

Interactive CAL Made Easier

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Abstract

Many of the problems associated with producing stand-alone CD-ROM titles, often resulting in gross underestimates of the time span for production, can be alleviated by using an 'authoring system' with many pre-defined features. The Computer Assisted Learning (CAL) Unit in the School of Medicine at The Flinders University of South Australia (FUSA) has developed such a program. LessonMaker allows academics with basic computer skills to produce interactive instructional modules which provide students with a consistent interface across all modules.

Keywords

computers, education, multimedia, authoring, LessonMaker

1. CAL at Flinders - School of Medicine

The CAL Unit has been in existence since the late 1970's and was formerly known as the Computer Assisted Instruction (CAI) Unit. The change in name of the unit, although subtle in language terms, represented a changed view in the School of Medicine about the nature of student interaction with computers. 'The re-examination has centred around the issue of *Who ask the questions?*' (Martin and Prideaux, 1994).

In 1996, the School of Medicine begins offering a 4 year graduate medical course where it will introduce a Problem Based Learning (PBL) curriculum. Martin and Prideaux (1994) suggest that although they do not believe the PBL process can be fully implemented in computer programs using current generation computers, it can be well supported through a number of avenues. The staff of the CAL Unit believe that the computer can support a PBL curriculum in five ways.

- a program presenting the information pertaining to a PBL case;
- generic multimedia databases;
- practicals simulations;
- instructional modules; and
- self-assessment programs.

The CAL Unit takes on the major task of producing the computer programs to support the PBL curriculum. A fundamental function of the unit is to encourage better use of

interactive multimedia to enhance teaching and learning. The unit is essentially a production centre, but we also evaluate many computer programs developed elsewhere, whether they be internet based or CD-ROM titles.

Over the past 18 months the unit has been preparing computer resources specifically for the new curriculum whilst continuing to support the current curriculum. A major project of the unit is producing an interactive CD-ROM title in conjunction with the Department of Paediatrics.

2. Problems with producing CD-ROM titles

‘The creation of a multimedia product from an initial concept is difficult and risky. For every successful multimedia title, probably another two to three never make it out of prototype stage and another two fail to bring in appropriate returns at market.’ (Creative Nation Statement, 1994)

Many successful ventures result from a team working on a project over quite a lengthy period of time. Some of the issues involved when developing a CD-ROM title include interface design and educational structure. This is why a development team often consists of a content expert, a programmer, a graphic artist, and perhaps an educationalist.

3. Interactive CAL made easier

About 18 months ago, the unit became closely involved with the Department of Anatomy and Histology in order to develop interactive computer programs. The Head of Department, Professor Ian Gibbins appointed a graduate research assistant (Rebecca Anderson), who was to spend half her time preparing computer programs for the new PBL curriculum.

In the early stages of this collaboration, we set about developing a few stand-alone instructional modules. It was soon recognised that there was a need to develop a customised authoring tool. The reasons for this were two-fold. First, there was a need to speed up the production of these instructional modules and second, we needed a program that allowed educators with no programming skills to develop these modules.

The development of an authoring tool that fulfilled these aims was greatly enhanced by having two people with very different backgrounds working on the project from its inception. Combining the ideas of a computer programmer and someone with no programming skills meant that the project could be approached from two different viewpoints while working towards a common goal.

LessonMaker is the customised program that we have now developed. The program consists of two components: the LessonMaker as the authoring tool, and the LessonPlayer as the presentation tool.

For the author using the maker component of the program it provides:

- an authoring environment which requires no programming skills;
- a fixed structure for all lessons;
- the ability to integrate all forms of multimedia with academic content;

- a predefined set of quiz modes; and
- the opportunity for creating lessons with varying levels of interactivity.

For the user of the player component of the program it provides:

- a consistent interface for all instructional modules;
- a number of methods for navigating a given lesson; and
- a facility to make on-line notes.

