ПОД-СЕКЦИЯ 3. Инновации в области образования.

PROBLEMS AND SOLUTIONS FOR USING COMPUTER (NETWORKS) FOR EDUCATION

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The idea to use computers for teaching and learning is over 50 years old. Numerous attempts to use computers for knowledge dissemination under a variety of names have failed in many cases, and have become successful in others. The essence of this paper can be summarized in two sentences. One, in some niches, applications of e-Learning technology tend to be successful. Second, attempts to fully eliminate humans from the educational process are bound to fail, yet if a large number of aspects is handled well, the role of teachers can indeed be much reduced.

A number of features that seemed essential in earlier e-Learning systems turn out to be superfluous. New e-Learning systems have to concentrate on quality of content, not complex technology and E-Learning the right way helps learners, teachers and institutions.

There is no doubt that Programmed Logic for Automated Teaching Operations (PLATO) was the first e-Learning system using computers, and for that time quite impressive, as it was used in an early timesharing system more than 50 years ago. It originated in the 1960s at the Urbana campus of the University of Illinois. Professor Don Bitzer became interested in using computers for teaching. With some colleagues he founded the Computer-based Education Research Laboratory. Bitzer collaborated with a few engineers to design the PLATO hardware. To write the software, he collected a staff of creative eccentrics. Together they built a system that was at least a decade ahead of its time in many ways.

It is almost impossible to exactly define what PLATO was and how it developed, since it went through an endless process of improvements over the years. But it is worth noting how powerful the system was, and how many of the good ideas in it around 1970 were only rediscovered decades later! Basically, PLATO around 1970 was still based on black and white terminals able to display mainly written text. Terminals were connected to a central computer presenting information to users whose identity was known and whose behaviour (every key pressing) was carefully monitored. Thus, it was possible to find out where the material presented was too difficult for students at a certain stage in their studies, how long they needed to go through a section. Further, multiple choice questions allowed to understand the level of

understanding. This allowed to adjust learning material created with the authoring system called TUTOR. Thus, it was recognized at this early stage that unobtrusively obtained student feedback is important to make it possible to modify material for individuals or groups of individuals and that continuing testing of the level of understanding to provide alternatives and to provide encouraging feedback are crucial issues.[1]

It is truly amazing to see that important issues such as "student feedback is essential" have been ignored in many systems developed later, and even today often not enough feedback is collected without bothering students and often with much too little evaluation of the feedback.

In the years up to about 2000 (when the internet started to be widely available) in North America three main streams are observable:

Plato's development continued and its deployment spread, including offering terminals with graphics and particularly important messaging, between users online at the same time or allowing communication of students at least asynchronously with instructors.

Systems to create sophisticated and animated graphics as part of the "courseware" were developed. One of the many such products was "Macromedia Director", a product to develop stand-alone (typically CD based) learning material. However, note that all those many standalone systems did not allow to collect specific feedback, except by using tedious questionnaires!

The emergence of hypertext/hypermedia systems used in timesharing systems typically in university settings provided the possibility to work highly interactively with linked material, including text, animations, graphics, even sound and video. All this was based on Ted Nelson's vision to develop a model for creating and using linked content he called "hypertext" and "hypermedia". Ted Nelson began implementation of a hypertext system named Project Xanadu in about 1960. However, his first and incomplete public release was finished much later, in 1998. In August 1987, Apple Computer released HyperCard, a powerful alternative to Macromedia Director, yet again with no networking facilities to speak of. Yet its impact led to broad interest in and enthusiasm for hypertext and new media. Yet all this did not provide a serious impact except as instrument to argue for more funding. This started to change a bit with the advent of the internet, particular the web.[3]

