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The Instructional and Motivational Effectiveness of a Computer Program in the Training of Cataloguing Students

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The low level of interaction between lecturer and student has led to a number of problems in the education and training of cataloguers through distance education and training. Students often need an immediate answer to a question or problem in a practical exercise for them to continue to the next step. The case study is a response to the need to conduct research on the provision of additional practice opportunities to students. The program development included a needs analysis phase, design phase, development phase, implementation phase and formative evaluation phase. Students' response to such a program is evaluated. The fact that an overwhelming majority of the students would use the program again and recommend it to others is an indication of the success of the program as well as the need to expand the program to include all the aspects pertaining to the cataloguing course.

Background

Cataloguing and reference work are still considered the core of Library and Information Science courses (Smith 1985, 35; Stieg 1992, 109; Clack 1993, 27). Bender (cited in Bearman 1987, 29) mentions that "traditional skills associated with acquiring, organizing, and disseminating information will still be needed by tomorrow's information professional at the entry level". One of the most important skills for organising information is cataloguing. The automation of libraries has also changed the nature of the work in cataloguing departments. The functions and tasks of librarians in cataloguing departments have changed. However, bibliographic work can never be completely computerised. Human input, especially with regard to authority control, is very important (Snyman 1998). Co-operative cataloguing has become an important function amongst libraries. Copy cataloguing is now one of the most important tasks of cataloguers. To adapt and utilise a copy record for a library's own purposes, it is very important that the cataloguer have a sound knowledge of cataloguing principles. This can only be achieved though proper education and training in cataloguing. Zyroff (1996, 47) mentions a number of valid reasons why training in cataloguing should now, even in the age of automation, co-operative cataloguing and shared cataloguing, still be considered a core competency. Her statement that "[t]hose who have not spent time applying and creating subject and name headings, authority records, descriptive cataloging and classification codes, and indexing norms don't have in-depth perspective on the structure of information" captures the essence of organising information. Cataloguing skills also play an important role in the organisational aspects of knowledge management (Hill & Intner 1999, 7–

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8). It has therefore become more important than ever that cataloguers receive appropriate education and training through all possible modes.

The education and training of Library and Information Science students through distance education is becoming more popular, since an increasing number of students are unable to afford the luxury of full-time studies at a contact class institution. Distance education has traditionally been provided through paper-based correspondence. Interaction between the lecturer and student is limited to course material and books, completed assignments from the students and projects related to their work experience. This low level of interaction between lecturer and student in distance education has led to a number of problems in the education and training of cataloguers. Students often need an immediate answer to a question or problem in a practical exercise for them to continue to the next step. With paper-based distance education they usually have to wait weeks to receive an answer to problems encountered during the study of a particular skill.

The expansion of access to educational opportunities for students through technology is generally recognised. Training institutions are changing to telematic teaching which means that distance teaching delivery can be either paper-based or technology-based, or a combination of both. Although a number of training institutions present so-called online or web-based courses in cataloguing, it became clear, after further enquiry, that these courses are still print-based, i.e. students submit written assignments. The web and e-mail facilities are used merely as alternative delivery modes for print-based study material and assignments. There is no utilisation of interactivity in the presentation of the courses. This asynchronous instruction has the advantage that students may choose their own instructional time, but there is no real-time interaction and immediate feedback from the lecturer. This is especially true of South African institutions that provide cataloguing training.

Niemeyer (1999, 90–106) describes the development and testing of a computer-based final examination in a section of a library skills class at the Iowa State University Library. The training was in the searching of an online catalogue to find materials by author, title, subject, call number and keyword. The tutorial and test program was Windows-based, developed in Authorware. It is significant to note that the students who took part in this program were Honours students to whom Niemeyer refers as "academically gifted students" and for whom the program would provide "an appropriate degree of intellectual challenge" (Niemeyer 1999, 94). As part of this study, a Windows-based test program developed in Authorware is also utilised. Technikon SA's students, however, are second-year students (undergraduate) and are generally not considered as academically gifted. It would therefore be important to establish the success of the students' interaction with a computer-based test program. In Niemeyer's (1999, 100) study, students responded favourably to the program.

According to the well-known and much disputed "no significant difference phenomenon", no matter who or what is being taught, the utilisation of various media will produce the same learning results. Evidence for this argument is based on hundreds of media comparison studies produced since the 1920s (Russell 1999, xiii). Russell (1999, xiii) believes "that differences in outcomes can be made more positive by adapting the content to the technology". In going through the process of redesigning a course to adapt the content to the technology, it can be improved.

