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TELESOFTWARE FOR BEGINNERS

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ABSTRACT

This article serves as an introduction to the Telesoftware and Education Project being run at Brighton Polytechnic. It describes the recent history of telesoftware as an idea, and its development as a combination of television and micro-computer engineering. The article then moves to the research project itself, outlining the project's organization, intentions and educational aspects. The author provides examples of how telesoftware may be of use in classrooms and speculates on the potential of the telesoftware idea. Finally, the article mentions some present difficulties for micro-electronics in education and the move towards a more coordinated approach.

INTRODUCTION

Whatever one's point of view, there can be no doubting the influence of TV - it has passed into the language and culture of our society on many fronts. But television itself also exists on several levels: it is an entertainment, it is an informer, it is a set of social and political issues for those involved in making television; and it is also work - creative, interesting, dull and demanding in turn.

Television is also a technology, and it is technology which has given rise to the subject of this article - telesoftware. Literally, telesoftware means 'software at a distance' and, as the name suggests, it is a combination of broadcast and computer engineering.

Technology does not exist in a vacuum, though; it arises from a social background. This first article acknowledges the existence of much wider issues but is centrally concerned with introducing telesoftware - its recent history, its capabilities and its place in the TELESOFTWARE AND EDUCATION PROJECT being run by the BBC, ITV and Brighton Polytechnic.

The chief innovation of telesoftware is its provision of an *interactive* capacity - the 'intelligent television'. It is this feature which is of particular interest to education and which forms the core of the research project; but first an explanation of telesoftware itself.

THE BACKGROUND TO TELESOFTWARE

In the later 1970s, television was joined by teletext and the TV became the source of a considerable range of topical and up-to-date information. Teletext broadcasting introduced a degree of choice for its viewers. From the hundreds of numbered pages that CEEFAX, ORBIT and ORACLE transmit, any single page can be selected and held on the screen for as long as required. Access to this information is available at any time via a simple control method which incorporates the TV's on/off switch into a remote control unit capable of choosing numbers as well. For the viewer, knowledge of the sophisticated encoding, decoding and control technology which is built into the system is no more a requirement for using teletext than it is for using television. News headlines, financial information, horoscopes and recipes accompany film reviews, engineering information (and, on ORACLE, advertisements) - all available when required from the wide range of broadcast information.

Elsewhere during the 1970s micro-techniques in electronic engineering wrought changes in the capabilities of computers. The large-scale calculators that had constituted computer science in the early days gave way to micro-circuitry. It became possible to incorporate into small units sophisticated symbol-handling routines. The basis of these routines were special languages, which enabled interaction to occur between user and machine on a friendly and useful level. The mainframe 'number cruncher' rapidly reduced in size, giving rise to the portable micro-computer; and in a parallel setting word and information processing equipment developed from the same electronic source. The silicon chip, heart of this change, quickly passed into folklore.

What the chip introduced was a convenient method for adding 'intelligence' to machines. Wrist watches became able to remember the time while acting as a lap timer; typewriters could remember a letter and reproduce it on instruction; computer memories could be made smaller, enabling them to remember more routines - thus adding more intelligence without a corresponding increase in size.

Contemporary intelligent machines are capable of many tasks. Each task requires a set of instructions but writing these instructions (software) demands skilled authorship and a simple method of storing, transporting and loading them into the machine. Tape cassettes and discs have become standard methods of storing software, and machines are programmed to read and act on the instructions they contain. The proliferation of small micro-computers has caused poblems with this method of instruction. Recording thousands of copies of a particular software item, ensuring their accuracy and robustness, and making them small enough to store easily and cheap to obtain is a daunting task. Each of the many different types of machines which are manufactured requires its own instructions in its own language (or dialect) in order to cope with its own operating idiosyncrasies. Ensuring that software is available for the thousands of micro-computers that have come into use is a major problem for computer manufacturers. The initial research impetus into hardware design has now turned some of its attention to methods of disseminating software.

If a means could be found to introduce instructions directly into the machine's memory, the intelligent machines could become freed from the expensive and time-consuming problems of distributing pre-recorded software.

TELESOFTWARE

The link between teletext and micro-computers is their use of text. CEEFAX and ORACLE information is written in English, and computer instructions use English alphabetical characters in a regular coded form. If teletext was used to broadcast pages of computer language rather than standard English, these instructions could be received and recorded directly at site and would not have to rely on intermediate movements of cassettes or discs (given that equipment could be designed to capture and use such signals).

W.G. Overington is credited with the initial idea of combining the cathode ray tube, the semi-conductor memory, the key pad input and digital interface (a standard remote control TV) with

enough intelligence to use it as a micro-computer. Overington's first proposals in 1976 incorporated a high level language for broadcasting telesoftware, for transmission standards, and he described a network of geostationary satellites broadcasting to Third World countries. The general concept of telesoftware was taken up by the television companies, and in 1979 ITCA published SOFTWARE FOR TELESOFTWARE. This set out to consider the language, broadcasting and equipment design issues involved in bringing telesoftware into the range of transmitted television services.

