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SIMULATIONS IN NURSING EDUCATION: A REVIEW AND A FORECAST

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Abstract: Basic simulation and related materials have long had a place in nursing education, however there still seems to have been a very slow growth in their further development and use.

The advent of computer systems that are usable by relative novices and development cum presentation tools such as HyperCard have led to lecturers being able to prepare their own materials. The School of Health Science at the University College of Central Queensland outlines such an approach to computer-based case studies with a potential for developing more sophisticated social simulations.

We have seen that simulations have considerable potential for nursing education, albeit an unfulfilled potential, while computers have the ability to simplify the development and management of simulations. We have been experimenting with simple case studies and similar materials. Our future lies in using computer tools to develop true social simulations.

Review

Simulations have long had a place in nursing education. Some of the earliest in use were 'physical' simulations – the 'doll' or 'dummy' (known as Mrs. Chase in North American schools and Mrs. Bedford in Australia) on whom beginning nurses first practised procedures before being turned loose on real patients – and most nurses, until very recently, first learned to give injections by stabbing an orange.

As nursing education became more complex, enthusiasts developed a variety of games to encourage or assist students with learning the great amount of factual anatomy, pharmacology and other material which had to be covered. Community health educators developed games to assist with health education in the schools and with community groups, but as recently as ten years ago there was not a great deal of material directly applicable to the education of nurses at the professional level (Zelmer and Zelmer, 1980; Zelmer and Zelmer, 1982).

Since then there have been sporadic and isolated developments of material which could be classified as simulations, interactive case studies and more elaborate physical simulations. CEREBRAL TAP, a board game developed by Royal North Shore Hospital (Sydney, NSW) is an example of what can be done interactively; WARD 13, a

clinical management exercise (Ward) shows what can be done using computers; however it requires a somewhat esoteric, for Queensland, BBC computer. The more elaborate, usually microchip controlled, versions of the resuscitation practice dolls which can provide feedback to the students with regard to the location, force and timing of pressure for cardio-pulmonary resuscitation would be an example of the latter. Despite the undoubted merits of using simulations, and the examples of Ellington and others developing social simulations for industry, there still seems to have been a very slow growth in this area (nursing) as compared to some others.

Factors which have led to limited use

The greatest potential for the use of simulations within nursing education is to allow students to experience working in a nursing unit and the related nurse-patient interactions. Both manual and computerised 'social' simulations have been developed for urban planning, military and business situations, but not for nursing. Many of the early (manual) 'social' simulations required a 'controller' who was able to quickly do any calculations required and to feed the information back to the participants in a timely and realistic fashion.

We can recall one use of the COMMUNITY LAND USE GAME which required four operators with calculators and took an entire day to run – an involving learning experience but one which left everyone exhausted. Obviously no educational program can marshal the kind of time and resources required for such endeavours very often. Similarly hospital disaster simulation exercises tend to be once-a-year phenomena which require a great deal of advance planning. A simulation of the complexity of even a moderately intensive health care setting is simply not worth the effort using human moderators in real time.

Although one of the advantages of simulations is the possibility of simplifying reality and focusing the attention of the student upon key factors in the situation, the rather simplistic nature of many nursing care simulations (which usually focus on just one patient at a time) versus the complexity of real-world nursing care has meant that they have often been used on an introductory basis rather than for more complex teaching. Some of the current computer-based simulations (case studies) do become quite complex, but generally they only present one situation at a time and, as with the otherwise interesting materials from one Iowa nursing school, are too American for use in Australia.

Anyone who has developed a simulation knows that the time and effort involved is often considerable. The staff in most schools of

nursing are already very busy people and it requires considerable dedication of these individuals as well as a sympathetic administration to put aside the resources required to develop good simulations of nursing care situations. The number of partially-developed simulations around is probably very large, but they have not yet reached the stage where someone else can use them reliably.

Another handicap in making more widespread use of existing materials has been the need to adapt material from one situation to another. Although there is a great deal which is common to nursing care in different countries, differences in terminology, usual practices and even the continued use of the Imperial measurement system in the USA create difficulties for easy use of others' materials.

Finally, the lack of marketing outlets means that any simulation which is developed is unlikely to reach a wide audience of potential users. Although textbook publishers seem willing to put a good deal of effort into the marketing of books to schools, they do not seem to have the same interest in simulations (or computer software) – perhaps the pricing structure is inadequate.

The need

Despite all of the barriers outlined above we see a continuing, and indeed increasing, need for the development of good teaching simulations for nursing education.