The question with regard to the training of cataloguing students is: Would these students not learn from traditional print-based correspondence courses as well as they would from various other media and technologies? To answer this question, a study similar to the many quoted by Russell (1999) would have had to be conducted, specifically focusing on cataloguing students. The result would probably have been the same: no significant difference. The purpose of this study, however, is not to find a few technologies or media that might achieve improved learning results, but to establish how the available technologies and media should be utilised to meet the instructional and motivational learning needs of all cataloguing students. The purpose is not to measure learning gain through pre-tests and post- tests alike, because Clark's (1994) contention that media do not influence learning and Russell's (1999) conclusion that there are no significant differences in performance between individual delivery media are accepted. Students' response to such a program is evaluated. The advantages and dis-

advantages of the program as experienced by the students are addressed.

This article reports on the instructional and motivational effectiveness of a computer program used to provide additional practice for cataloguing students of the Technikon SA, a distance education institution in South Africa. The design, development, implementation and formative evaluation of the computer program as well as the results of the evaluation will be covered in the article.

Pedagogic considerations

The learning method applied in cataloguing training is very much a problem-solving method. According to Laurillard (1993, 55), the main focus of a problem-solving exercise is getting to the answer. The answer in the cataloguing problem is a bibliographic description and assignment of access points to an information source. It is essential to understand the methodology and approaches that are followed to solve the problem. Through understanding students' different approaches to this problem-solving, training can be designed to encourage the activities they need for successive problem-solving (Laurillard, 1993, 56).

The following practical steps listed by Gagné (cited in Piette 1995, 79) are traditionally followed in cataloguing instruction:

- The nature of the performance to be acquired is stated.
- Recall of the component concepts is verbally evoked.
- Cues for the rule as a whole with the concepts to be combined in the right order are given.
- The learner is asked to demonstrate the rule.
- Feedback is provided on the learner's performance.
- Opportunities for practice are provided.

Merrill developed a construct which recognises a sequence of presentation and learning (Merrill 1983, 302–304). Merrill and Gagné recognise that instruction involves intellectual, verbal and procedural skills. Cataloguing instruction involves all these skills. To perform, the learner has to master an integrated number of cataloguing skills.

Cataloguing instruction has to address the need for motivation. Questions that could be asked are the following (adapted from Piette 1995, 83):

- Are the learners' needs addressed in the instruction?
- Are the learners overestimated?
- Are meaningful exercises provided that can allow for some measure of success?

In the constructivist learning environment students have to apply skills to real-world situations. The constructivist approach is widely accepted by educators in theory, but is not always evident in teaching practices, including web-based instruction (Morphew 2000, 1).

- The following approaches in the constructive learning models as discussed by Henze and Nejdl (1998, 65) and Brown (1998, 28–36) could be adapted for training in cataloguing:
- Simulation-based learning by doing: Students have to actively carry out projects in which they apply knowledge and techniques. Projects are designed in the form of simulations. The role of the lecturer or trainer is to assist students when necessary.
- Incidental learning: Projects are designed so that students have to apply the knowledge and skills from their conventional course content.
- Learning by reflection: Students have to think about and reflect on problems, often in-group work with other students and the lecturer or trainer.
- Case-based / problem-based learning: Students have to solve problems that are case-oriented and the knowledge that is presented by the lecturer depends on the progress that the students make in solving the problems.
- Learner-centred training practices: The lecturer should not set tasks or assignments, but should organise and facilitate experiences that allow the students to develop their own knowledge and understanding.
- Authentic assessment: Knowledge and skills should be demonstrated through performance and by applying them in the same way in which they would be used in the real world. Examples include portfolios, journal-keeping, peer reviews and self-assessment.

Program development

The design of the program was started in 2000. The development, implementation and evaluation of the program took place in 2001.

The computer program was developed as a pilot test and addressed the classification part of the cataloguing course. This part was selected since the results of previous assignments and examinations, as well as interviews conducted with students who repeated the course, indicated that

this is the part with which they experience the most difficulty.

The computer program for the classification component was designed by the Integrated Technology Centre (ITC), a division of Technikon SA. They were responsible for the multimedia programming and graphic design. The contents were supplied by the lecturer.

The following phases were addressed during the process:

- Needs analysis phase which includes:
  - Goal analysis
  - Target population analysis
  - Task analysis
  - Content analysis
  - Instructional strategies analysis
  - Media analysis
- Design phase which includes:
  - User interface design
  - Contents
  - Navigation
  - Input methods
  - Guidance
  - Feedback
  - Support
  - Progress evaluation
- Development phase which includes:
  - Authoring
  - Layout of the program
- Implementation phase
- Formative evaluation phase

Needs analysis phase

During the needs analysis phase attention was paid to the following:

Goal analysis

According to Milano & Ullius (1998, 98) the goal statement articulates the relationship between the training that is being designed and the desired performance. During the goal analysis the purpose of the design was established. The goal for the computer program was formulated as follows:

> The computer program should be used in conjunction with the printed course material to complement it and to form an integral part of a mix of training media and technologies.

