ONE YEAR EXPERIENCE IN TELETEACHING
AND CBT (COMPUTER BASED TRAINING):

RESULTS, ACHIEVEMENTS AND DRAWBACKS

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Contents:

1. General Remarks

The FIM (Research Institute for Microprocessor-Technology) offers
two courses on data processing and computer-science in the
Austrian viewdata-system (called "BTX"). We regard BTX as very
suitable for teleteaching because of the following characteris-
tics, in particular:

a) Electronic-Mailing (which is the minimum requirement of a
   teleteaching-system) covers:

   -- Asynchronity: The receiver of a message does not have to
      be available at the moment of sending.

   -- Two way information-flow.

b) Viewdata offers the means to store and service the teachware
   centrally.

The Courses offered via BTX are the following:

1.1 BASIC-Programming Course (since October 1st, 1985)

This course consists of 7 lessons, 6 exercise-blocks and a
communications-program.

It covers a general introduction to programming and is designed
for beginners. The question "What is a program?" is answered by
showing up analogies from daily life, e.g. a (cooking) recipe,
the several activities in building a house, and so on.

The emphasis however is on the explanation of the most important
BASIC-commands. Simple programming-problems are solved.

The communications-module serves for the build-up of a "class-
community" (see "2. Organization"), which is an essential part of
how the course is organized and run.

It is worthwhile to mention that the lessons, exercises and the
communications-module are programmed in BASIC. This was done
because at the very beginning of BTX in Austria BASIC was the
only available programming language.

1.2 TOP-JOB -
    A Computer-Game to Learn the Basic Concepts of Data
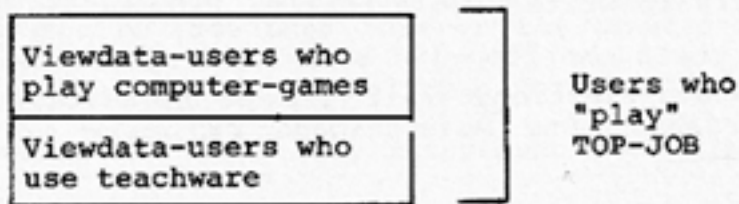   Processing

In this course the player can "work" in three hierarchical levels
according to his/her knowledge: GREENHORN, JUNIOR or MASTER.
During the game the player can "collect" bonus scores for expert-
and general-knowledge based upon correct answers to corresponding
questions.

As far as the basic knowledge on dataprocessing is concerned,
various lessons are offered and it is assumed that the player,
i.e. student, works them through carefully. All questions put by
TOP-JOB are based on knowledge contained in the lessons.

The goal of the game is to maximize the product of expert- and
general-knowledge-points. This guarantees that there is an
optimal balance between expert and general knowledge.

On the MASTER-Level one can collect the most points, but it is difficult to stay on this level throughout the whole game, because there are many expert-questions. If two expert-questions cannot be answered at this level, as a penalty the player is moved to the level below. On the other hand the player is not forced to start with the lowest level if he already has enough expert-knowlegde to "survive" a higher-level or if he thinks he has. If the player overestimates his knowledge, the lessons on the lower levels have to be studied in order to ascend again. So the regular way is to "work one's way up" from the GREENHORN to the MASTER-level.

The purpose of connecting computer-games with teachware is to enlarge the group of potential users:

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┌─────────────────────┐ ┐
│ Viewdata-users who  │ │
│ play computer-games │ │     Users who
├─────────────────────┤ ├     "play"
│ Viewdata-users who  │ │     TOP-JOB
│ use teachware       │ │
└─────────────────────┘ ┘
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1.3 Course "Operating System Concepts"

This course was developed within the scope of the COSTOC-project in cooperation with the IIG (Institutes for Information-processing Graz) using the AUTOOL-authoring-system. The course consists of 12 lessons each comprising up to fifty frames.

2. Organisation

2.1 BASIC-Course

a) The communications-module:

This module enables the simulation of a class-community: interested viewdata-users enrol by the means of a dedicated answer-page, (which also is used to charge the registration-fee (AUS 20.000)). Then the student is added to the table of current-students. This list itself is stored in a viewdata-page. It is ensured by the communications program that only authorized persons (=members of this list) can use the communications - module. Consequently every student is entitled to find out who else is taking the same course currently for communication purposes.

