem solving, resolution of specific concerns or queries, a shared vision and common goals. Recording of such sessions can enable review as required for both learners and teachers.

Although synchronous e-learning can reach a wide audience, it has temporal limitations, requiring fixed time or place commitments. This may be exacerbated by locality time differences and, in the case of video-conferencing, significant technology requirements, of which speed of image transfer (bandwidth) is a key limiting factor (22).

Asynchronous

Discussion forums, bulletin boards, and email allow students and teachers to interact at variable times and locations, and so have much greater flexibility and convenience than synchronous activities. Their lack of immediacy with other learners or teachers, however, inevitably slows activities such as problem solving or management of learning issues. Information overload can also more readily occur through the ability of asynchronous sites to absorb much greater content than that presented synchronously (23).

More recent internet initiatives - such as short messaging systems (SMS), blogging (individual journals), wikis (on-line submissions with tracked modifications by multiple users), podcasts (streamed audio), vodcasts (streamed audio with video) and social networks typified by Facebook, Twitter and YouTube can also be viewed as asynchronous activities, which are likely to become increasingly important as e-learning opportunities (24, 25). Mobile technologies, such as internet-enabled iPads, other tablet PCs, and mobile phones are also finding increasing roles in both e-learning and clinical practice, where their ability to store factual information or link with patient records can be used both outside and during consultations for education and patient care (26, 27).

In addition to synchronous and asynchronous activities, an e-learning programme will require educational content and delivery software. Content can comprise text, sound or images, in various combinations. It, and supporting software, may be obtained externally or developed internally. There are advantages and disadvantages to both, but cost and availability will often be a key deciding factor (22).

The role of design

Although it has not yet proved possible to construct an effective system of evaluating websites for their medical training suitability (28), good web design also plays a key role in producing an effective e-learning programme, and making learning enjoyable. Information should be presented in a consistent manner, with clear and easy on-line course navigation, short webpages containing important information at the top of the screen, regularly updated links to other pages, current course information, learning tools to enable stimulating interactive discussion or collaboration, and downloads not exceeding ten seconds (22, 29, 30).

Good educational practice

There is general agreement in the literature that the following characteristics are associated with high levels of learner satisfaction and good educational outcomes (1, 14, 31, 32, 33):

- Use of real world scenarios with worthwhile learning goals.
- Interactive involvement with relevant and useful projects – 'learning by doing'.
- Attention to academic standards and stakeholder expectations.
- Active participation, collaboration and teamwork.
- Inclusion of multimedia, where activation of different senses produces better learning of complex content.
- Multiple versions of information presentation e.g. text, text + graphics, audio, or video to cater for different learning styles or students with disabilities.
- Hypertext links to allow students to follow individual learning pathways.
- Reliable technology and user-friendly software that is easy to navigate.
- Strict guidelines for direct or indirect contact with other learners or teachers.
- Good instruction and information concerning use and nature of available resources, required roles, and teaching or learning techniques required.
- Availability of adequate and suitable resources.
- Opportunity for self-evaluation, formative assessment and performance feedback.
- Good support from teaching and administrative staff who understand and are able to manage the learning environment.
- Assessment processes which reflect the syllabus, are diverse in nature, evaluate the learning objectives, are presented on-line in a suitable format, allow prompt performance feedback, and enhance the training experience.

An illustrative anecdote / case study

'An internet-based Clinical Discussion Board was set up using Blackboard software, for medical students undertaking six-week clinical placements at rural and remote sites. The original aim was to enable students to gain a greater understanding of the depth and breadth of rural medicine through discussing their experiences and views on-line with each other. It was soon evident that a self-organising curriculum was developing to meet the students' learning needs, with ethical issues being the second most common discussion topic, after internal medicine. Over half the students exceeded the minimum required submissions, suggesting they were using it because they liked doing so. An unexpected benefit of the Board was its pastoral care capability. Through

students' submissions of emotionally challenging experiences, a senior academic staff member overseeing the Board daily was made aware of those who might be in difficulty, allowing early intervention and management. This support function was reflected by over a quarter of students reporting the Board significantly reduced their sense of isolation and lack of contact with fellow students.' (34)

Practice pearls

- As a first step, define the learning outcomes.
- Don't assume e-learning is the best educational strategy – traditional methods may be better.
- Blended strategies, where e-learning is combined with traditional teaching, are generally best.
- Separating e-learning into synchronous and asynchronous processes is a useful approach.

Pitfalls

- Using e-learning activities which the available technology cannot support.
- Inadequate training or experience in the design and use of suitable teaching activities.

Conclusion

Providing undergraduate and postgraduate clinical training to rurally-based learners presents specific difficulties related to distance, and the separation of learners from other learners, and from teachers. A careful evaluation of learning objectives, and required training outcomes, can enable the role of e-learning to be properly assessed, and suitable strategies implemented to improve or enhance an educational programme.
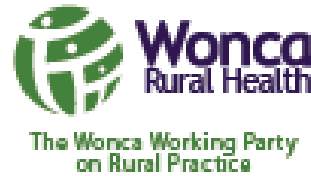
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