CAN INTERNET BASED SCENARIOS ENHANCE CRITICAL CARE NURSES CLINICAL DECISION MAKING SKILLS?

Carole Boulanger, Jon Yorke

ABSTRACT

Nurses need to be trained to make rapid and accurate clinical decisions in a rapidly changing and complex environment. Unfortunately, a reliance on traditional training methods (lectures, small group sessions, experiential learning) will probably prove inadequate in a context characterised by increasing pressures of time and limited resources. The injection of market forces into the National Health Service in the UK has had a significant impact on nurse education, especially in the area of critical care, where demand for highly skilled staff continues to outstrip resources available for training. This study investigated the potential for online scenarios to support the development of clinical decision making, through the provision of a "safe" learning environment allowing the students to have flexible, repeated access to learning materials. Critical care scenarios were developed and placed on a web server, taking advantage of multimedia to add an element of realism. Participants were given the option of working alone (at a time of their choice) or in groups. The online scenarios included a mixture of peer and self assessment (including self-confidence ratings), and incorporated an element of expert feedback into the design. Pre and post test measures were used to establish whether the approach had supported the development of decision making expertise. Although computer based learning is relatively little used in nurse education, the online scenarios were well received by the participants, who reported that they had found it flexible to their needs, and the demands of clinical practice. Perhaps unsurprisingly, it was difficult to demonstrate with certainty that clinical decision making had improved. However, the "safe" learning environment was praised, and the self-confidence assessment proved to be of high value as a means of establishing and defining "what it is I don't know". The findings of this pilot study suggest that this approach to learning has much to offer.

INTRODUCTION

The injection of many market forces into the United Kingdom's National Health Service (NHS) has thrown a sharper focus on nurse education. Some might even argue that nurse education tends to be viewed as a commodity purchased by NHS employers, who are primarily looking for cost effective and flexible training to educate their staff quickly and efficiently.

It is certainly true that the territory is defined by an increased emphasis on continued professional development (CPD) for nurses, whilst simultaneously demanding high quality patient care in a litigation conscious culture. Due to the constraints of resource and time, it is probable that the demand for quality education to meet these requirements cannot be met by traditional methods alone. This study proposes and investigates the potential for an alternative approach to traditional teaching methods, one which is flexible to both the learner and the time constraints of clinical practice.

BACKGROUND

The framework of clinical governance focuses on the delivery of healthcare by appropriately trained and educated staff (see, for example DoH 1998). Failure to deliver appropriate levels of care can lead

to litigation, a point not lost on Healy (1998) who highlighted the risks involved when staff with limited skills care for acutely ill patients. The review of Adult Critical Care Nursing (NHSE, 1999) argued that every critical care patient ought to be cared for by skilled nurses wherever they are and in consequence, recent changes to nurse education now include rather more emphasis on skills acquisition. Measures such as these may improve the outlook in the medium to longer term, but we must recognise that there are diploma staff nurses who have limited clinical skills working in busy areas today.

How has this situation arisen? Firstly, there has been a notable decrease in the number of trained staff in favour of increased reliance on support from healthcare assistants who may account for as much as 13% of the workforce in some Trusts (McKenna 1998). Furthermore, new high dependency units (which were developed to ease the strain on general wards) are likely to attract the more competent staff nurses away from the general wards thus depleting skills further (Gibson 1997). Finally, the requirement for critical care skills on the wards is likely to increase as surgical procedures become increasingly complex, with patients are who are often older, sometimes with pre-existing disease. In recognition of these issues, Baldock (1999) suggested that there was an increasing and serious need for ward-based staff to develop critical care skills.

Issues relating to the support of nurses working under increasing pressure have been subject to much scrutiny by the nursing press (see, for example Place & Cornock, 1997). Haines (1999) revealed that nurses in busy clinical areas were often left to deal with more highly dependent patients requiring complex treatments. Pressures such as these have had a negative impact on recruitment and retention within the profession (Kennedy & Grey 1997, Gulland 1998). Professional support and ongoing training has been recognised as influential in reducing staff stress and was prioritised by the current Government as an integral component in the drive to provide quality care for patients (NHSE 1999).

