

Developing a Generic Library Skills Multimedia Package Using an Expert Strategy for Instruction

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Abstract

Video and computer-assisted instruction (CAI) were used in combination to create an instructional program for Open Learning students who are novice library users. An important requirement was to enable the students to develop generic skills that could be applied to any library and catalogue system. The instructional analysis involved identification of strategic knowledge applied by expert librarians, and analysing this to reveal the declarative and procedural knowledge base necessary to carry out search tasks. The instructional materials used a design strategy that involved cognitive modelling of the relevant processes in the video material, and also in the CAI package where the student is able to practice all skills and to gain experience of the range of catalogue systems available. The instruction focuses on learning strategies that will enable the novice to use an unfamiliar catalogue system by recognising basic attributes, locating appropriate instructions and relating these to standard search procedures.

Keywords

instructional design, video, computer assisted instruction, strategic knowledge, cognitive modelling, library instruction

1. Context

The Open Learning Library Information Service (OLLIS) identified a need for education in library use for Open Learning students. This needed to be a comprehensive skill development program ranging from basic library skills to sophisticated keyword searches of library catalogues and CD-ROM indexes. Another important need was that the program had to be generic. User education classes are carried out in universities to familiarise their students with their own library. Open learning students, however, have no 'home' institution so instruction in library use has to apply to any university library.

At the University of Southern Queensland a combined video and computer-assisted instruction (CAI) package had been developed by staff at the Distance Education Centre (DEC) and Library, to introduce students to library use. These materials were developed to make reader education more effective with less time spent in conducting classes. The DEC was commissioned by OLLIS to develop a generic package in two stages, a basic skills package and an advanced package. The packages were required to use video and CAI components, with the CAI able to operate on readily accessible levels of computer technology. A team of three expert librarians worked with DEC staff on the development of the project. This paper describes the introductory package. Materials from

this package have been distributed to libraries throughout Australia that participate in the Open Learning program.

2. Instructional Analysis

2.1 Skills

At the commencement of the analysis phase there were two key aspects of the project that concerned the design team: skill development was essential, and skills had to be generic so that they could be applied to any library system. A major concern was the use of library catalogues, which vary widely from the user perspective due to the range of command or menu structures applied. The learners needed to develop skills in interpreting instructions provided by an unfamiliar system, and in applying these to different types of searches. This was the key focus for the instructional approach.

The topics that had to be covered by the instructional program were outlined by the OLLIS librarians before the project began. One of the first tasks undertaken by the design team was to consider these in terms of the level of skill required. A simplified version of Merrill's (1983) Performance Classification System was applied. In this system, performance on a task is classified according to whether the learner needs to remember the information, or be able to apply it, or be able to find the information when it is not provided. If, for example, the learning task relates to a procedure, the simplest level would be if the learner only had to memorise the steps in the procedure; at the next level the learner would be required to apply the procedure; and at the next level the learner would be required to construct (find) a procedure to carry out a task. It was not considered that learners in this project would ever need to find an approach for themselves, so a simple classification was applied in according to whether the learner needed to know about the topic (remember), or whether the learner needed to do the task (apply the learning). This classification had implications for the subsequent instructional treatment. Items at the 'know about' level needed to be clearly communicated in context, however items at the 'do' level needed to be comprehensively demonstrated, and followed up with hands-on practice to reinforce the skill.

2.2 Knowledge base

A major issue for the design team was the range and type of student knowledge base needed to carry out the task of successfully searching an unfamiliar library system. The requirement of generic skills implied that a new approach was required, as the usual approach focuses on the specifics of one system. As this could not be done, the nature of the knowledge itself became the focus of analysis.

Knowledge is considered to have declarative and procedural components. Clark (1992) describes a procedure as knowledge of how to do tasks with discrete steps. This he sees as usually based on experience, becoming automatic with practice. Declarative knowledge he describes as knowledge of why things are the way they are, consisting of knowledge of principles, concepts and facts. This type of knowledge never becomes automatic and can only be used consciously. The instructional video and CAI package developed at USQ for its own students used a declarative knowledge base of the actual library and the characteristics of the catalogue system, and aimed at teaching the students procedures for using the system. For a generic skills package this same approach could not be applied, as it was not considered possible to teach the specific procedures required for all catalogue systems, and a generic approach did not appear to be procedural.

Expert librarians go about the task of searching unfamiliar catalogues, CD-ROM indexes and online databases regularly, and have a basic approach to doing this. On analysis, this was found to involve a strategy, which could vary according to the individual who was carrying it out. These strategies were not seen to be procedural, as they did not become automatic. Instead, they required continual

reflection and the application of a high degree of knowledge and experience. The knowledge base used was not specific to the system being used, but a wider knowledge base of information systems and database search techniques. The instructional challenge faced by the team appeared to be to teach enough of this wider knowledge base, and how this knowledge could be applied strategically, so that the learner could follow this same approach.