As medical and health care become more complex it is increasingly difficult to find good, safe situations for learners. Our students must be competent, not only with hands-on procedures, but also with decision-making skills, before they begin student practice.

As we all become more conscious of the rights of patients, the question of the access of students to some types of patients and for repeated practice arises. The 'programmed patient' originally developed at McMaster University in Canada to teach medical students the finer points of history taking and examination is one possibility, but again rather expensive on an on-going basis.

As more of our students become part-time or non-traditional students, there is a greater need to develop teaching materials which can be used for student-paced learning, rather than in a standard classroom situation.

One tentative response

The University College of Central Queensland is a relatively new

institution which established a School of Health Sciences in 1989. It provides basic nursing education for students from Central Queensland (an area roughly the size of the United Kingdom) as well as a degree-completion programme for hospital-trained RNs. Because we are not well-resourced, and because we must be prepared to support students geographically dispersed, we have been forced to re-examine the need for classroom-based teaching and to develop alternative strategies. We have had the advantage of not having to discard a previously established curriculum, and we have also had the advantage of a start-up grant of Aus\$300,000 over two years to establish a Computer-Assisted Learning/Computer-Managed Learning (CAL/CML) program.

Computers, increasingly being used to facilitate both factual learning and simulation management, have a lot to offer nursing education.

- **Safety:** Patients don't suffer from a wrong decision with a computer exercise but students graphically see the consequences of their decisions.
- **Repeatable:** Computers are infinitely patient. There are only limited opportunities for repeat practice in the real world.
- **Experimentation:** Real world practice, as it involves people and expensive resources, does not lend itself to 'what if . . . ' scenarios.
- **Individual Pacing:** Those who need more time and practice can do so without penalty.
- **Independent Learning:** Computers can save scarce staff resources for situations where an instructor must be present; ie, practice in the real world.

While we are far from reaching our goal of a full library of teaching materials we feel that we have made some significant progress in this regard.

The process

A successful nursing education program obviously requires financial and other resources. However the development of CAL/CML resources also needs a cooperative working environment that allows administrators, academic designers and subject matter experts, computer programmers, software specialists and students to work together.

Murphy (1987) lists constraints to achieving the integration of computers within nursing education:

- a general lack of useful software,

- the cost of equipment (purchase and maintenance) and software,
- the time required to develop instructional materials, and
- a lack of opportunities for faculty to learn about computers.

Most simulation designers, especially designers of computer simulations, would postulate a very similar list relating to the problems of integrating simulations into education. From our experience we would also add:

- the difficulty of finding resources that are applicable to the local culture, terminology and procedures, and
- the lack of information about how to organise and manage the process of implementing a program such as ours.

As we have discovered, generating creative ideas and designs for our program is easy; finding the resources, time and people to implement them within a reasonable time is more difficult.

The UCCO grant has been used to purchase computer hardware for staff and student use and to provide a basic level of technical support. Students have a dedicated 20 station computer lab as well as computers in tutorial and study areas. Staff – academic, administrative and clerical – have access to a networked computer system, generally with a computer on their desks.

The primary computing system chosen – the Apple Macintosh – has influenced the developmental structure within the School. Two factors are at work here, the computers are novice friendly, and the AppleShare network system allows easy interchange of information between users (electronic mail and files). The Macintosh computer also offered more potential than other systems for local development of materials. At the time we purchased our first Macintosh (1989), the authoring systems which allowed easy integration of text and illustrations were Macintosh based. As well, all Macintosh computers were being shipped with a simple development and presentation tool, HyperCard, that would allow us to get started without expensive royalty or other costs.

A major advantage of HyperCard lies in the seemingly random approach to data organisation. Individual pieces of information can be organised according to the needs of the user (student) rather than the preconceived hierarchy of the instructor. Interactive computer usage is well supported with the possibility of scoring, pre-programmed responses, etc. HyperCard also allows the author to 'hide' data which only become visible if the user enters appropriate responses.

HyperCard features and Macintosh computers may not be your

solution. A number of HyperCard clones exist for the IBM/MS-DOS computer platform; Macintosh computers are becoming more readily available in tertiary institutions as its ease of use and graphical applications become more common on other platforms.

Integrating computer systems

The human experience has been the most interesting – how to achieve productivity, and quality materials with new staff, new equipment, cost constraints and time constraints?

One factor is paramount – the need to be time effective within the undergraduate program. As Murphy (and her sources) identified, the problem of lack of computer experience (both in general information systems, and software development) has posed a severe problem.