Recognising the need is only part of the answer. Modern nurse education remains under increasing pressure to deliver quality learning whilst at the same time reducing the costs of traditional teacher intensive approaches such as lectures (Garrell & Callear 2001). This is set in an educational context where constructivist approaches are in their ascendancy, favouring active participation to economical passive listening.

In a prominent review of the (educational) literature, Bligh (1998) reviewed the role of lectures in learning, highlighting what Friere (1994) described the inadequacies of the 'filling the bucket' approach. In a climate characterised by strong emphasis on the provision of quality care, the need to produce safe and effective practitioners is ever more essential.

DEVELOPING CONFIDENCE… AND COMPETENCE

There has been a recent drive towards competency-based courses in nurse education (UKCC 1999). However, Cutler (2000) argues that the definition of 'competence' is inadequate, questioning whether this approach can form the foundation of a national standard.   Nevertheless, it has been proposed that competence can be used to inform and maintain practice, ensuring that nurses develop practical skills and related theoretical knowledge (Jeffries 2000).

Nevertheless, the skills and knowledge used in nursing are difficult to clarify. Knowledge represented through practice (especially in critical care) is often a product of the culture within which the nurse works. Cutler (2000) cogently points out that the cultural contexts in which nurses operate can determine the norms of practice. It is these norms that subsequently become perceived and defined as 'competence'. It could be argued that competence will remain difficult to standardise as it exists within and is a product of these discrete cultures.

Greenwood (2000) observes that critical thinking is currently a highly valued outcome throughout the educational spectrum, suggesting that reasoning is integral to clinical decision making and therefore a routine part of nurses' work. Daley (2001) suggests that there does appear to be agreement that critical

thinking ability and competent nursing practice are related. This might suggest that the structure of learning activities and assessment need to be very carefully scrutinised for their capacity to support and develop critical thinking and decision making processes.

The development of competence is currently facilitated in a number of ways. For example, the High Dependency Skills Course uses clinical scenarios in a classroom setting, placing the trained nurse in a clinical situation in a safe environment with tutor support. We have previously alluded to the high costs of such approaches, and here lies the question: can the use of computers support the development of competent decision making?

THE ROLE OF THE COMPUTER IN NURSE EDUCATION

Over thirty years ago, Rogers (1969) described the importance of students having the "freedom to learn". Such student centred approaches are also advocated by Lowry & Johnson (1999), who also spoke of the importance of giving the learner control over their education. It is possible that the use of computers can support such concepts of learner control and freedom, by providing repeatable access to materials at a time, location and pace of the student's choosing.

Nevertheless, in spite of potential advantages there has been relatively little uptake in the use of computer supported learning within nurse education, a point noted by Dearing (1997), who highlighted the lack of development using available technologies. Staff resistance has been cited as influential in this lack of progress, coupled with the limited availability of suitable material in nursing. Lectures, with their efficiency of numbers continue to dictate the pace of information delivery, often failing to cope with varying student ability and experience. Although undeniably efficient, the transmission of knowledge alone is likely to prove inadequate, and consequently learning skills and practical activities have been seen as complementary ways of supporting the development of professional competence. In this respect, approaches such as problem based learning have gained much popularity in nurse education, often using highly structured scenarios to support the learning process (Garrell & Callear 2001).

It would seem that a computer based clinical scenario following these principles would facilitate development of decision making skills in a risk free environment. Whilst en route, it is important that the anxieties of failure are minimised as far as possible, a point not lost on Claxton (1984). Furthermore, the use of computer assisted scenarios as an addition to lectures would allow students to spend more time on topics they find difficult. This would offer the learner opportunities to build on existing knowledge, monitoring their own learning process, and developing knowledge and confidence in their clinical decision-making skills.