The development in Europe from the late seventies to the turn of the century was somewhat different. In 1969, a British Engineer Sam Fedida proposed to equip TVs (everyone had one by that time, most with a remote control pad that could be used as simple input device) with a bit of additional electronics, called "decoder". This would be connect via phone-lines to a network of servers to allow users to retrieve information, to order anything offered and to write simple messages (akin to today's SMS). The first nationwide systems on that basis, called officially videotex, were introduced in the seventies first

in Great Britain and then successively in most European countries. In Austria it was responsible to recommend whether to also take this approach. So an alternative was recommended: to use the same basic idea, but add enough electronics in the decoder to turn it into a small programmable colour-graphic computer and equip it with a full keyboard. Thus, the MUPID, a colour-graphic networkable, programmable device was born, with all programs and data stored in network of videotex servers (today it would be called "in the cloud"). Due to the fact that the network of servers was run by the nations' telecom authorities messaging without spam was easy, senders of messages and information providers could be identified by the users, and micropayments were possible, since the amounts were just added to the monthly phone bill.

Thus, in addition to stand-alone "e-Learning Computer Labs" (at this point in time under abbreviations like computer assisted learning or instruction, computer-based teaching or training and others) videotex and MUPID offered networked variants. It allowed the use of colour and of different types of animation.[7]

The typical IBM PC was getting more accepted, so SW and protocols had to be adapted to PCs and to whatever networks were available, reducing the possibility to use full colour and powerful communication facilities, including central supervision of learners, feedback between learners and courseware supervisors and between learners. It is possible to argue that because of this, first attempts of truly networked e-Learning with all kinds of communication facilities were delayed by almost 20 years until the internet was starting to become accepted and inexpensive enough to allow its use on a large scale.

Nevertheless, one rather unique commercial e-Learning undertaking was started around 1986 as joint work with CDC (using an authoring tool similar to PLATOs Tutor, mainly developed by the late John Garrat) called Computer Supported Teaching of Computer Science (COSTOC) making use of colour and animation as mentioned above. At some stage over 300 one-hour lectures were available and where used in a number of labs in Europe and two in the USA.[5, 6]

However, with the exception of Austria and Germany the COSTOC lessons could not be downloaded from a nationwide network, but at best from some university network, reducing the important feedback to courseware developers. Communication between students and tutors usually required an extra component tailored to the local circumstances and interrupting the learning stream. Hence, most efforts in e-Learning between 1985 and well past 2000 were based on stand-alone or only very locally networked groups of PCs or workstations. That is, they were limited to local e-Learning labs, or even just to e-Learning on an isolated machine with material available via some external storage device ignoring the lessons made already wit PLATO.

So there are many ways to teach and to learn, with and without computers. The looking back at successful and not so successful attempts has at least shown one aspect clearly: one large homogenous sys-

tem for e-Learning does not make sense. Never put all eggs in one basket.

The real challenge for innovation in e-Learning is to find the correct mix of techniques, with the mix depending much on application areas, students and scenarios.

A few short video clips followed by some test question may be nice, but then maybe just "presentation type material", or if possible material presented by a human teacher who, for a change, is not sticking to PPTs, but captures attention by the "missionary spirit" that fascinates the learners is one of the many, many ways to go.

Main credo: do not be boring, switch media, use competitiveness and use technology when suitable or when good as surprise. Above all: the quality of the teacher who is lecturing or who has prepared material is most important. [2, 4]

There are two statements that are blatantly wrong:

One can make learning arbitrarily easy and entertaining. No. To get good at some sportive activity you have to work and let your body sweat a bit; to be good at some cognitive activity you have to work a and let your brain sweat a bit. That does not mean that you should ban gaming or entertainment from e-Learning, but you have to use the right amount.

The (Western) world has invested hundreds of billions of dollars on computers for e-Learning, often driven by commercial interests. Let us continue to do so. No. It may well be that the same amount used for training more and good teachers would have been more effective. That does not mean that we should not (indeed we should) use computers in all educational institutions, but we have to use the right amount.

Here then is the enormous challenge we are facing: let us try to describe very large number of circumstances where learning is essential; and the let us find the right mix of approaches for each situation. To put it bluntly: many of us have believed there will be an ideal solution for e-Learning. Now we know: we have to find the ideal solution for e-Learning depending on a staggering variety of scenarios and possibilities.

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