The Telephassa Project
Interactive Instruction Modules

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5.1 INTRODUCTION

Interactive Instruction Modules (IIMs) provide library instruction by means of a computer: library users can learn how to use different library systems and procedures. The Interactive Instruction Modules can be used with stand-alone configurations as well as in a network environment. The great advantage of online available IIMs is the fact that library users can get personal instruction, based on the educational principle 'interactivity', at any time and any place they want.

Three universities and two commercial enterprises in three different countries (Spain, Greece and the Netherlands) are involved in the Telephassa project Interactive Instruction Modules.

In the beginning of the project (early 1991) nobody at the university libraries in Patras, in Barcelona or in Tilburg had experience in developing interactive instruction modules. In spite of a lack of practical knowledge and experience on multimedia and authoring languages at the three university libraries, the goal formulated was to train library staff in the development of IIMs and to produce 15 IIMs during the course of the project. Stating these two objectives was realistic because of the following circumstances in the beginning of the project:

- a recognition of the great advantages of computers;
- a common basic computer trained library staff in Patras, Barcelona and Tilburg;
- good cooperation with specialists from internal Library Computer Division or/and University Computer Department;
- a great deal of enthusiasm;
- the availability of user friendly authoring systems;
- the support by IIM specialists.

In this article an overview will be given of the activities that have taken place since early 1991 during the Telephassa project Interactive Instruction Modules.
5.2 THE COMETT-II PROJECT TELEPHASSA HM

Telephassa is a COMETT-II project that aims at the introduction and use of advanced (electronic) technologies in libraries. A significant part of the Telephassa resources has been dedicated to the design and development of educational material for the benefit of library users. This material takes the form of computer programs that instruct library users on the new technologies that are increasingly being used in libraries and documentation centres. These programs are called Interactive Instruction Modules (IIMs).

Another goal of the Telephassa project is the transfer of knowledge and experiences of the cooperating universities and enterprises to interested groups of information professionals and information end users in various regions of Europe.

COMETT-II is a European project which aims at:
- strengthening university - commercial enterprise cooperation;
- training in (advanced) technology;
- by means of transnational projects;

In the Telephassa project Interactive Instruction Modules this has been given concrete form by cooperation between the following participating organizations:
- Universitat Autònoma de Barcelona (Spain);
- University of Patras (Greece);
- Tilburg University (The Netherlands);
- Synar Productions (The Netherlands). Synar is a Dutch company specialised in multimedia productions. Synar has also built up expertise on the use of interactive applications;
- Digital Equipment Corporation (The Netherlands). Digital has supplied the hardware for the development of the instruction modules. The educational department of Digital also supported the courseware teams of the three universities with the educational design of the interactive instruction modules;

5.3 STARTING POINT OF THE PROJECT INTERACTIVE INSTRUCTION MODULES

In general it can be stated that there is a need for library instruction. It is obvious that a lack of knowledge and experience in the use of library instruments results in a regular appeal to library staff by library users. This may be the reverse side of the coin of introducing more and more sophisticated library instruments for the benefit of the library users. These sophisticated instruments offer many advantages for the library users, but at the same time the complexity of these sophisticated instruments cannot be ignored. Is it that strange that library users in a high tech
library or information centre, who have been charmed by the many advantages and opportunities such a high tech library offers, sometimes get lost in a jungle of nonstandardized user interfaces and library instruments? This lack of knowledge and experience in the use of library instruments may result in an extra appeal to the library staff by library users. This lack of knowledge, however, may also result in sophisticated library instruments being used in a very elementary way. These are the main reasons why library instruction should be practised in every library and especially in innovative high tech libraries.

Traditionally, library instruction has been realized in different forms:

- Individual instruction: individual help; self instructional material or printed guides;
- Group/Individual instruction: e.g., film, video, slides, audio/illustration presentations;
- Group instruction: guided tours, demonstrations and lectures, seminars and workshops.

In a traditional library individual instruction is frequently used: library users can be helped to solve their problems individually. The disadvantage, however, is that one has to have sufficient personnel available all the time to solve these individual problems. At the same time, this library staff has to be trained in giving library instruction. In addition, all the trained staff has to master all the different library instruments well enough to transfer this knowledge to the users. This time consuming method conflicts with an economically managed library.