Computer assisted learning has been criticised for reducing human interaction (Lowry & Johnson 1999). This suggested that online scenarios should be used in addition to traditional approaches. In recognition of the fact that the effect of social learning can be especially powerful, the scenario could also be used in a group setting, allowing for peer support and shared learning. Adequate online support and help, coupled with the availability of tutor feedback ought to provide the student with the confidence in a supportive network, providing encouragement to progress through the scenario at their own pace.

A final remark concerns the potential cost of developing such materials. The relative lack of existing packages given the obvious benefits is testament to the time constraints of providing quality education in a clinical practice setting! However, one advantage of learning technologies is that costs of initial development are often outweighed by gains over the medium to longer term (see for example Bates 1995, Daniel 1996).

THE ONLINE CLINICAL SCENARIO

An online scenario was developed along similar lines to scenarios taught in the classroom. The scenario considered the treatment protocols for a patient who has been recently admitted to the hospital with a history of chest pains and shortness of breath. Short quizzes were used as pre and post test measures of learning in an overall structure outlined in Figure 1.
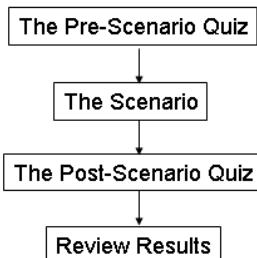

Figure 1. Structure of the Scenario

A series of questions were devised, spanning a number of themes all related to the scenario. These questions were then randomly divided into two groups, and used as pre and post measures- presented to the participants in the form of a quiz, taken before and after working through the scenario.

During the scenario itself, various pieces of information were presented, and participants were asked questions relating to how they would deal with the situation at that point. Multimedia clips, PowerPoint presentations and graphics (of electrocardiogram readouts and blood gas analyses) were used to contextualise the scenario.

Throughout the scenario, participants had the opportunity to get 'hints' (a short prompt), and 'help' (longer and more detailed support) prior to entering their answer to the question in a text box. A self confidence rating was used, and participants were encouraged to rate their confidence prior to viewing the 'expert opinion'. Having read the experts opinion, participants marked their own answer out of ten using a drop down scale, and then proceeded to the next question. Figure 2 shows a question towards the end of the scenario.

Figure 2. The Online Scenario

Participants were subsequently provided detailed feedback on both of the quiz results, through a dynamically created web page (using PERL script) which detailed their overall percentage, additionally reporting which answers were correct and which were not. Feedback was also provided as to why each particular answer was wrong. The participants' were therefore able to review their results with detailed and immediate feedback, an aspect that is recognised as potentially beneficial to student learning (Race & Brown 2000).

Finally, upon completion of the scenario, the participant's results were passed to the PERL script, which automatically passed the data to the researchers in the form of an email. As a result, individual or group identities were not recorded in any way, and the automatic email served as a truly anonymous 'hand-in' of the detailed results.

THE RESEARCH QUESTIONS

The need for competent clinical decision-making has been highlighted, together with the need to develop these broad capabilities in an environment conducive to learning. However, is it possible to demonstrate that the online scenario has actually supported learning? Were there measurable gains in student confidence in their decision-making?

The use of online scenarios to support a traditional course inevitably places more control with the learner with the potential to support, or hinder learning. However, does this online format create a 'safe environment' for learning? Finally, what can be learned from the ways in which the scenario can be used? For example, do participants express a preference for working on their own, or in groups?

METHODOLOGY

Action research is one of the new paradigm research approaches, having an emphasis on participation and partnership. This approach aims at both taking action and creating knowledge or theory about that action through cyclical processes of conscious, deliberate planning, action and evaluation. Nurses are increasingly involved in action research projects to improve aspects of nursing practice and education (Webb et al 1999). Furthermore, Greenwood (1994) suggests that action research is the most appropriate methodology for nursing with a particular suitability for the practice context. In short, a combination of qualitative and quantitative methods in what could be termed a 'hybrid' approach appears to offer sufficient flexibility to capture the complexities of research within a rapidly evolving clinical environment.