3.1 Advantages for authors

- No programming skills

One of the main problems when producing CAL modules is the time span for development. The CAL Unit is only a small unit, comprising two computer programmers and a project manager. With the new demands for CAL modules resulting from the new PBL curriculum, the unit's resources are almost exhausted. An authoring system like LessonMaker allows academics with an interest in CAL, yet no programming skills, to develop interactive CAL modules.

The unit maintains a close relationship with academics using LessonMaker, providing both instruction and advice. The unit also supports the preparation of lessons by digitising many of the resources (video, 35mm slides) used by lesson authors, and creating animations.

- Fixed lesson structure

A common problem faced when developing a multimedia computer program is deciding on a structure that best delivers the content. All lessons created using LessonMaker maintain a similar structure. The basic template for lessons has a structure mimicking that of a book with sections and screens (chapters and pages). This means that LessonMaker is suitable for almost any subject area in secondary / tertiary institutions, as well as other training institutions.

- Integration of multimedia

Multimedia describes the combining of text, graphics, sound, animation and video. One of the main advantages of presenting instructional modules on a computer using current generation software products is the ability to integrate multimedia. The advantages of multimedia-based instructional modules have been highlighted by many authors. Vint (1994) encapsulated many of the advantages when he wrote,

Multimedia enhances the education market because it presents information in a fun, attention seeking manner which enables students to navigate through course materials at their own pace whilst providing them with necessary feedback along the way.

However, for the author of lessons incorporating multimedia, it often requires a rethink of the design process for lessons so as to create appropriate interactions for the students (Burgess, 1994). Clearly, some subject matter is better suited to the multimedia

environment than others. It is therefore important to consider whether the information that is to be imparted is appropriate for the multimedia environment.

A key feature of LessonMaker from the point of view of an author is that all resources are kept external to the lesson: the advantages of this are two-fold. First, resources can be stored on a central server, with only the LessonPlayer component running on each workstation. Second, modification of lesson resources is simplified.

- Provision for quizzing

A major feature of LessonMaker is multimedia resource presentation. LessonMaker extends this basic feature by providing a range of 'quizzing' techniques for lesson authors. Each screen can incorporate any of the following quiz types: multiple choice, true / false, text answer, open ended, and identify.

- Interactivity

LessonMaker allows lesson authors to create instructional modules with varying levels of interactivity. Sims (1994) categorises interactivity, suggesting that there are seven levels, which are not necessarily mutually exclusive. Level 1 ('Passive Interactivity') is defined as the user being able to 'move (forwards, and possibly backwards) through a pre-determined, linear sequence of instructional material', and level 7 ('Situating Interactivity') is defined as a 'complete virtual training environment' (Sims, 1994). Sims (1994) comments, '... it is argued that the higher *levels* [of interactivity] may provide "better" instruction through learner involvement'.

LessonMaker provides user interaction on a number of the defined levels. The user of a lesson can:

- navigate through a lesson in a number of ways;
- interact with images by clicking on hot spots providing links to pictures, movies, sounds and labels;
- read through text providing hypertext links to glossary and hot spots;
- answer quizzes, gaining assistance through hints; and
- receive immediate feedback on quiz answers.

3.2 Advantages for students

- Consistent interface

A key issue when creating a multimedia product is the interface. The goal is to produce an interface that is easy to use, and allows both the author to display all the necessary information, and the user subsequently to access that information.

A fundamental problem with users accessing information from multiple CD-ROM titles produced by different authors relates to the learning curve associated with each program. With each new CD-ROM title, the user is required to re-learn the basic navigational technique adopted by the author (Lynch, 1994).

LessonMaker addresses this issue by maintaining a consistent interface across all lessons, hence maximising the real learning time for students. Figure 1 shows an example screen from a lesson developed using LessonMaker by Keryn Williams (an academic from the Department of Ophthalmology at FUSA). In this screen we are viewing a 35 mm slide of the side view of the cornea. The text is describing the medical condition Keratoconus, and within the text there is a hypertext link to the glossary, which is displayed over the picture.