Of course, other methods of introducing software directly into computer memory are possible. The Post Office is using PRESTEL to initiate a system with telephone lines replacing broadcasting signals. Connecting slave terminals to a central computer produces a situation with similar potential.

The television companies have continued the development of broadcast telesoftware using the experience that their teletext services have provided. Although other countries have such services, UK teletext is an established system with a proven track record, and CEEFAX and ORACLE have gained a wealth of technical knowledge. The stage has now been reached where telesoftware has been defined enough to enable the construction of telesoftware receivers containing a decoder capable of capturing broadcast software, a micro-cassette system for recording and storing it, and an interpreter capable of acting on the instructions.

Standard television/teletext receivers already contain seventy-five per cent of the circuitry necessary for constructing a micro-computer. They use a television screen which can act as a display monitor, and provide remote control facilities via a keypad and alpha-numeric input. These are the most expensive items on any micro-computer budget while the intelligence - the silicon chip - is relatively cheap. By adding intelligence the telesoftware set is capable of receiving teletext and television, and also of acting as a 'stand alone' micro-computer. But the integrated design of the equipment also enables it to provide a range of information processing skills alongside these capabilities.

Prototype equipment is currently being built along these lines and both the manufacturers and broadcasters consider telesoftware to form the next development stage for television technology. Several innovations are built into the telesoftware concept. Perhaps the key innovation for the actual user is that of interaction, and it is this interactive capacity that suggests telesoftware could be extremely useful in education.

TELESOFTWARE AND EDUCATION

The integrated tele-vision/text/software design - the intelligent television - offers to become a more active participant in learning. Just exactly what the uses of telesoftware in educational settings could be are being investigated by the TELESOFTWARE AND EDUCATION PROJECT at Brighton Polytechnic. The research is a collaboration between the BBC, ITV and the Polytechnic, and follows on the TELETEXT IN EDUCATION research that the same bodies conducted in 1978/79. The project is initially a one-year study and has attracted widespread support. Funds have been provided by the Department of Industry; the Department of Education and Science; the Scottish Education Department; the Council for Educational Technology and the counterpart Scottish CET; and the Schools Council, as well as by the television companies. Mullard, as manufacturers of prototype telesoftware equipment, are supplying the project with ten sets to be used in trials with secondary schools during the Spring Term of 1981.

The research project aims to investigate telesoftware in three broad areas: as an interactive teaching and learning medium, as a means of providing schools with educational software, and as a means of developing educational broadcasting.

Telesoftware extends the possibilities of micro-electronic technology for assisting in learning. The use of computers and associated equipment in education is growing, but more widespread use is hindered by some difficulties that telesoftware could help overcome. Currently, using a micro-computer to assist in teaching effectively demands a good knowledge of computer programming. Finding a suitable programme, transferring it to a computer's memory and then checking its reliability are often daunting tasks. Telesoftware programme standards are currently being discussed by all the interested parties and this should result in a common standard for software design in both educational and other applications. Commercial software houses have sometimes been reluctant to enter the education market because of the high level of expertise necessary and the low volume of likely sales. Educational telesoftware would be part of the larger information services provided by the television companies, and would benefit from the educational and technical expertise available.

As yet, telesoftware is in its infancy, but speculation on how telesoftware could be used in schools has provided a number of potential uses. Edcational TV broadcasts could be accompanied by telesoftware as well as by written notes. These programmes could be designed to extend a broadcast's information, or to simulate events described in the programme, or to provide follow-up exercises, or to build up over a series of broadcasts to provide a revision course.

Software could make use of the constant up-dating that occurs in teletext information. For example, an economics simulation which involves the stock market could be written always to include that day's figures from the relevant teletext pages provided as part of the normal teletext service. It would only require the telesoftware receiver to interrogate what is already there.

With a colour display unit available and a sophisticated computer interpreter, a telesoftware receiver can generate both teletext and medium resolution graphics. Pages of text can be created on the screen and stored for later playback. Such pages could eventually be mixed with existing teletext pages in a sequence which amounted to an electronic blackboard. Sequencing such pages could provide illustrations for a lesson. Text could be displayed and edited at will, using colour or size for emphasis. The colour graphics which are available on a telesoftware set are available to the user via the keyboard. It is possible to create accurate diagrams and to write programmes which introduce a degree of 'movement' into charts and statistical representations.

Because of teletext's status as an information provider, telesoftware programmes could be developed for other educational applications. Already the careers service and some social studies teachers have expressed interest in using telesoftware to provide up-to-date local services.