Three aspects of the clinical scenario were selected for further analysis and evaluation:

Self / Peer Assessment was incorporated to encourage the learner to take ownership and responsibility for their own learning. Knowles (1990) points out that self directed learning and assessment allows student the facility to use learning resources in ways most appropriate to their learning needs, gaining much from the evaluation of their own learning.
Observation by the researcher was judged to be particularly useful as the phenomena to be investigated encompassed skills, behaviours, performance and interactions (Polit & Hungler 1997).
Questionnaires were provided for participants for completion after the scenario, using open-ended questions allow the participants to describe their experiences with minimal constraint on their answers in an approach originally suggested by Openheim (1966). Questionnaire pilots were shared with colleagues who had completed the course previously, and also with others involved in the delivery of the course.

THE PARTICIPANTS

Participants were purposely sampled using a criterion-based techniques suggested by Patton (1990). Five of the participants (all nursing staff members) had completed the High Dependency Skills Course

and had spent less than two years in the Intensive Care Unit. The sample group comprised two male and eight females reflecting the gender workforce balance.

Their experience ranged from two to four years post qualification, with no participants holding any qualifications in critical care. Although two of the more senior participants had management experience in ward areas, they too did not possess qualifications specifically relating to the acutely ill. Across the group, participants showed a similarity in experience dealing with critically ill patients in general ward areas. In all, eleven members of staff took part in this evaluation. Participants were able to choose whether they wished to work together or on their own. Six preferred to work through the materials alone, and five staff divided into groups of two and three respectively.

All participants agreed to be involved in the study, and consent and confidentiality were agreed on and assured prior to completion of the scenario, in accordance with ethical standards and guidelines laid out by the Trust.

All participants were given the opportunity to review the fieldwork notes to confirm they formed an accurate representation of what had occurred, and as Holloway & Wheeler (1996) point out, this approach can add validity to the findings, reducing the potential for researcher bias when interpreting the observational data.

RESULTS

Of the eleven participants, ten volunteered to complete the questionnaire after the scenario, and from this some broad themes emerged.

All participants stated that they used a computer at least 'occasionally', with most describing their use of the computer as 'often'. Only one participant had encountered online learning in the past. Interestingly, despite having a reasonably high level of computer usage in the group, not one had encountered an online clinical scenario of any description previously.

There were no problems reported when using the software. When asked to describe how intuitive the user interface had been, two had found it "easy". Six reported it to be "straightforward" but remarked that they had made use of the navigation tips. Fainter praise was received from two participants who said that they had found the interface "not too bad".

Eight of the responses suggested that the format was 'about right', with one suggestion that the self assessment aspect ought to be discontinued, and one who felt it had taken too long to complete. Nearly all (nine) remarked on the value of having immediate feedback, and seven commented positively on the role of the 'help' and 'hint' options. All the participants reported that they had enjoyed the pre and post quizzes.

The ability to complete the scenario at a time and place of their choosing, and (significantly) at their own pace was remarked upon in eight of the responses. All respondents claimed to be interested in completing another similar scenario, and three suggested that more clinical information (or the ability to ask further questions) would be of particular help. Most (seven responses) found the comparison of their answer with the expert's to be of value. It was also noted by some participants that the focus of the scenario on patient assessment was a central part of daily clinical practice.

It was not surprising to note that nearly all of the respondents had been involved in clinical scenarios before, with nine holding the view that these scenarios were a helpful way of developing their skills. Rather disturbingly, seven participants stated that they had found traditional face to face clinical scenarios to be "threatening" or "intimidating", with one even remarking that they were "dreading my turn, rather than what was being taught".

Both of the groups were observed during the entire scenario and pre/post quizzes. It was readily apparent that both groups collaborated extensively with each other, prior to uncovering the 'expert opinion' and marking their score. In many cases, individuals 'bounced ideas' around, and made suggestions, occasionally needing to justify their point of view with a more detailed explanation. Interestingly, both groups contained a more junior member of staff, and in each case the other participants drew these lesser experienced colleagues into the discussions, providing amplification and explanation where necessary.