2.3 Expert analysis

Expert strategies differ from procedures in that they are consciously applied in carrying out the task (Alexander and Judy, 1988). An important part of the instructional design process was to identify and conceptually analyse the strategic knowledge used by the librarians. Strategic knowledge is not the same as general strategic processes such as learning style, but domain-specific knowledge that is used in a strategic way in solving domain-specific tasks (Taylor, 1994). A problem was that the domain-specific strategies used by individual librarians contained knowledge of specific systems gained by experience, leading to short-cut or idiosyncratic approaches which could not be used as a conceptual model for a novice user. By conceptually examining individual strategies in a team situation it became possible to compare individual strategies and to arrive at a model of a strategy that could be used in a particular type of situation and which did not require expert experience to apply once a minimal knowledge base was in place. In many cases, the strategy itself was simple, or could be expressed in simple terms, after the learner had some knowledge of the ways in which this strategy could be applied.

The process of analysis of experts applied in this project, and the development of instructional materials based on this analysis, is comparable to that outlined by Taylor (1994, p. 8), which includes the following stages:

- specifying domain-specific cognitive skill performance required on completion of instruction;
- analysis of underlying declarative knowledge base of experts, particularly with regard to relational and strategic knowledge;
- use the expert knowledge base to measure the existing level of knowledge of the target student group;
- design an advanced organiser; and
- design a range of learning activities that require different types of performance, requiring relational and strategic knowledge.

The first step was specified largely by OLLIS, and clarified in the preliminary analysis. The second step has been described above. The third step was also carried out during the analysis stage, in consultation with librarians accustomed to dealing with Open Learning students. A list of concerns most frequently experienced by these students was obtained from liaison librarians at many universities, and incorporated into an profile of Open Learning students most in need of library education. It was also recognised that some Open Learning students are proficient library users, however they are not the target group for this program. The final two stages are an important part of the instructional approach described below.

3. Use of Media

Instructional media selection was based on criteria of accessibility to the students and ease of use under unsupervised conditions. A combination of video and CAI was seen as ideal. Video has the advantage of potentially providing a clear, interesting and motivating introduction and explanation of

the idea and the process of library searching with a minimum of time and effort from the student. Two videos were developed for the project, *Introducing Library Searching* which covers a basic introduction to libraries and simple title and author searches, and *Advanced Library Searching* which considers the more conceptually advanced keyword and subject searching, using CD-ROM indexes also. Instructionally, the videos provide a conceptual model of the process of library searching.

The CAI packages provide a different instructional role. A critical factor in CAI use is that CAI can emulate features of library catalogues, and provide instructional feedback when the students are interacting with a simulated system. It was decided that the videos would cover all of the subject matter in the project, and that all topics classified as tasks that the learner must carry out would be included in the CAI to provide hands-on practice and reinforcement of the skill. A CAI package accompanies each video. The CAI and video materials are aimed at cognitively modelling the process of library searching in different and complementary ways.

4. Instructional Approach

The key emphasis in the instructional approach is on domain-specific strategic knowledge based on expert strategies. To successfully model the appropriate cognitive processes, it was decided to follow an instructional design model in which these strategies and the associated knowledge base were contextualised by embedding them within authentic activities associated with the task (Hannafin, 1992). This model places emphasis on the richness, strength and complexity of the associations formed by the learners through interaction with the contextual circumstances in which the knowledge is used, as these are seen to be more important than learning decontextualised rules and principles. As Taylor (1994, p. 8) points out, 'the extent to which direct experience of tangible reality is necessary for the generation of an expert knowledge base is a key consideration in the design of instruction'. In this case, it was decided that tangible reality was critical at every stage in the instruction process, in order to reinforce the contextual nature of the declarative and strategic knowledge.

Another key element of the instructional design is the process of cognitive modelling. This is aimed at enabling the learner to build appropriate schemata, or scripts (Clark, 1992), that can be followed in the instructional situation, and also in the real situation. The cognitive models needed to be strategic rather than procedural, that is, the learners experience a range of options at some decision points where they need to show an understanding of the overall process.