The main advantage of group instruction is that one can serve many users in a short time. When all kinds of audiovisual material are used during group instruction, this method of instruction can be very effective.

The disadvantage is that the information transmitted remains rather global. Moreover group instruction does not solve library users individual problems. Users may meet problems while using a specific library instrument and they want to be helped at that time. Using group instruction one treats the group as if they all have the same problem at that specific time. Group instruction is less time consuming than individual library instruction, but from the educational viewpoint, it is not very effective.

Is Computer Based Instruction able to solve these problems? One advantage of Computer Based Instruction is that the user gets instruction at the right time: when the user has a problem, he or she can choose an instruction module. The interactivity features of instruction modules also provide direct feedback. Furthermore, many users can be served in a short time; if a network is available many users can use the instruction modules at the same time. The library staff does not have to be available all the time to give instruction.
With Computer Based Instruction it is obvious that the instruction can be organized by expert library staff (the courseware teams that develop the IIMs can consist of library staff who have mastered the specific library instrument).

Computer Based Instruction (CBI) in libraries was not very successful until some years ago. This was due to the following circumstances:

- little cooperation between libraries and computer experts;
- insufficient computer knowledge in libraries;
- non-flexible computer systems;
- early CBI programs were less attractive text programs;
- not much CBI software was available;
- composing CBI modules required knowledge of programming languages.

In the last few years, the situation has changed and CBI in libraries got a better chance. This is due to the following circumstances:

- growing cooperation between libraries and computer experts;
- growing computer knowledge in libraries;
- broad availability of flexible micro computers;
- availability of user friendly authoring languages;
- possibility to create CBI modules with integrated text, images, graphics, video.

It is especially the interactivity that distinguishes CBI products like Interactive Instruction Modules from other, more traditional methods of instruction. The user actually defines the sequence and speed of presentation, and the routing through an instruction module. IIMs are technological products for active, personalized learning.

5.4 THE OBJECTIVES OF THE PROJECT INTERACTIVE INSTRUCTION MODULES

If the only purpose of the IIM project within Telephassa was to develop computer based training programs to instruct library users, the Steering Committee could have assigned a specialist firm to produce them. At the end of the project the result of this effort would have been 15 interactive instruction modules of high quality produced by a specialised firm.

However, a major objective of the Telephassa project Interactive Instruction Modules was to train library staff, who were not familiar with the development of computer based training programs, to design and produce such programs.

At the end of the project the result of this effort will be 15 interactive instruction modules produced by several members of the library staff in three different countries.
So, besides the production of 15 interactive instruction modules, several members of the library staff in the three countries have also been trained to develop these instruction modules. The production of the IIMs took place in teams of about 4 or 5 members of the library staff. These production teams are called courseware teams. All participating members of the library staff started from a blank page and did not work as fulltimers on this project. Besides their own daily work in the library, they participated in the IIM project.

In short, the objective of the Telephassa IIM project can be described as:
- training of library staff of the three universities in creating Interactive Instruction Modules intended for library instruction;
- the development of 15 modules intended for instruction on information gathering and information handling.

The plan is to develop 15 IIMs based on multimedia technology. This means that the information they convey takes the form of text, graphics, animations, simulation.

The following instruction modules are to be developed in the three universities:

Barcelona:
1. The Use of CD ROM.
2. Databases on Agricultural and Food Sciences.
3. Library Information and Resources available on Campus.
4. The Use of ABI Inform.
5. OPAC by networking in Europe.

Patras:
6. The Use of the Science Citation Index.
7. The Use of Silver Platter Information Retrieval System.
8. Extended version of The Use of the Science Citation Index.
9. The Use of Medline.
10. Library resources accessible by Internet.

Tilburg:
11. The Use of the Excerpta Informatica Online Database.
12. The Use of MS Windows/Integrated Desktop.
14. The use of the European Documentation Centre.
15. Online Contents.
Notice that most themes covered by those IIIs are CD-ROM-based bibliographical databases, the use of computer resources and the access to remote resources by means of the computer network.