Target population analysis

Since students' personal background and circumstances, educational background, professional background, expectations and experience of distance education, study methods and access to media and technology influence their studies, it was considered necessary to establish these factors by means of an extensive questionnaire. The questionnaire was adapted specifically for cataloguing students at Technikon SA from the questionnaire designed by Beneke (1998). The South African Advertising Research Foundation's Living Standards Measure (LSM) (1993) also provided useful information regarding the demographics, financial circumstances, lifestyle and media access that could be further explored in the questionnaire. It was assumed that the majority of students fell into the category LSM5 (the young aspirers). This was further supported by the results from the questionnaire. The questionnaire was sent to all the students (109) of the 1st registration 2001 registration. Fifty-six (56%) completed questionnaires were returned.

The information about the target population was considered during the design of the program. The following factors were especially significant and are shown in table 1:

Task analysis

The task analysis is conducted to determine the content needs to be included in the instruction for the students to achieve the learning objectives for that specific instruction. According to Smith & Ragan (1999, 63) the task analysis can be conducted by traditional processes such as:

- investigating what has been taught on the subject in the past;
- trial-and-error (teaching and observing where there are problems); and
- following the structure of the subject content.

Table 1: Target population factors and design considerations

Target population factors	Design considerations
Language group	Only about 14% of the students belong to the English language group. This is an important consideration for the language level at which the training media are developed. English is the chosen medium of instruction since all the cataloguing tools and manuals are in English. The level of language has to meet the students' language abilities.
Average percentage in final school examination	The majority of students had an average pass mark at school and are not the top performers. The training program should be on an introductory level.
Most recently completed library qualification	The majority of students are unqualified library and information workers and have therefore not received any higher education training. The training program should be on an introductory level.
Demographic area of library / information centre / department where students work	The majority of students work in larger urban areas where access to facilities such as electricity and telecommunications infrastructure is available.
Type of library where students work	The majority of students work in the public and community library sector. Examples selected for cataloguing in the training media should resemble items that would typically have to be catalogued in these types of libraries.
Section / department of library / information centre / department where students work	None of the students work in a cataloguing section (accept those in one-person libraries who sometimes have to perform cataloguing tasks). This means that students have not been exposed to the work and procedures in such a department. Training materials should be designed to introduce students to cataloguing.
Access to computers	The high number of students (72%) who have access to computers makes the utilisation of computer programs a possibility.
Computer skills	All the students have completed an introductory course to computers during their first year studies. They are, however, inexperienced in using a CD-ROM training program.

For the purpose of this course the outcomes-based method was used in combination with the above traditional approaches. The learning goals or tasks were formulated according to outcomes that have to be achieved by the students.

Content analysis

It was not possible to immediately include the full content of the cataloguing course, since the content is complex and involves different aspects. The contents encompasses descriptive cataloguing, assignment of access points, classification, assignment of subject headings, indexing, abstracting, copy cataloguing and authority work.

As a pilot project, the first component of the cataloguing process for which a training programme was designed was the classification module. The motivation for this decision was that students' results, personal interviews and group discussions revealed that students found the classification module the most problematic part of their studies. Comments such as "*classification is the most difficult part of the entire Library and Information Studies course*" were often made.

The content analysis was performed to find out what the program ought to contain. It was conducted by analysing existing study material. The content had to comply with the syllabus.

Instructional strategies analysis

The different potential instructional strategies had to be investigated to determine the most appropriate strategy for the training programme. It would also ensure that the computer program would be as effective as it would be understandable. The following strategies were analysed to be utilised in the computer program:

Drills and practice

The lecturer determines how many problems a student has to complete in order to master a specific concept. With cataloguing in particular, it is important that students get as much practice as possible. Reinforcement of cataloguing skills is the key to successful training. Problems presented must not be too difficult or too easy. The selection of problems must also not be too limited.

Simulations

A simulation is ideal for teaching actual, real-world cataloguing problems as encountered when cataloguing materials for a library. One of the most important advantages of simulations for training classification is the fact that the complexity of the learning can be controlled. Students can be presented with various real-world cataloguing problems, but the level of complexity can be changed to teach a certain aspect.

Media analysis

The only medium considered for this part of the project was the computer program (CD-ROM) used in conjunction with the printed course material. A complete media analysis was conducted to determine the media that should be included in the final training resource programme.

Design phase

A team approach was followed, involving the subject expert (lecturer) who had to provide the content and the Integrated Technology Centre (ITC) of Technikon SA, which performed the programming.