These key elements of instructional design form the basis of the instructional approach. To embed all instruction within an authentic context, case studies provide examples that reflect the complete process of library searching. These examples illustrate the process, from analysis of the assignment topic and selection of the key concept, to selection of appropriate items from a reading list, through to a search of the library catalogue. A wide range of catalogue systems are used, with some cases modelled on more than one system to illustrate that the overall process is the same, even though there are considerable differences in the commands or menu selections used on different catalogues. This process is reflected in both the video and the CAI package. Within this framework, the overall strategy is demonstrated. A key element in understanding the strategy is that the individual steps may be simple, such as identifying the most appropriate instructions provided by a particular system for carrying out a particular type of search and then following them, however the range of forms that these instructions may take is wide, in terms of command or menu systems, the terminology used, where to look for them and how to use them. Some experience of this range of forms is necessary to be able to follow the strategy. An important element is knowing when to use a particular type of strategy, which is always demonstrated in relation to the original assignment topic and the circumstances in which the search must be made. This overview approach is critical to understanding the domain-specific strategy.

The introductory CAI package applies the instructional approach in a number of specific ways. In accordance with Taylor's (1994) suggestion of using an advanced organiser, a flowchart of the overall process is used as a menu for the program. This enables the learner to see the structure of modules in the program, and the relationship between them. A sequence of modules is suggested, however the learner can choose to work through the modules in any order, and to go back to a module at any time.

The final point listed from Taylor (1994) refers to the range of learning activities. In the CAI program, all learner tasks directly reflect the actual activity associated with library searching. These can be characterised as analysis of assignment topics to select the key concept and appropriate qualifiers that can be critical in deciding what to search for, selecting appropriate items from a reading list, and making entries to the catalogue system. In many cases, sequences of entries are required, with each step in the process requiring interpretation of the catalogue screen to determine what must be done next. In this way learners are provided with practice at finding and interpreting catalogue directions. In keeping with the approach of modelling the actual process, learners may select an icon, to see on-screen an extract from the printed guide provided by a library using the system being modelled. This is a safety net for users of the program in the same way that it operates in an actual library.

An important goal of the instruction is to enable the learner to use an unfamiliar catalogue system. Learners are stepped through practice examples of types of searches on more than one system to enable them to see how the strategy is applied when the details of using a particular catalogue are different. They are also provided with searches to carry out on simulations of systems that have not been demonstrated in the CAI package before, so that the unfamiliar problem is part of the instructional approach. As with other examples, the learner can choose to see an extract from the printed guide, or try to operate simply by interpreting on-screen instructions. To aid this process, an early module in the program is specifically directed towards finding and interpreting instructions. Learners are introduced to ranges of terminology that may be used for simple functions, such as beginning a new search, and also in finding menus or other instructions when these are not apparent on the screen as it is found (usually displaying whatever is left behind by the last user).

By carrying out a range of actual searches in this way on the CAI package, learners gain an overview of the whole process, and can see search strategies in action. This provides experience of a range of systems, and knowledge of the actual range of operations, including serious thinking about the topic before any search is carried out. By experiencing the relationship between operations, and by learning at a declarative level about the process of topic analysis, the nature of catalogue records and the different ways in which catalogues are searched, learners can gain a general understanding of the process of accessing information through libraries, and strategies to accomplish this.

5. CAI Programming

The program was coded using Icon Author. This authoring system provided a valuable degree of flexibility that was important to the effectiveness of the program. Most importantly, the requirement to emulate various catalogue systems meant that the program had to be able to interpret a possible range of user inputs, and to be able to respond appropriately. This was further complicated by the need for diagnostic capabilities which challenged the programmers and the flexibility of the authoring system. The instructional design required a range of anticipated misconceptions to be diagnosed and the learner provided with corrective feedback, so that user inputs would seldom be judged simply as right or wrong.

Another requirement for the program was that it be economical, and not require the use of specialised computer technology such as CD-ROMs or high-powered computers. Up-front planning ensured that the program could be used on a computer using Windows with only VGA resolution and 16 colours. The program uses only fonts and font sizes found in the basic Windows or Windows for

Workgroups operating systems so that no problems with fonts should occur. The program requires space on a hard disk to run, however the whole program only takes up two 1.4Mb floppy disks. The use of graphics was kept to a minimum to achieve this, however some graphics are used where needed to demonstrate particular concepts.

6. The Project Team

Instructional Design	USQ Librarians	Programmers	OLLIS Librarians
Iain McAlpine	Ilona Eberle	Allan Edwards	Stephanie Cohen
	Garry Hall	David Grant	Marie-Therese Van Dyk
	Jennifer Redding	Thea Russell	Debbie Leatham

7. Summary

A number of key elements of instructional design were applied together to create the instructional program. These were the use of performance classification, analysis of the strategies of experts, embedding learning activities in an authentic context, and cognitive modelling using different media—video and CAI. The video was effective in demonstrating the overall process and comparing different catalogue systems, however the CAI enabled the student to participate in the whole process and to learn strategies that would be effective in unfamiliar catalogue systems. This application of the technology was of particular value to the project.

8. References

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