5.5 PROJECT PLANNING

5.5.1 Hardware and Software
All library employees had to be trained how to set up an educational design of an instruction module. Such an educational design could be worked out, transformed into a computer-based interactive instruction module with the help of an authoring language. An authoring language is software that enables one to create multimedia presentations and multimedia, interactive instruction programs.

Acting on the advice given by Synar an Digital, we decided to work with the authoring language Authorware Professional for Windows. We opted for this authoring language because the language had to be used in a Windows environment and had to be user-friendly; no extended programming knowledge was to be required.

It was decided to purchase the following hardware and software:
- Hardware: PC 386, with HDD 200MB, FDD 1.44MB, tape drive 80MB, RAM 8MB
- color VGA, Videologic board. The Videologic board enables one to use it both as a VGA board to provide 256 colors and to integrate moving images and video.
- Software: MS DOS 5.0, MS Windows 3.1, Authorware Professional for Windows 1.0.

The project started with a beta version of APW. In the meanwhile update versions of APW are being produced. Recently the 2.0 version was purchased.

5.5.2 The courseware teams
In each of the three participating university libraries a courseware team was formed. A local project coordinator was responsible for the production of the IIIs. The progress of the total III project was controlled by a general project leader.

The interactive instruction modules had to be produced by these courseware teams. Each courseware team consisted of a local project coordinator, a subject matter expert, an instructional designer and a programmer, all to be recruited from the library staff.

The local project coordinator was the local organizer who maintained contact with the general project leader. He was responsible for the progress of the production of the IIIs. He also maintained contact with his own librarian. The latter was a member of the Steering Committee of the Telephasis project.

The subject matter expert was the specialist in the field of the III to be developed. Sometimes a courseware team was formed with two or three subject matter experts. In most cases these persons changed with every new III to be produced.
The instructional designer took care of the educational aspects involved in the systematic development of the IIM.
The programmer took care of the actual programming with Authorware Professional. He or she translated the educational design, the flowchart with the indicated interactions, into a running Authorware program, an IIM.

At the end of the project some 30 people of the library staff will have been involved in IIM development: Barcelona: 10, Patras: 8, Tilburg: 11.

5.5.3 Training of the courseware teams
The training plan for the courseware teams was divided into two parts: workshops and selfstudy learning by doing.
The first workshop to train the local courseware teams took place in August/September 1991 in Barcelona, Patras and Tilburg. During this first workshop the goals and the organisation of the IIM project was explained and agreements were made on how communication was best arranged. This organizational aspect of the IIM project was taken care of by Mr Peter van Tilburg, general project leader of the IIM project. The teams were trained in setting up an educational design of an instruction module. An introduction to a systematic approach to IIM-development was given by Mr Gerrit Grietjes from Digital. The teams were trained in the use of Authorware Professional for Windows by Mr Jan Schenck from Synar.

After this first workshop the three courseware teams knew the basic principles of setting up an educational design and they had become familiar with the first principles of the authoring language Authorware Professional for Windows.
As the teams first had to practise working with these new tools a certain period of time can be regarded as unproductive, judging by its deliverables. But, judging this first period of trial and error by the progress, they made in coming to grip with their new tools, it can be regarded as very productive and useful.

A second workshop for the benefit of the training of the courseware teams was organized in May 1992. The goals of this workshop were the exchange of experiences with respect to the development of the first IIMs and the upgrading of IIM development, supplementary training in educational design of IIMs. After that the teams were trained in an advanced use of APW.

This second workshop was very important. After the teams' first leap in the dark, they had become aware of some of the pitfalls. It was very important to exchange experiences and to find out how other people had solved the problems they had run into.
5.5.4 Time schedule of the IIM project

In the first phase of the project important decisions had to be made. Setting up a project plan and writing a project manual are the first steps in any successful project. In the project plan a systematic planning was described, which was needed to guarantee the necessary progress of the project.