The computer program was designed as pre-programmed computer-based learning. The following features of computer learning programs motivated the design of such a program for the teaching of the classification module (Bates 1995, 189, 191–192):

- The student interacts solely with the computer; there is no direct contact through the computer with a tutor, instructor or other students.
- The student has to work though pre-designed material, interacting by answering questions and choosing options.
- The program reacts to students' responses and controls routes through the material.
- The program provides feedback to the students' responses.
- With the use of questions and responses from students followed by feedback from the program, dialogue with the student is simulated.
- The program can assess the student and keep record of the progress.
- The program can identify areas where further study is necessary and prevent students from moving to new material until previous material has been mastered.
- The program can allow students to select materials, levels of difficulty or pathways through the subject matter.
- Video, audio and animated graphics can be integrated within the program.
- Pre-programmed computer-based learning can be combined with other forms of instruction such as printed materials, videotapes, audiotapes and broadcasts.
- Students are allowed to work at their own pace.

The design of the program has to make provision for interactivity, individual work and group work. For this, content, user interface and the infrastructure has to be considered (Harris 1999, 153). The researchers included navigational aspects and input methods under infrastructure and also added guidance, feedback, support and progress evaluation. All these aspects should support the content and learning objectives.

User interface design

The user interface is critical to the success of a computer-based training programme. There is nothing else to keep the student interested in learning except the computer (Lee & Mamone 1995, 107). The interface should firstly attract the students and secondly keep them interested. The following factors were considered:

- The level of simplicity or complexity expected from the students (based on their previous experience).
- Screen sizes: The content should be designed to accommodate the smallest or most common screen size that students will use.
- Screen layout: This involves consistent placement of information, colour combinations and object size.
- The loading time of graphics and sound: This should not be so slow that it will discourage the students from using the program.
- Interactivity to keep the student involved in the learning process: The student should input information, get a response and spend some time thinking about the answer.

The population analysis established the characteristics of students who have to use the program.

It is essential during the design process to be specifically aware of how much computer experience the students have. According to the analysis students have very little computer experience.

Contents

The actual content of the program consists of different types of classification exercises. These include:

- True / false questions
- multiple-choice questions
- completing diagrams and flow charts
- placing books in their correct positions on shelves

The content for each type of exercise or unit is randomly arranged by the program. This means that the order in which questions appear is different each time the student attempts the exercises. This eliminates guessing answers after a previous attempt.

The content had to be supported by the appropriate graphics and audio. During prototyping it was important to experiment with background and text colours to find a suitable combination. It was decided to keep colours simple and use only a few consistently throughout the program.

Audio had to consist of a human voice that introduced the program and gave responses to answers, as well as computer sounds that indicated responses. It was decided to experiment with the human voice and computer sounds and determine during the formative evaluation process how students experienced the audio and what they preferred.

People with computer experience as well as students with very little experience were asked during the design process to evaluate the graphics and sound. The experienced people (lecturers and programmers) were satisfied with the graphics and preferred the human voice to computer sounds. The students were satisfied with the graphics and voice and indicated that they enjoyed the sounds. In the questionnaire for the formative evaluation of the program, which had to be completed by all the students, a section was included on screen layout, colours and the audio to determine how students experienced these aspects.

Navigation

Since students' computer experience was limited, it was decided to make the interaction as simple as possible. It was decided that students would have to follow a predetermined route through the program that coincided with their printed course material. The learning events are also short and confined to one screen. Therefore students' input has to be short, for example, selecting a letter to correspond with an answer, selecting true or false, or entering a number. Only after completion of these exercises are students expected to proceed with more advanced interaction, such as moving an object from one position to another. To keep students meaningfully involved, feedback is provided after each response.

According to Lee & Mamone (1995, 108) unnecessary levels of menus and decisions about paths to take, interfere with learning. Therefore, the screens were kept as consistent as possible.

Input methods

Although there are various input methods, the keyboard and mouse are the methods with which students are most familiar and it was decided to use these methods. Since the students have very few typing skills, it would take them far too long to answer a long question and reduce the effectiveness of their learning. They therefore merely have to type in letters or click on an option. The more advanced input involves clicking and dragging objects with the mouse.

Guidance

Students should know what to do at every step throughout the program. The guidance comes in the form of navigational help files that should be consulted before starting the exercises. Interactive feedback and explanations are provided after each response from the student. Whenever reading on-screen is required, the text remains on the screen until the students respond with an input or answer.

Feedback

According to Laurillard (1993, 61) "Action without feedback is completely unproductive for a learner". It is also important that feedback is used.