The communications-module is used to send messages from the students to the teacher and viceversa. It also may be used for mailing among the students themselves. These messages may be questions, solved exercise-problems or just "normal" mail.

b) Exercises, additional information:

After the admission of a viewdata-user to the course, additional information material is sent to the student by postal mail.
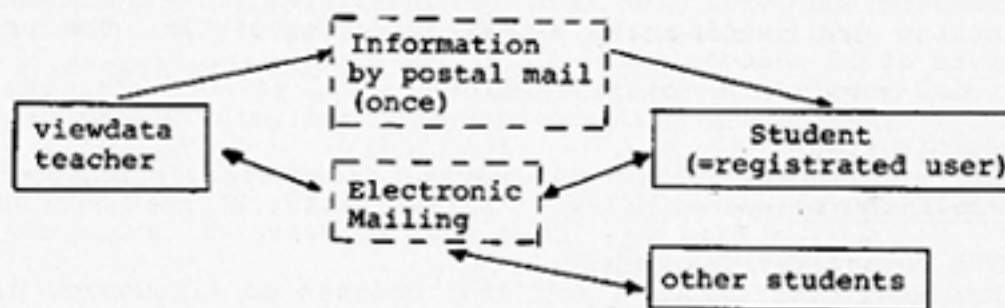
This information consists of:

- Additional exercises whose solutions are to be sent to the teacher using the communications-module.

- A brief description of the BASIC-program-development-system which enables the user to test his exercise programs without assistance.

  The postal service to convey these textbooks was given preference over electronic mailing for the following reasons:

- Only a few viewdata-users have a printer connected to their decoder and it would be an unreasonable demand to force users to write down extensive information from the screen.

- The viewdata-electronic-mail concept is suitable for short messages. One message-page can take up to 500 characters.

- The transmission of graphics (e.g. flow-charts) within the electronic mailing system is not yet possible.

c) Diagram of the information flow:

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          ┌ ─ ─ ─ ─ ─ ─ ─ ┐
          │ Information    │
          │ by postal mail │
          │ (once)         │
          └ ─ ─ ─ ─ ─ ─ ─ ┘
┌──────────┐                    ┌──────────────────┐
│ viewdata │                    │ Student          │
│ teacher  │                    │ (=registered user)│
└──────────┘                    └──────────────────┘
          ┌ ─ ─ ─ ─ ─ ─ ┐
          │ Electronic   │
          │ Mailing      │
          └ ─ ─ ─ ─ ─ ─ ┘
                        ┌──────────────────┐
                        │ other students   │
                        └──────────────────┘
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2.2 TOP-JOB

A modification of TOP-JOB to a course with the same structure as the BASIC-course can be made without problems. Because of lack of free capacity at the FIM, this modification hasn't been undertaken yet.

It is worthwhile mentioning that the TOP-JOB software also is used for seminars we present outside the university. In such cases that part of data which represents what we have called "general knowledge" is replaced by other information according to the wishes or needs of the audience or the contractor.

3. Statistics (concerning the BASIC-course)

a) Number of course members registered during the period from 1. 10. 85 to 31. 7. 86 (10 months): 70

b) "Drop-Out" Statistics:
The course-members can be divided into two groups:
Group 1: (36 students) Users, who are not interested in the course but in its organisation (form of the information-material, graphic viewdata-pages,...).

Group 2: (34 students): Users, who are interested in learning.

The members of group 1 only very seldom used the communications-module to send questions or solved exercise-problems to the teacher. These course-members therefore should not be counted as "drop-outs".