Learning by doing, trial and error and self-study can be very effective. One of the disadvantages of this approach however, is that it takes up more time, and usually even more than was expected. This makes it necessary to draw up planned time frames and strict agreements for a project like this.

In the first phase the appropriate software and hardware configuration had to be chosen and budgetary agreements had to be made.

In the second phase (starting August/September 1991) the goals and the organisation of the IIM project were explained to the courseware teams. They were also trained in the systematic approach to IIM development and in the use of Authorware Professional for Windows.

The third phase (October 1991 - September 1993) was characterized by real practical training and during this period the 15 modules were produced.

The systematic approach to IIM development can be divided into six phases, mentioned below. An estimation of the time investment is given in percentages.

phase 0: Initial phase (5%)
Result: Project plan
This is the phase in which the current situation and the necessary additional instruction are defined. In addition the global objectives of the IIM are described.

phase 1: Product definition/Macro design phase (10%)
Result: Production plan
In this phase the goal of the IIM is described. The Production plan includes what the student should know or be able to do after completing the IIM. This is also the phase in which resources are collected that can be useful for the subject matter experts. Useful subject matter resources include textbooks, reference works and most important by the expertise of the library staff.
In this phase the instruction objectives (based on task analysis) and the characteristics of the target group are described.

phase 2: Micro design phase (35/45%)
Result: Paper design of IIM
In this phase the flowchart and the storyboard are produced. A flowchart is a series of diagrams describing the operations a computer performs. It includes information about the moment the computer will draw or animate pictures, what
happens when the student makes mistakes and when the lesson ends. In the flowchart all the interactions are defined.

**phase 3: Realisation phase (30/40%)**
**Result:** 0.x version
In this phase the programming of the IIM units takes place. This is the process of translating what has been described on paper in the preceding phases into a series of instructions understandable to the computer. This is a complete version of the IIM, tested and revised by the courseware teams.

**phase 4: Completion phase (5%)**
**Result:** 1.0 version
In this phase the IIM is evaluated. Now the courseware teams formulate recommendations for future changes and formalize the end products.

**phase 5: Implementation phase (5%)**
**Result:** Operational IIM
In this phase the IIM has to be made operational for the users. The operations to be executed in this phase mostly require computer engineers. The IIM software has to be implemented in the stand alone configurations or in the computer network. At the end of this phase the IIM is available to the users.

The figures represent the average percentage of time a courseware team needs to accomplish the various activities of the phases. In practice it can be stated that IIM development ratio is 1 : 500 or more.
The production of an IIM of, for instance, 20 minutes costs time 20 x 500 = 10000 minutes = 167 hours (minimum) of development time. This is a minimum calculation and it assumes the courseware team is well trained and experienced.
5.5.5 Communication

Clear communication between the local project coordinators and the general project leader was essential for the progress of the project. The local project coordinator reports to the general project leader concerning the activities of the local courseware team and possible problems. The local project coordinator also reports to the local librarian. The latter is responsible for the progress of the local courseware team.

All communication from the local project coordinator with Synar Productions and Digital goes through the general project leader.

The general project leader controls the progress of the project and reports to the project manager of the Telephassa project and to the Steering Committee, and consults the project manager concerning financial and organizational affairs.
The communication is formalized in the figure below.

Sometimes the distance between the three courseware teams hindered communication.
One should note that the three courseware teams speak different languages. All communication was in English, so none of the teams used their own native language.
Another factor that hindered communication was the fact that while using e-mail and file exchange, sometimes problems with the network infrastructure occurred due to an overburdened network. File-exchange of APW files did not succeed: we had to mail the files, which often cost some weeks. This delay was caused, in spite of unified Europe, by formal actions at the borders. Sometimes mail was stopped at the border because of customs obligations.

5.5.6 Production control: quality
To control the quality of the IIMs, an evaluation checklist was used, which was part of the project manual.
The key to a successful module is to test and revise it many times. Two kinds of test have been used: Lab test and Product evaluation.
A Lab test must detect all technical bugs and functional errors. It consists of three parts.
At IIM Structure testing, check whether:
* all menu and/or button selections take the user to the correct screen;
* the user guide describes all user activities which are necessary to use the IIM;
* the instructor guide describes all instructor activities which are useful to use the IIM.

