TEACHING TEACHERS ABOUT COMPUTERS
- A COURSE DESCRIPTION -

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When people express fear or mistrust of computers, it is not always a result of their ignorance of them. Some of these fears are legitimate, and it is up to everyone working in the field not only to try to dispel the ignorance about computers but also to listen to these criticisms with an open mind, for people less involved than we may be able to see things that our disciplines blind us from seeing.

The dangers inherent in some computer uses will not be averted by ignoring them and hoping they'll go away; nor will computers themselves go away. I believe computers will continue to expand their areas of application, and so am forced to the conclusion that school curricula will have to deal with them. (Also, even ten years after my last foray deep into software, I am still sufficiently fond of messing around with computers to believe that for many schoolkids it will be a source of enjoyment!) And if computer curricula are to be introduced into the schools, teacher training institutions must prepare teachers to teach about computers.

I teach a B.Ed. course at La Trobe University, "INTRODUCTION TO COMPUTER USES IN EDUCATION". The course runs for nine weeks, about three hours per week. It's put on in the evenings, as most B.Ed. students are part-time. The students are mostly secondary teachers, with a sprinkling of primary or tertiary teachers, administrators, librarians and counsellors working in an educational environment. There are about 50 students taking the course this year (1975), in 3 groups.

So far, it has been mainly maths and science teachers who have taught anything about computers in the schools (particularly in South Australia, Western Australia and Victoria, less so in Tasmania). This is largely because they are the only teachers who have had much contact with computers in their own degree work. They then pass on the same kinds of skills to their students. This is generally inadequate - not just because of the rapid obsolescence of skills or even concepts of what is possible, but because the continued identification of computers with maths and science engendered by their association in the schools gives rise to another generation of mystified non-numerate kids.

Computers are not only nor even mainly number-crunchers , and it is up to teacher education institutions to help teachers of all subjects learn this, and to introduce non-mathematically minded teachers to what computers are doing in their own areas and in the world in general. The question is, how best to go about doing this?

First, I think a common factor amongst most of the potentially or actually harmful computer applications is that fascination with technique has blinded users to the meaning of what is being done - the electronic battlefield in Vietnam is the prime example. It's important to avoid this trap when teaching about computers. I don't think it's the job of schools to teach everyone to program, and it's not my job as a teacher educator to offer the straight technical skills that are undoubtedly part of an Information Science course. It is far more important to teach about what computers can and cannot do in a context where the meaning of what is to be done is constantly referred to.

The context I choose is education itself. "Education" is of course rather a broad term; computer uses in education are many and varied. Some of these applications are similar enough to those in other areas that some very general principles of computer use will automatically be raised. Others are quite unique,and raise specific questions which teachers will have to deal with in their own professional lives , so that the study of computers can be seen to be very relevant to being a teacher. By teaching about computers in this context instead of more abstractly or generally, and by drawing attention constantly to the educational implications of computer uses, I hope that the teachers who are my students will in turn pass on to their own students the habit of attending to the social implications of what is done by computers.

What topics are covered in this course? La Trobe's School of Education is organized on an interdisciplinary basis. At B.Ed. level, we don't have core courses in Sociology, Psychology, History or Philosophy of Education, but courses are mostly organized according to the Centres. (There are five Centres, oriented toward particular problem areas - Centres for the Study of Comparative Education, Innovation in Education, Educational Communication and the Media , Urban Education and of Teaching and Human Interaction.) Many of the courses are along the lines of staff members' current research interests. As a result of this , and because some B.Ed. students plan to go on to Higher Degrees, there is quite a demand for skills in using the computer as a tool in empirical research. We spend nearly half of the course on learning to use SPSS(STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES), which is the package we use on our DECsystem-10 for most of our standard research processing needs. The students may collect their own data or work on live research data relevant to their other interests in B.Ed.

We consider what kinds of educational research can and cannot be done using a computer. What constraints upon research are imposed by a decision to use a system like SPSS? While they gain competence in using a particular package, students are learning how to use the batch system and the on-line terminals, editing facilities, the various disk libraries that are available; they are discovering (painfully') how precise they need to be to communicate effectively and unambiguously with several levels of system. They're also learning a new language in which to discuss particular sorts of problems, which is an aspect which is stressed in each segment of the course.

The next formal teaching segment is BASIC. With the skills they have already acquired, it only takes a couple of hours and some backup handouts, including a set of demonstration programs, to have most people programming. I use as demonstrations some little CAI programs illustrating different "teaching" styles, and a variety of string manipulation applications and games rather than mathematical algorithms. I do introduce flowcharts and the notion of algorithms - I find this is where the maths/science types hive off and start thinking about programming as a way of teaching kids ideas about procedures, and often about developing some kind of CAI for their classes.

All through the course, handouts and assignments are stored on a disk library, and students are accustomed to looking for information there. We play with a number of interactive BASIC games and simulations, and have access to the CAI being used to teach accountancy and some experimental lessons in HSC chemistry, as well as my own "Mickey Mouse" CAI programs. so that when we move on to talk about CAI and simulation, the students have experienced it at first hand. The idea of computer managed instruction comes rather easily, and we discuss computer assisted guidance and counselling also. The diversity of the students is interesting here: people working in the State, Independent, Catholic and Technical sectors , for example, have different facilities and different expectations about equipment; people in the tertiary, secondary and primary areas , as well as the different subject areas, have different needs and interests. It makes for some heated discussions of what is possible or desirable in the institutions they know best.

We address ourselves to such questions as what teachers can do that computers can't, and vice-versa, which leads fairly naturally to some discussion of the implications of artificial intelligence research and the use of computer languages to help us think about thinking.