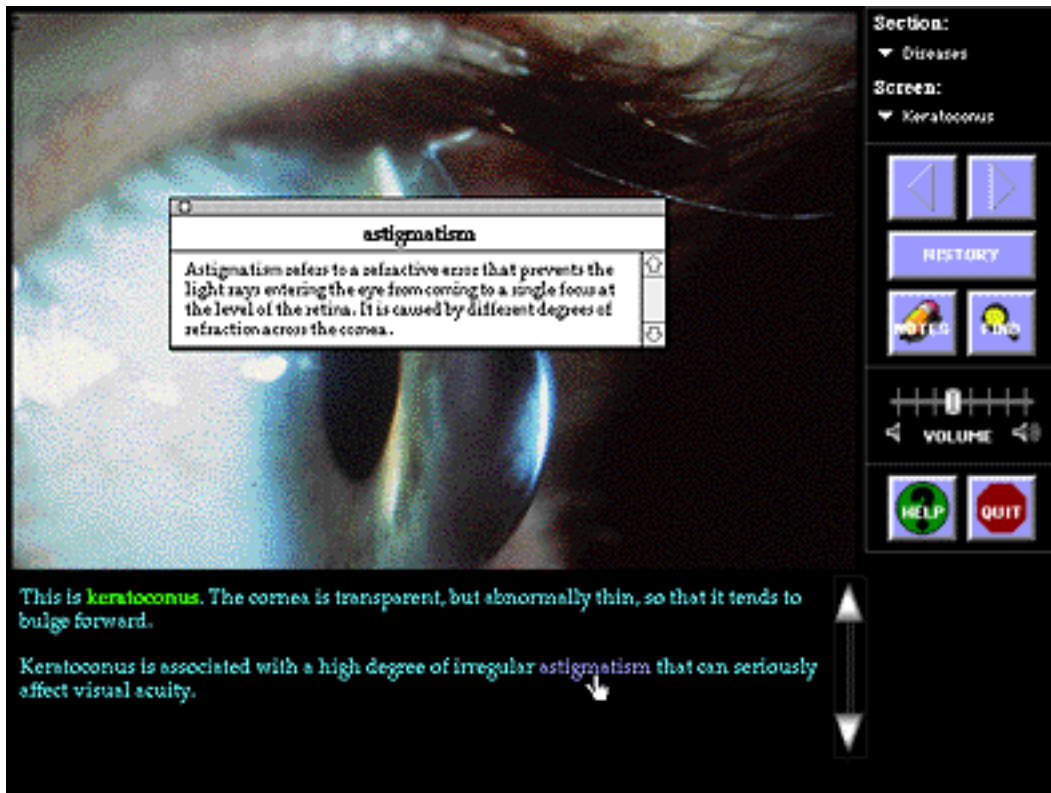


Figure 1. Example screen from Corneal Transplantation lesson.

- Methods for lesson navigation

There are essentially four ways a user can navigate through a LessonMaker lesson.

- the next and previous screen buttons allow the user to step sequentially through the screens of the lesson;
- the section / screen menus allow the user to move to any screen in the lesson;
- the History button gives the user a list of the most recent screens, allowing them to go directly to any screen; and
- the Find button allows the user to search the text on all screens of the lesson for a particular word, giving them option to move directly to any screen with that word.

Figure 2 shows a diagram of the control panel showing the buttons and menus used to navigate through a lesson.