At Unit testing, check:
* whether all interactions, all user control facilities and feedback facilities run as planned;
* the consistency of the housestyle;
* whether the presentation standards, language and grammar are correctly used.

At System testing:
* it is verified whether the run time version runs on different stand alone PCs and on a server with various PCs connected to it;
* it is checked whether the installation procedures are correctly described.

When an IIM is finished, it can be evaluated by different categories of persons: professionals on IIM development, members of other courseware teams, library staff and IIM users. The first three categories can use an extended checklist to evaluate the courseware. The last group, the IIM users, can use a brief checklist. This brief checklist is a part of the product evaluation. Product evaluation must detect all user problems, technical bugs, functional errors and errors in instructional assumptions. It should be done by people from outside the development team and preferably by representatives from the target group. Product evaluation can best be done by using the extended checklist.

Because the use of these evaluation procedures was also part of the training of the courseware teams, it was decided that both Synar and Digital, as specialists in the last period of the project, would upgrade the 15 modules. At the end of the project, 15 well running IIMs can be delivered.

During the project we did have some technical problems. The quality of the images was low because of problems with the Videologic board (only 16 colors available). The technical problem with the Videologic board was one of the reasons why no moving images and video have been used.

Another remark must be made concerning the 256 color images. Even if we had succeeded in using high quality 256 colors images and video on the developed configuration, we would have had problems because the end users configurations were equipped only with 16 color boards.
The first IIMs produced by the three libraries certainly were not advanced. Nevertheless, they served the purposes of instruction and covered their respective subjects sufficiently. As training products, the result is positive. As end products, the quality should be improved: better quality of the images, more and deeper interactivity. Especially the possibilities of simulating a database to improve the instruction are a challenge. Simulating databases for instructional purposes was a skill the courseware teams had still not mastered halfway through the project. But, almost at the end of the project, it can be stated that simulation of a database is also a skill that has been mastered by the courseware teams.

5.5.7 Housestyle
The housestyle was produced by Synar for the benefit of the courseware teams. It explains when and how to use the standardized layout, defines different screens and gives directions for using colors and letter fonts. In spite of cultural differences in the use of colors, we have to provide the users of the 15 IIMs with consistency in layout. But sometimes the use of the housestyle reduced creativity. At the supplementary workshop it was decided to continue using the housestyle, not as iron armour that reduces creativity, but as a useful tool that provides consistency. In the last phase of the project, Synar and Digital have produced a new housestyle.

5.6 CONCLUSIONS

From the beginning, the plan was that IIMs could in principle be developed by library staff having some experience with computers. The computing platform was the PC with MS Windows which offers substantial user friendliness in the form of a desktop environment. The combination of MS-Windows and the software package we used, Authorware Professional for Windows, enforced a graphic way of designing and implementing interactions and presentations. This means that the IIM developers need not have programming experience. This assumption still holds true, although probably programmers would do things easier and faster. Therefore cooperation between specialists from the library and the computer centre is an important condition for the production of additional IIMs in the future.

The great spreading of knowledge and expertise by the different courseware teams is very positive. The principle of learning by doing during the project was a good choice. The courseware teams have quickly gained expertise in the systematic approach to IIM development. Producing IIMs successfully while learning and training by trial and error requires a flexibility from the library staff which is working parttime in the courseware teams. Also required is the commitment of the library director: participation of
In building a module, complexity is not a guarantee for quality. One ought to choose the possibilities that best fit the necessities for making both the learner’s and the trainer’s objectives clear. The computer should be used in training when it adds to the training. We agree with the minimalist philosophy: ‘Do as little as possible, in a medium as simple as possible to achieve the objectives.’

It has been a very positive experience working in such a transnational project. This project has shown that some differences between the three countries can be removed by working together with an open mind and by working in a systematic way. It is clear that much has to be done to facilitate European communication. It is also clear that it is important not to remove cultural differences between the three countries. It is worthwhile to maintain and even to strengthen the cultural differences. Recognition of cultural diversity will benefit European integration.