An action should be adjusted according to the feedback to enable learning. Laurillard (1993, 61–62) distinguishes between two types of feedback, namely intrinsic and extrinsic feedback. Intrinsic feedback is given as a natural consequence of action. In the program the student gets an indication after his/her input, of whether the answer is correct or incorrect. Extrinsic feedback is usually in the form of an external comment, approval or disapproval. Extrinsic feedback is more helpful if it includes suggestions on how to improve on an action. If the answer is incorrect, a brief explanation of the correct answer is given. In this program both types of feedback were used.

Support

Provision should be made to give students support throughout their use of the program. Support should be available not only for content-related problems, but also very importantly, for problems that students may encounter with the running of the program.

After completion of each section, students have the option of reviewing the section. The questions with correct answers are then displayed. After completion of the flow charts and book classification sections, students also have the opportunity to make print-outs of those screens. The print-outs can be added to their printed study text or own notes for future reference.

The student should have the opportunity to describe the problem he/she has encountered. Depending on the type of problem, it should either be investigated and solved by the lecturer (if it is more content-related) or it should be referred to a bugmaster (a system specialist). Feedback should then be provided to the student who reported the problem. A help function is available to assist students with navigation through the program.

Progress evaluation

Progress evaluation plays an important motivational role. As students progress through the program, an evaluation bar indicates to them how they are performing. After completion of a unit, they receive a report comparing their score with their previous score. The incentive is therefore to attempt to improve the score each time they do a particular section.

Development phase

The development phase involved the final authoring of the program and integration of all the components. The researchers provided all the content for the exercises. The programmer from ITC had the major responsibility of integrating the graphics, audio and text during the development phase.

Authoring

At this stage the text, audio, graphics and sound files were integrated. The program was developed in Authorware. Authorware was selected as it is powerful and flexible and can be adapted to perform many functions, including creating different types of exercises (Vaughan 1998, 164). As far as possible, the program was developed to meet the standards of personal computers mostly in use by private individuals and libraries, since those are mostly the computers on which the program would run. The following minimum requirements are necessary to run the program:

- Pentium II
- 64 MB memory
- 16-speed CD-ROM drive
- Sound card
- Windows 95/98/2000 or NT

The program was developed to start running and loading automatically so that the minimum input is required from the users when they use it for the first time.

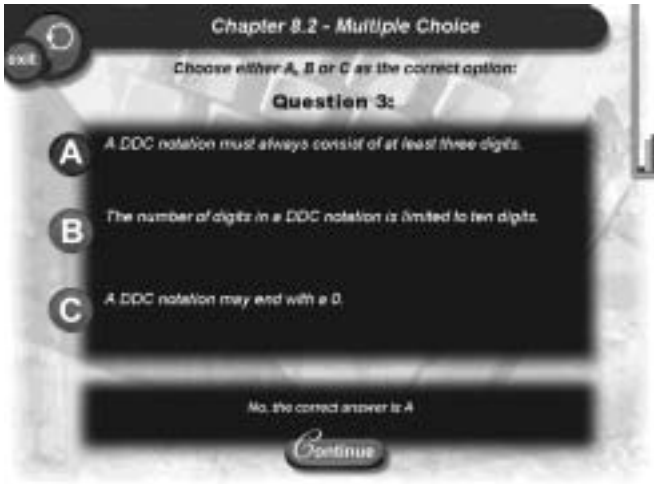
Layout of the program

The program consists of:

- an introduction
- the option to look at the help files
- the exercises, namely:
  - a true/false section
  - multiple-choice section
  - a section where missing text should be filled in
  - a book classification section
  - a flow chart

Figure 1: True / false section

Figure 2: Multiple-choice section



The introduction gives a brief description of the course in general. It then indicates where the classification module fits into the course as a whole.

When students use the program for the first time, they have to work through the help files before starting the exercises. This is indicated to them in the accompanying letter.

The first section in each chapter is a set of questions with true / false answers. Immediately after selection of an answer, the correct answer with a brief explanation is given.

The next section is a multiple-choice section. After the student's response, the correct option is given.

In the book classification section, book classification according to the Dewey Decimal Classification (DDC) system is simulated. This exercise can be done individually or jointly by small groups. The exercise is performed by placing books in the correct positions on shelves. The shelves have the classification numbers. The student has to select the correct number for each book. This can only be done if the student can correctly classify the book according to DDC. There are more numbers on the shelves than there are books, so students cannot guess the numbers of the last books. The student has two opportunities to place the books. Thereafter it is done by the program. After completion of this exercise the student has the option to make a print-out of the screen.