An obvious approach to this was to design an intermediary system allowing maximum output of CAL materials by the subject matter expert with minimal need to understand the computer.

This has resulted in CAL_Maker, an easy-to-use authoring tool (Zelmer, 1991). The subject matter expert prepares interactive learning materials using normal word processing format and a minimal set of programming codes. The CAL_Maker program 'reads' the resulting file and makes an interactive learning activity complete with student information, questions and responses. Interestingly, CAL_Maker was the result of collaboration between the School and a computing degree student.

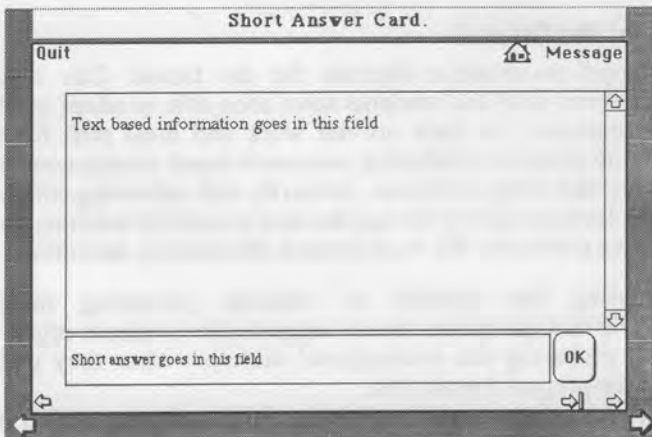


Figure 1: Standard presentation screen for case study and other materials prepared with CAL_Maker

Our use of HyperCard is not limited to CAL_Maker. Several other applications include the production of pharmacology tutorials, an interactive decision-making authoring system, and tools such as an examination handler to facilitate the creation of multiple-choice examinations. The authoring system in particular (titled Generic Health Authoring Process) has the potential to allow us to experiment with the nursing care component of our ultimate social simulation.

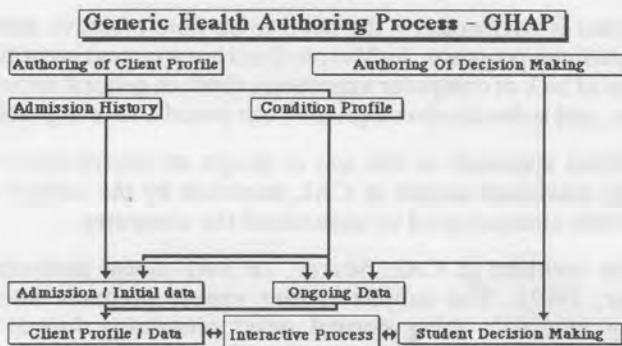


Figure 2: Authoring Flow Chart for Generic Health Authoring Process (GHAP)

What of the future?

This report promised a forecast for the future. Our relatively inexperienced staff and students have been able to adapt quickly to using computers for their normal work and most staff have also become involved in developing computer-based resource materials. There are still some problems, primarily with achieving consistency between lecturers and in finding the time to convert teaching notes to interactive materials. We have several alternatives, including:

- increasing the number of students preparing materials. Experiential education theory suggests that students might learn more preparing the instructional materials than they do using lecturer-prepared materials.
- developing forms and formats for longhand preparation of the content material; but this would require clerical staff which we don't have.

We have seen that simulations have considerable potential for

nursing education, albeit an unfulfilled potential, while computers have the ability to simplify the development and management of simulations. We have been experimenting with simple case studies and similar materials, our future lies in nursing computer tools to develop true social simulations.

References

- Murphy, Marilyn Anne (1987) Preparing Faculty to Use and Develop Computer-Based Instructional Materials in Nursing *Computers in Nursing*, March/April, 59-64.
- Ward, Stephen (ed) WARD 13, Open Software Library, Phillip Institute of Technology, NSW.
- Zelmer, A C Lynn (ed) *Guide for Preparing CAL/CML Materials* (mimeo, 2nd Draft) University of Central Queensland, Rockhampton, QLD.
- Zelmer, Amy E and Zelmer A C Lynn (1980) Health and Health Care Games and Simulations: An Evaluation in Horn, Robert E and Cleaves, Anne (eds) *The Guide to Simulations/Games for Education and Training*, 4th edition, Sage Publications, London.
- Zelmer, Amy E and Zelmer, A C Lynn (1982) Simulations and Games in Nursing and Health Education in *Canadian Health Education Society Technical Reports 3* (winter/82) 56.

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