In each case, the groups took far longer than their solo counterparts to work through the scenario, primarily due to the quantity of discussion and deliberation over the entered answer. They tackled the scenario with vigour, and appeared to enjoy the experience. Quite often, participants engaged in enthusiastic rivalry over the scores and the answers to the quiz questions.

Table 1 shows the distribution of results achieved by each of the individual participants and groups. These results were not analysed for statistical significance in view of the small number of participants.

Table 1. Distribution of results

	Pre-scenario quiz score	Post-scenario quiz score	Self assessment	Confidence scores
Solo user	84%	86%	46%	28%
Solo user	85%	85%	51%	88%
Solo user	81%	86%	50%	44%
Solo user	80%	87%	45%	24%
Solo user	79%	84%	46%	56%
Solo user	87%	86%	47%	64%
Group of two	87%	88%	46%	88%
Group of three	85%	89%	68%	88%

It is inevitably difficult to draw substantive conclusions from a relatively limited source of data. However, there were indications of some potential trends, which are worthy of comment and further investigation.

Firstly, from a comparison of the quiz test scores, it would appear that in nearly all cases, a slight increase in score was obtained in the post scenario quiz. Furthermore, groups appeared to perform better than their individual counterparts, which was perhaps unsurprising. In general, the self assessment scores (awarded after comparing answers with the expert opinion) were quite low. On this measure, group scores were similar to those achieved by individuals.

DISCUSSION

Whilst being sensitive to the ever present danger of researcher bias, it was interesting to note that all participants stated that they had enjoyed completing the clinical scenarios and had found them useful. Groups enjoyed working together, alluding to the "*friendly competition*" and "*lots of fun while we were doing it*". This is contrary to some of the literature, which suggests there has been a lack of uptake in the use of computer assisted learning in nurse education (Dearing 1997). This may be in part due to the need for computing skills and confidence, a point of initial concern in this study.

However, the questionnaire and observational data suggested that for these students, navigation issues were not of significance. One participant remarked that "*the computer bit isn't nearly as scary as I thought it would be – maybe they haven't got minds of their own after all*". Possibly so, but it is worth mentioning the time taken to create scenarios, which required rather different skills as an educator. For example, it was particularly difficult to anticipate all the potential questions students might raise when

writing the scenario and developing the software. Nonetheless, the effort seems worthwhile- it did lead to active participation, which can improve learning (Race & Brown 1999).

The self-assessment system appeared to work well. It was felt that both groups had scored their response quite appropriately when comparing their response to that of the 'expert'. However, the self assessment scenario scores (decided upon after comparison of their answer with the 'expert' answer) showed no appreciable difference between solo and group participants. This was somewhat unexpected, as educational theory suggests that group activities are generally higher scoring than their solo counterparts. However, Burns (2000) points out the reticent nature of nursing staff to award themselves high scores even when justified, an effect noted here and expressed by the participant who remarked *"we reckon we underestimated our knowledge- it was nice to be proved better than we thought"*.

There was a noticeable difference in the confidence levels of those completing the scenario as a group and those going solo. It is possible that this could be explained in terms of the reduced individual level of responsibility when the group answer proved to be wrong. However, the observation of the groups highlighted a great deal of collaboration and discussion. One participant remarked that *"it really made us think about the decision we had made when we had to say how confident we were about the answer – that led to a re-think and a change in some of the answers"*. Kaye (1992) suggests such collaboration reinforces and deepens learning, and the use of confidence measures here would seem to be potentially helpful.