The last section is the flow chart section where students have to click and move blocks to their correct positions in a flow chart. This section was developed since following steps in the correct sequence is very important for successful classification. It gives students the opportunity to actually follow the flow charts presented in the DDC and the study guide.

Figure 3: Book classification section

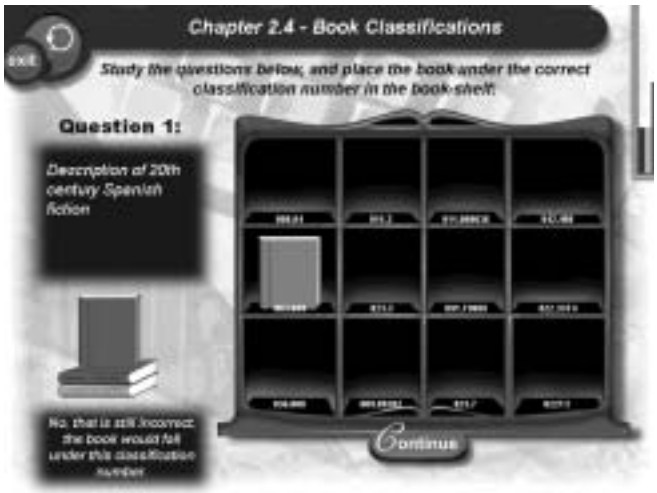


Figure 4: Flow chart section

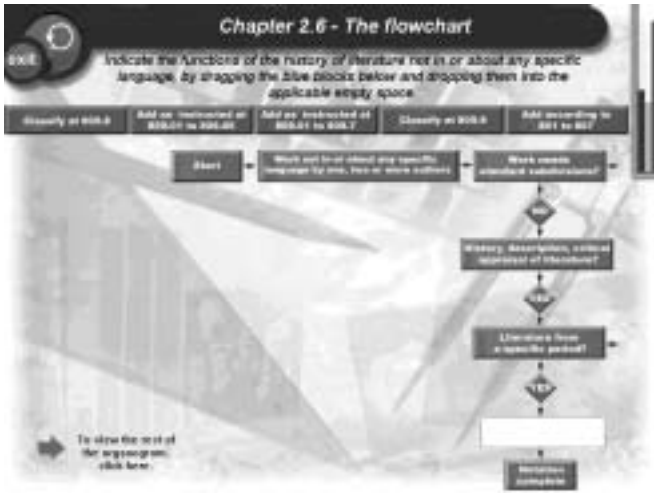


Figure 5: Display of results

After completion of a chapter, students can see how they have performed and compare this with their previous performance in the chapter.

Implementation phase

The program was issued in CD-ROM format to all the students of a specific registration period (1st registration 2001) for evaluation. There were 109 students. The CD-ROM was accompanied by a letter explaining the purpose of the program and a questionnaire to be completed for the formative evaluation. The students had one month in which to use the program, complete and return the questionnaire. Forty-eight (48%) completed questionnaires were returned. During this period students also had the opportunity to discuss the program with the lecturer and fellow students via telephone, fax, e-mail and the discussion group facility on TSA Co-operative Online Learning (TSA COOL), the virtual campus of Technikon SA. All the comments and questions were noted. There was also a contact session at the main campus where the program was demonstrated and students could use it in small groups. This session was attended by fourteen students. During this session personal interviews and focus group discussions (five to six students per group) were held. Observations were made while they worked and their comments and other noteworthy incidents were recorded. The information was gathered and then organised to be used in conjunction with the questionnaires for the formative evaluation phase.

Formative evaluation phase

Laurillard (1994, 287) defines formative evaluation as "... the collection and analysis of data on the pedagogic value of a teaching program, defined in terms of the learning processes it promotes and the learning outcomes it achieves".

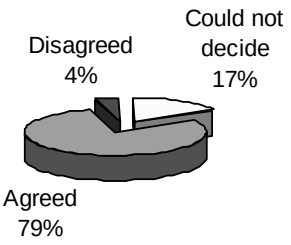
Questionnaires were used to test the experience of the wider population of students. The purpose of the questions was to obtain simple reflections from the student's recent experience with the program.

Laurillard (1994, 290) considers observation an extremely rich and useful data collection method that can be carried out very quickly. The unconstrained data collection process complements the closed evaluation techniques such as questionnaires. In the evaluation exercise one or more students used the program and discussed it as they used it. This "conversation" was observed (without interference). This method can reveal a great deal about students' experience of the program, particularly about the screen design or interface, pointing out things that might interfere with learning and might otherwise have gone unnoticed (Beattie, 1994, 254). This helps designers to understand not only where the program fails, but why, and what needs to be done about it. (Laurillard 1994, 290). One must, however, keep in mind that what students say they "like" or "prefer" may not necessarily be the best for learning.