Television is already extensively used in education, and many schools use video-recording techniques. TV/VCR equipment has given rise to the concept of TV as a resource with libraries of tapes being commonly available. A telesoftware set would extend this resource basis, CEEFAX and ORACLE giving immediate access to a wide range of information. Eventually, software should be available to interrogate these information services, and any others that may become available, such as PRESTEL, which uses the TV as a terminal.

For example, one of the difficulties with a micro-computer is its small memory for data. Storing the data on teletext and interrogating it on site could broaden the range of data searching applications. Suitably connected, PRESTEL would also be available to be interrogated by the telesoftware receiver.

For education, telesoftware should satisfy the demand for reasonably priced equipment capable of operating across a range of subjects and in a variety of classroom conditions. Unlike

outside broadcasting hours, while, as a micro-computer, they would be compatible with a range of peripheral equipment. A telesoftware set could form the basis of a school's first entry into the use of computers, or it may slot into already developed systems.

Actual educational uses of telesoftware are, in the first instance, concentrated on those schools which are participating in the TELESOFTWARE AND EDUCATION PROJECT. Seven Local Education Authorities in England and Scotland are cooperating with this research - East Sussex, Hertfordshire, ILEA, Lothian, Shropshire, Strathclyde and West Midlands. A telesoftware set will be placed in secondary schools in each authority's area. In each of these schools, a teacher with some knowledge of computing techniques will be responsible for conducting day-to-day use of the receivers, encouraging as many other teachers as possible to experiment with the telesoftware sets.

Project staff are developing software for the first transmissions, using the dialect of BASIC built into the prototype sets. Much of this is being developed from existing educational material. This should both ensure an initial relevance to educational settings, and also provide a range of applications in a short time. Completely new software demands large amounts of development time - time not currently available to the project.

The available software obviously reflects the current bias of computer use towards the sciences, but one of the project's express aims is to investigate the potential for machine use in other curriculum areas. Telesoftware clearly offers much in this direction. One of the programmes under development is to enable users to write and save pages of teletext under instruction from the set itself. The user will still have to know how to place a cassette into the machine and how to load a programme into memory, but these tasks are literally child's play compared with the difficulties of originating the whole process. Such a text/diagram writing programme could be very useful to teachers of any subject.

CONCLUSION

The use of technological aids in education has always been fragmented. Some LEAs, some schools and some teachers have originated schemes which have proved succesful and useful to their pupils. Apart from a general tendency towards more use of technological assistance, little pattern of development has emerged. Complex relations of economics, educational theory, personal interest and luck appear to have governed the entrance of micro-electronic technology into education. Some areas, such as Hertfordshire and the Midland Consortium, have developed wide ranging supportive structures at LEA level. Other areas are still debating the issue.

The appearance of Micro-electronic Development Programmes in the United Kingdom shows the movement that is now occurring towards a coordinated approach in educational micro-electronics. Whatever the outcome of these programmes they should provide impetus for the important research that remains to be done. We hope that the TELESOFTWARE AND EDUCATION PROJECT will contribute to the debate over the future relationship between education and micro-electronic engineering, a relationship that is crucial to the future of ourselves.

REVIEWS

HERMAN, S. (1980)

The Broadcasting of Low Gauge Video

London: Centre for Advanced TV Studies,* pp 16, £1.50 A4 pb.

This is undoubtedly a carefully researched and helpful report. The broadcasting institutions' quality control requirements are well-documented, whilst the section on Union practice must be of interest to a much wider readership than prospective 'Independent Producers'.

I would simply question one relatively small recommendation. This suggests that, in order to minimize the risk of technical veto, monochrome material be produced rather than colour. With the advent of so-called 'new technology', and bearing in mind the desire of the broadcasters to transmit as high a proportion of colour as possible (to prevent an outcry from colour licence holders), sights should perhaps be set higher.

D.M. Lee, Independent Broadcasting Authority (Manchester)

FIST, S., FOSTER, P., FURLEY, D., & GOODALL, P.. (1979)

Basic Video

London: Centre for Advanced TV Studies,* pp 44, £1.80 A4 pb.

This Australian Film and TV School publication really is, as the title implies, video for beginners. It may also be slightly out-dated, in so far as it deals exclusively with Portapak. Within this remit, however, it is comprehensive, covering in some detail operational and production procedures from hand-holding the camera to scriptwriting, editing and technical trouble-shooting.

Here and there one is reminded of Antipodean origins - 'making a watchable tape requires a cetain amount of planning' and '*even* a documentary has to be particularly professional and interesting if it's to keep the audience involved for more than 15 minutes'.

But my favourite section is 'Video Enemies' where the user is exhorted not to drop biscuit crumbs into his VTR and to beware of 'uninformed people'. Personally I always do.

D.M. Lee, IBA (Manchester)

* available from: Centre for Advanced TV Studies
42 Theobald's Road, London WC1X 8NW