The number of "drop-outs" in the second group is very small. Most of these students work through the whole course completely. Sometimes however the more difficult or rather cumbersome problems are skipped (see also: "4.1 Consequences Resulting from the Established Form of Organisation").

c) Knowledge of the really interested course-members:

The course-members are not asked about their preknowledge, but many of them make some remarks about their know-how when sending their solutions of the exercise-problems. Generally subscribers of the course have no preknowledge in data-processing or BASIC-programming. This is in accordance to the potential profile the course has been designed for.

d) Age of the course-members: from 10 years up. (= wide range!)

e) Statements about the organisation:

72 % of the coursemembers are content with the organisation of the course (this includes the sending of exercises and information material by postal mail and the possibilities of the communications module).

f) Frequency of calls for the lessons and exercises of the BASIC-course:

viewdata page   number of calls within 10 months

Lesson 1	118
Lesson 2	102
Lesson 3	98
Lesson 4	127*)
Lesson 5	86
Lesson 6	77
Lesson 7	94

*) Explanation for this statistical anomaly:
In this lesson the most important BASIC-commands are featured.

These statistics are interesting, because the BASIC-lessons can be called not only by the course-members, but by all viewdata users. We also remind you that each lesson can be downloaded to the decoder.

4. Conclusions and Experience with the Design and Development of Teachware

4.1 Consequences Resulting from the Established Form of Organization

-- Drawbacks of this "loose" course-organisation:
    Because of lack of deadlines it is very difficult for the course-members to solve their exercise problems conse--cutively.Particularly large-scale-exercises are skipped.

-- Advantage of this "loose" course-organisation:
    A high grade of flexibility is guaranteed which in particular is essential for working people.

4.2 Less efficiency of the Course-Organisation because of Technical Restrictions

The maximum baud-rate of 1200 in the Austrian viewdata-system causes a load time of 2 minutes for the communications-module. Therefore a student waits with his questions until he has enough messages to use the communications-module efficiently. This results in a loss of information: often the answer to such a question is essential for the understanding of the following lessons.

4.3 Comparision of Developing Teachware by Programming and by Using an Authoring-System

-- Using a programming language:

    Directly programmed subject-matter can bring very good results for the students. For all those people who have to design, develop or service teachware, the limits of this kind of teachware-development become evident: It is the most expensive way to develop teachware because it is very inflexible when being forced to update the produced teachware. Nevertheless this method has its advantages in certain fields, e.g. simulation, within which the student can set parameters and watch the resulting effects; and testing of sorting algorithms.

    When the FIM-BASIC-course was developed, no authoring-system was available, so it was programmed in BASIC.

    TOP-JOB was programmed in BASIC, too, because the game-environment could only be generated by using a programming language.

-- CBT (= Computer Based Training) with authoring-systems:

    These systems enable the author to develop teachware without any programming knowledge. Without doubt, all authoring-systems have one advantage in common: Because the author is not forced to learn how to write a program in a high-level-language, the group of authors is extended to those experts, who, from the methodical and didactical viewpoint, are best qualified to develop teachware.

4.4 Characteristics for High-Quality Teachware

-- There is only a minimum of full-text-pages.

-- Facts can be better and faster understood by the means of an alternating build-up of text- and graphic components. In books, these facts can only be shown by static diagrams.

-- Facts, which can be explained with moving graphics, can fully use the advantages of CBT.

   Examples for such fields of learning:

   - Algorithms applied on data-structures, which can be visually represented.

   - Even slow-motion, computer-animated films can bring new understandings of (certain) phenomena.

   Example from physics:

   Emission of electromagnetic waves of charges in motion. In books often diagrams are shown, which cover only a small part of this phenomenon.

-- The quality of teachware declines if it is not possible to present useful graphics or symbolic visualities.

5. Summary

Computer Based Training (=CBT) will become a major instrument in our "retraining society". Without CBT it will not be possible to fulfil the demands and requirements of training, education and further education.

The development-costs of teachware are the motor or the brake in using CBT.

The "programmed classes" in the late 60s failed by the technical limits of data-processing.

CBT of the 80s should not fail by commercial limits set to the development costs of teachware of nowadays.

The positive feedback from the two courses offered by the FIM (BASIC-programming-course,   TOP-JOB-game/course)   furnishes evidence that a sensibly-conceived system can be applied efficiently, particularly in the field of adult education.

remote education and informatics: teleteaching

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