The open-ended nature of interviews can help to establish what aspects should be further investigated with the closed form of the questionnaire (Laurillard 1994, 290). On the other hand, certain information obtained from questionnaires can be further investigated in greater depth by interviewing respondents to the questionnaires. Interviews and informal discussions were held with the students who used the program. These interviews were conducted after the questionnaire had been completed. The interviews and comments provided the opportunity to clarify certain comments made by the students and aspects indicated in the questionnaire.

Focus groups are useful in the planning and design phases if there is a formative question to ask that will guide the design of the program (Beattie 1994, 255). The purpose of the focus group discussions which were held during the

Table 2: Assistance with classification

Aspect	Finding
The program assisted students in their study of classification.	

contact session was the same as that of the interviews and discussions.

Results of formative evaluation

Students' impressions of how the program assisted them in the study of classification were established. The purpose was therefore not to determine whether students' performance in the module improved or not with the use of the program. In other words, students were not tested before and after working through the program. The results of pre- and post-testing of performance are also influenced by other factors that do not form part of the scope of the study.

Students had to indicate to what extent they agreed that the program:

- helped them with their classification
- helped them to understand the contents on classification in the study guide better
- helped them to answer questions for self-evaluation and assignment questions

The finding to all the above statements is summarised and indicated in table 2.

The results of the questionnaire indicated that the majority of the students (79%) felt that the program assisted them in their study of classification. During the observation it was also clear that students reacted positively to the different training media. Comments from the students indicated that they appreciated the fact that they were given exercises in a different format that was more closely related to "real-life" classification situations.

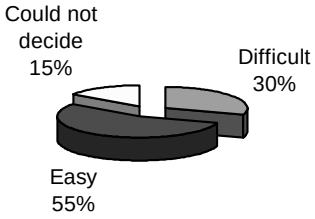
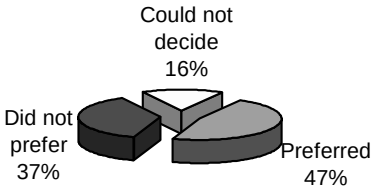
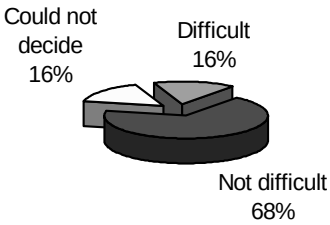
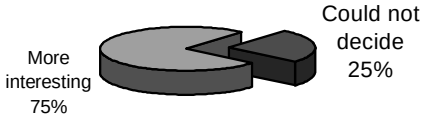
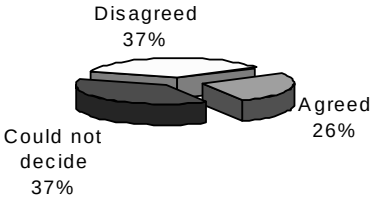
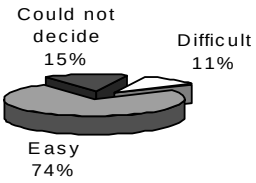
Most of the students had never used computers in their training before. Some had limited experience of word processing tasks and routine computerised tasks, such as issuing library materials, at the libraries where they work. It was surprising to find especially during the observations that the students quickly worked out for themselves how the program worked. Some students had to read the help file first, but others managed simply by following the instructions. It was clear that the students adapted quickly to the new format and did not experience difficulty in understanding the program and working through it. Table 3 illustrates the results regarding aspects of the computerised format.

Students reacted positively to the screen display and text layout. Although English was not the home language of the majority of students, 84% of the students indicated that the language level and the length of the sentences assisted them in understanding the program. The majority of the students experienced the pictures and colours positively. It was clear, especially during the observations, that students liked the sounds and human voices that responded to their answers.

In the past, when only printed material was used in the training of the classification module, students indicated that they found the module very difficult and therefore not a very pleasant experience. It was therefore anticipated that they would also find the content of the computer program difficult and would indicate that they did not enjoy classification. However, the opposite was experienced. The majority of students (77%) enjoyed the program and were satisfied with its content. Students who had difficulty in completing the program attributed it to the fact they had too many other subjects and work commitments.