The format of the course is about an hour and a half of seminar/lecture teaching, with about sixteen people in the group, then half of them go off for a meal break while I demonstrate the evening's practical exercise at one terminal. The students, singly or in groups of two or three, work through it themselves while I roam about, tutoring individuals who request help and generally observing how everyone is coping. Forty-five minutes later, the second group returns and I repeat the process. After the first few weeks, differences in learning rates ensure that virtually every student is doing something different at his or her own terminal. Assignments are kept on the class library so that students can access the next one whenever they are ready.

We have a classroom set up with three teletype terminals, and there is a maximum of seven others available in the adjacent public user area. The class runs from 5 till 9 (officially, it's 8, but I never get away before 9 unless the machine goes down, and even then I usually leave a few students still working), and there are usually other users around so we're lucky if we can make use of three or four of the public terminals. Demand for the subject is high, so I can't keep the class size down to where each student could have a terminal for an hour each class, but on good nights most students do manage to get about thirty minutes of terminal time, and to reduce demand for terminals we also use the user-controlled batch card reader for running SPSS from cards. Two nights of the course are wholly practical sessions, in

which I am available for individual consultation. The students seem to consolidate their skills enormously on these occasions, and I am able to spend enough time with each of them to discover his or her special interests and help choose a project for assessment which seems personally and educationally relevant.

On outcomes of the course - the best thing I can do is to list off some of the topics the students have chosen to be assessed on. (Assessment is mainly on this final assignment, tempered by my knowledge of each individual from weekly observation and his or her performance on a few set practical exercises.) This is a copy of my guidelines for choice of a final assignment for assessment which reside on the class library:

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This is a brief description of kinds of assignments which will be acceptable for assessment for INTRODUCTION TO COMPUTER USES IN EDUCATION.

I. Largely practical assignments.

1. A suite of BASIC programs for classroom or administrative use, with a rationale for your choice of these particular applications.

2. An analysis, using SPSS, of some data with an account of what contribution to educational practice or research the analysis makes.

II. Largely theoretical assignments.

1. A consideration of the future uses of computers in education- e.g. scenarios for the future classroom, or society at large, or a look at the likely interaction of computers and other trends you perceive as likely to change educational institutions.

2. The use of computers in your own subject area and their flow down to the teaching level.

III. Anything else you are interested in.

Please see me to discuss your own topics.

In the last seminar of term , I hope to discuss with each of you what you intend to do for your assignment. Due date is June 2nd, but if you think it will take you longer (to collect meaningful data, for example), we can possibly organize an extension on that night.

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A few students atempted CAI projects in BASIC - one developed an interactive statistics package geared to helping teachers do sensible things with their marks, another simulated a poker machine game as the "come-on" in an introduction to probability theory, and another wrote a tutorial/dialogue system to teach a couple of units on reflection and refraction, based on PSSC Physics at Leaving level. All of the BASIC projects were submitted by maths or science teachers.

The empirical research projects chosen usually fall into one of two categories - evaluation of some program in which the teacher has been involved , or exploratory surveys, usually amongst colleagues or students. In the first category in First Term, 1975, a speed reading program at a CAE and a regional In-service course for mathematics and science teachers were evaluated, using SPSS to analyze data gathered from questionnaires and/or tests. The second category included a survey of members of a religious order to determine attitudes toward closing its boarding schools, several projects (to provide data for requests for Schools Commission funding) on vocational choice and guidance, and a survey of students at a TAFE College enquiring about their degree of satisfaction with college facilities and their educational and demographic background information. (The student, the principal of the college, got excited about flowcharting and used it to portray students' progress through the educational system so that he could highlight points where access to educational opportunity was limited.)

Last year, two students working at a Teachers' Centre developed a system, in BASIC, to process applications for in-service training courses. (They did the exploratory work in the Introductory course, and completed the project as a research practicum.) Subsequently, the Education Department has agreed to computerize the whole operation. Another student wrote a consideration of how the introduction of computers had changed the nature of HSC English examining, speaking from his many years' experience as an examiner, both before and since their introduction. One assignment started out as a script for a radio play, with the dramatic tension arising from a conflict between one of the two computers which were then the World Government and its operator, illustrating the problems of dependency that might arise if we lost the power to "pull out the plug". It went on to discuss the future of research in the field of artificial intelligence and its educational implications. Several students did "review of the literature" type essays on using computers in teaching their own subjects, and another wrote a piece linking computers

with various theories of alienation as a plea for limiting their penetration into the sphere of education.

I have been delighted by the response of most of my students this year. I think the heavy enrolment and the ability of the students to apply what they learn to their own educational context highlights the importance of making courses about computers in education more generally available to teachers, particularly to those who have had no previous experience with them.

According to Smith and de Ferranti (1975), teaching teachers about computers is an idea whose time has come. There is scope for many approaches, and mine is just one which has taken off almost accidentally. The teachers who finish the course (and very few drop out) seem to integrate their new understandings and skills into their educational theorizing and practice, which is about as much as I hoped for from the course.

It is clear that pre-service teacher education, especially at primary level, would look rather different from this B.Ed. unit. The emphasis on research , appropriate at B.Ed level, would be less relevant. This term I have more primary teachers in my class, and we may work out a few new ideas. I'm also thinking harder about Dip.Ed. level courses for future teachers of computer appreciation . Access to an author language such as PLANIT would make it possible for students to learn a lot more about CAI, and several people have expressed interest in getting a demonstration project going using Seymour Papert's LOGO classroom approach (Papert, 1971) ,for example. In a less practical course, student teachers would have more time to read about the social effects of computer applications and would be more directly equipped to develop classroom materials for computer awareness pitched at the appropriate levels.

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