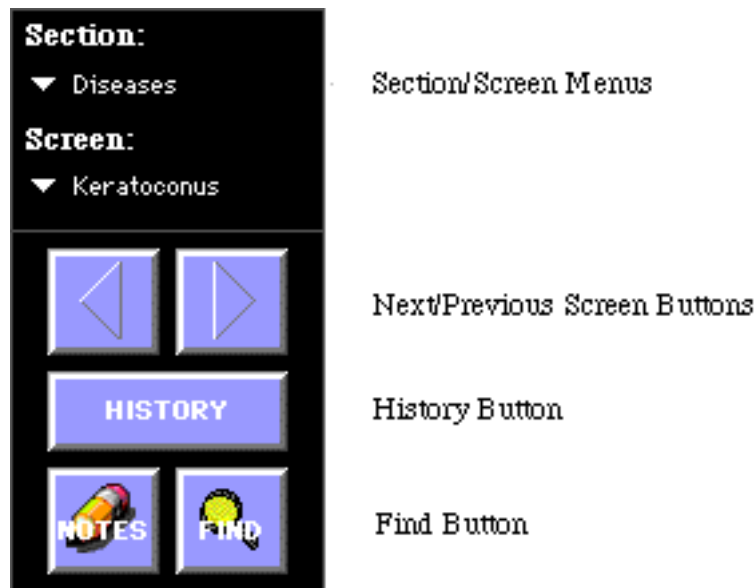


Figure 2. Control Panel showing navigation options.

- On-line notes

A commonly requested feature of multimedia computer programs is a facility for the user to make notes whilst working through the program. LessonMaker provides a built-in note-pad for users to make notes whilst working on a lesson. At the end of each lesson they can save these notes to a text file which can be taken away on floppy disk or printed.

4. Users of LessonMaker

In May of 1995, the CAL Unit ran workshops on LessonMaker for the first time. All three workshops were well attended. Currently there are about 15 academics with a copy of LessonMaker, who are beginning to develop lessons. This has resulted in feedback from many of the users, which allows us to continually refine the program.

The CAL Unit also uses the program quite extensively for its operations in developing CAL materials. The uses for LessonMaker include:

- producing CAL modules;
- providing a vehicle for presentations; and
- proto-typing of stand-alone projects.

Very recently, a representative from the Department of Transport in South Australia expressed an interest in LessonMaker as a presentation tool. This resulted in two presentations in late August 1995 to members of the department. These presentations produced a considerable degree of interest from those who attended, and the department has since identified a number of key areas where LessonMaker could be used.

5. Conclusion

Many producers of Computer Assisted Learning material have no desire to become expert multimedia programmers, nor do they seek any commercial gains for their efforts.

LessonMaker opens up the doors of multimedia lesson production to these people by providing an authoring tool which is easy to use, yet allows them to produce very professional instructional modules.

Although LessonMaker was developed to assist with the education of students within the School of Medicine at The Flinders University of South Australia, it has now been recognised that the applications of LessonMaker are much broader than we first anticipated.

6. References

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can be made by using a human-computer interaction technique known as computer-augmented environments. (Robinson, 1995) to allow publications which sit uneasily in the computer domain to have the best of both worlds. Rather than create virtual books, we make it easier for many people to use by making them look and act like ordinary physical desks. Electronic documents could be manipulated like paper documents, but the computer added powerful new capabilities. Recently, a joint project between the Computer Laboratory at the University of Cambridge and Rank Xerox EuroPARC resulted in the development of BrightBoard (Stafford-Fraser and Robinson, 1996), a computer-augmented whiteboard, and prototype DigitalDesks (Wellner, 1994). Instead of making the MirrorFly is a versatile Messaging, Audio/Video Calling API & SDK Provider for both large-scale as well as small-scale enterprises. Considered to be a prime product in the market, Mirrorfly is highly customizable and compatible with Android, iOS and Web Applications. They have an absolute chat-app solution that provides a design-enriched UI/UX, an intuitive build and a plethora of other features making personalized communication a cake walk. It is embedded with WebRTC that enables HD quality video interaction and a powerful VoIP that gives a dynamic voice experience. Calculus Made Easy is a book on infinitesimal calculus originally published in 1910 by Silvanus P. Thompson, considered a classic and elegant introduction to the subject. The original text continues to be available as of 2008 from Macmillan and Co., but a 1998 update by Martin Gardner is available from St. Martin's Press which provides an introduction; three preliminary chapters explaining functions, limits, and derivatives; an appendix of recreational calculus problems; and notes for modern readers