The lack of immediate feedback was identified as one of the main problems of learning cataloguing through distance training. The immediate feedback provided by the program, which includes correct answers as well as explanations,

Table 3: Computerised format of the exercises

Aspect	Finding
Did students find it difficult to do the exercises because of the computerised format?	
Did students who usually have difficulty working on computers find the exercises easy to do?	
Did students who usually have difficulty working on computers find the exercises easy to do?	
Did students who usually have difficulty working on computers find the exercises easy to do?	
Where students had the option to use either the mouse or the keyboard they preferred the keyboard instead of the mouse.	
Did students find the use of the mouse and clicking and dragging objects difficult?	

was highly appreciated. The following comment was made by a student in this regard:

> … the good thing is when you are wrong, it provides instant feedback" (Opperman 2001)

Students also appreciated the fact that their performance was measured and that they could compare it with previous performances. The following comment was made by a student about the fact that questions are randomised, which therefore provides the opportunity to repeat practise:

> The most wonderful part is that when you work on the CD the second and third time, it changes to other questions whereby you can work it a lot of times. (Makhubela 2001)

Table 4: Assessment of performance

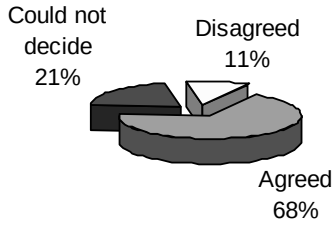
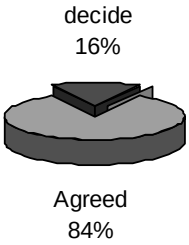
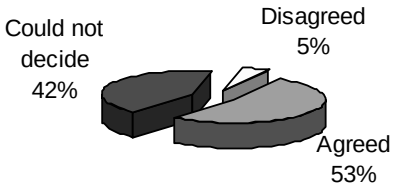
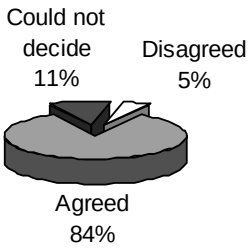
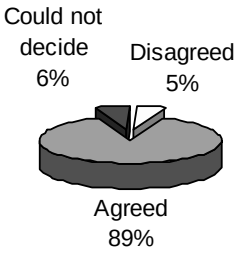
Aspect	Finding
Students found the progress bar useful.	
The answers and explanations were clear.	
Students would have preferred more than two attempts at the book classification section.	
Students found the percentage marks awarded for performance useful.	
Students found the comparison of their percentage marks with the previous performance useful.	

Table 4 illustrates the results on assessment of performance.

Results on the measurement of the enjoyment of the program were very positive. Follow-up with students confirmed that the different medium contributed significantly to the enjoyment. The majority of the students (95%) also indicated that they would use the program again and would recommend the program to others.

The results of the investigation have demonstrated that the overall effect or outcome of the evaluation was positive. Students expressed positive responses to the program and its value in their learning of classification. From the findings

it can be derived that the computer program is effective both instructionally and motivationally.

Conclusion

A number of barriers to learning in distance education caused mainly by the unique characteristics of distance education were identified by Cloete (2001). Some of these include:

- If one party (e.g. student) does not keep contact regularly, effective learning can be hampered.
- Limited face-to-face contact between the lecturer and the student.
- Lack of regular / immediate feedback from lecturers.
- Students find it problematic to perform self-assessment.
- Course material is often not specially designed for distance education students.
- Course pacing for distance education students is not taken into consideration.
- Additional pressures of distance learning lead to poor performance.
- Not enough opportunities for regular and interactive assessment.
- Delay in feedback about performance.

Although the computer program does not provide solutions to all the problems and limitations, the crucial issues are addressed, namely:

- Immediate feedback is provided by the program.
- Regular and interactive assessment is provided in the computer program.
- Students have the opportunity to create their own learning by utilising the program.
- The drill-type exercises in the computer program are very helpful for practice.
- To work with different media makes it more interesting for the students.
- Students can work on the course whenever it suits them.
- A variety of information and additional exercises can be provided by different media and technologies.
- The electronic media make it possible to train students in specific skills of the cataloguing course which are not possible through the print media.
- The electronic media make it possible to create simulations of cataloguing situations.
- The computer-based training stimulates students and promotes positive attitudes to learning.

However, there are disadvantages involved as well. These include:

- The electronic media are still very new to some of the students and they are therefore reluctant to use it.
- Students do not have adequate hardware.
- It takes time and technical support to become a competent user of the computer program.
- The lack of computer skills makes it harder for certain students to adjust to the electronic media.
- Students may consider the use of the electronic media and technology as extra work in an already demanding course.

The fact that an overwhelming majority of the students would use the program again and recommend it to others is nevertheless an indication of the success of the program and the need for further multimedia developments of the course. Further developments may include expanding the computer program to include all the aspects pertaining to the cataloguing course, namely bibliographic description, subject heading assignment, indexing and abstracting. In this study students' experience of a computer program was measured in terms of how it assisted them in their study of classification as well their enjoyment of it. Once a program has been developed that incorporates the full cataloguing syllabus performance measurement will also be considered and reported on.

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