It is worth noting that in both groups (which were selected at random), there was a group member with more clinical experience and perhaps more confidence than the others. Thompson (2001) suggests that the person with the greatest level of experience is afforded the heaviest weighting in clinical decision making. In that respect, the groups invariably bowed to the arguments presented by these nurses. Nevertheless, it was interesting to note that on several occasions the chosen response proved to be inaccurate when comparing with the 'expert' answers. This provided an unexpected dimension to the study: we had not intended to challenge the existing knowledge of more experienced staff but we had done so. Yet that challenge was seemingly non-threatening, as illustrated by the senior member of staff who observed that *"the scenario was great because I was at the same starting point as everyone else with no-one expecting more of me because I am a higher grade"*. In this respect the scenario had 'levelled the playing field'.

Nevertheless, it could be suggested that in different circumstances nurses in the company of more experienced members of staff might actually feel less secure in such a setting. Observing the groups demonstrated the high level of peer support through discussion and shared explanations of clinical data. Given this, it was surprising to note the strong preference for working 'solo', exemplified by the observation that *"it was good to be able to do the scenario alone as there was no pressure on me that I might look stupid if I did something wrong"*. Noting that much clinical work is done in teams, this was an unexpected result- one possibly caused by anxieties precipitated by a new teaching approach. The benefits of solo activity lie in the nature of an environment in which the fear of failure is removed. We alluded earlier to the destructive effect of the fear of failure, and the optional use of the software in this way allowed the more cautious student to build confidence at their own pace.

The majority of participants enjoyed the fact they could receive instant feedback on their answers. One participant asked for more online scenarios - *"I like to be able to test myself against something that won't do my patients any harm- its nice to know when you make the right decisions, useful too is maybe thinking about the knowledge behind those decisions"*. This challenge of existing knowledge is important in the development of expertise and critical thinking. The opportunity to practice clinical decision-making skills in a 'safe' environment with no impact in terms of patient safety is very important – in this respect the scenario allowed our students the 'freedom to learn' discussed earlier.

CONCLUDING REMARKS

This pilot study sought to establish the potential for an online clinical scenario to enhance and support the traditional classroom provision. The small number of nurses who took part in this study found the materials useful, and were enthusiastic about the potential for it to support their learning. The flexibility in the ways the material could be used, either solo or part of a group, and at a time and location of their choosing, using commonly available Web browser technology was very well received. However, the pressures of time in clinical practice are high, and the time available for education and development is often abandoned in order to meet patient nursing demands. It is likely that these pressures will remain in evidence, perhaps increasing, which would argue even more strongly for opportunities for learning that are sufficiently flexible.

It was surprising to discover just how threatened and anxious nurses felt when working in the comparable face to face clinical scenarios, and there is much that the online counterpart can offer here. In particular, the potential for online scenarios to reduce the anxiety described by the nurses in this study is a point clearly worthy of further investigation.

It is proposed to extend this pilot study with a substantially larger sample of participants, drawn from a series of courses over time, and representing a much wider range of experience. Further scenarios are to be developed, covering a range of typically encountered problems in intensive care nursing. We propose to retain and refine the approaches described in this paper. Currently, discussions are underway to allow wider use of this software across the Health Trust. The scenario as it stands at the moment will form an optional self-directed study task for the next High Dependency Skills course cohort as an adjunct to their taught clinical sessions. Discussions are also under way to make the new online materials available to new staff in the Intensive Therapy Unit, as well as to those wishing to practice or update their skills.

One final remark concerns the 'fit' of online aspects in the overall learning environment. Although online scenarios would appear to offer much promise, there are many other aspects to the learning process which must not be neglected. As Laurillard (1993) cogently points out, it is likely that learning will be most comprehensively supported through the use of multiple media, and not (just) multimedia.

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Carole Boulanger
Intensive Care Unit
Royal Devon & Exeter Healthcare trust
Barrack Road
Exeter EX2 5DW
United Kingdom
Email: caroleboulanger@hotmail.com

Jon Yorke
Educational Development
University of Plymouth
Drake Circus
Plymouth PL4 8AA
United Kingdom
Email: jon.yorke@plymouth.ac.uk