Early Computer Awareness Courses in Australian Secondary Schools
- Curricula from the Late 1970s and Early 1980s

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Abstract. Today there is no need to introduce secondary school students to computer technology, but in the early 1980s, the situation was quite different. In Australia in the late 1970s and early 1980s considerable importance was put on the introduction of Computer Awareness courses in secondary schools. The justification for such courses was the perceived need for children to be prepared for living in a society which was fast becoming dependant on the widespread application of computer technology, and that few people then understood the use and implications of this technology. Unlike in parts of the United States, no distinction was made in Australia between Computer Awareness and Computer Literacy, with the Australian curricula involving elements of each. This paper outlines the reasons for the development of Computer Awareness courses in Australia and describes their content. It discusses the consequences of these courses and why they were prominent in the 1980s.

1.   Introduction

In most developed countries around the world today, secondary school students are very aware of information technology and of the many use of computers. In Australia, most secondary school students now know a good deal about the Internet and broadband, play computer games, make extensive use of computer software and take photos using their mobile phones. This was, however, certainly not the case in the late 1970s and early 1980s when the first PCs began to make their appearance in Australian schools. Also quite significantly though, few Australian teachers were then aware of how to use a computer, what computers could be used for, or what the

implications of their use might be. It was into this climate that the first secondary school courses in Computer Awareness (or Computer Literacy as it was sometimes known) were formulated and delivered. This paper discusses the content of these early courses, what driving factors led to their development, what resulted from their delivery, whether they were successful, and why they were essentially a phenomenon of the 1980s that then ceased to exist in this form.

2.   Computer Awareness and Computer Literacy

Moursund (1983) suggests that the idea that there was a need for the general student population to become computer literate began in the U.S. in the late 1960s, leading to the development of a number of courses and individual units in the early 1970s. He describes these early courses as being in Computer Awareness rather than Computer Literacy, in that they aimed only to give students a level of understanding that would enable them to talk sensibly about computers, and involved little or no experience of actually working *with* computers. Moursund argues that courses like this had little personal relevance to most students and that just being *aware* of computers had little impact on their lives. He suggests rather, that students using computers in applications like Computer Assisted Learning and other curriculum areas had more impact.

Computer Awareness courses in Australia, however, began to appear in the late 1970s and early 1980s when the first microcomputers started to be seen in schools. Unlike the situation described by Moursund, distinctions between Computer Awareness and Computer Literacy were not made in Australia, and Australian Computer Awareness courses were always much more practical and involved a good deal of computer use rather than being almost wholly theoretical.

In the Australian state of Victoria in 1980 a report to the Education Department Computer Policy Committee noted that: "The case for computer education in schools is based largely on the need for children to be prepared for living in a society which is fast becoming dependant on the widespread application of computer technology." (McDougall 1980 :3). It went on to suggest that: "Computers have been called electronic 'brains' and there is no doubt that in the popular view, they are surrounded by an aura of mystery and are credited with powers they do not possess. The result is that most people outside the computing profession have attitudes of awe and fear towards computers and feel helpless and powerless in a highly computerised society." (McDougall 1980 :3) It saw a need for computer education to begin by imparting an "informed understanding of the power and capabilities of computers and also of their limitations ... to every school pupil as part of a general education for modern living." (McDougall 1980 :3). The McDougall (1980) report came up with several important recommendations:
- Schools should be encouraged to offer computer awareness education for all students.

- Where it is desired to teach programming this should be in Computer Studies units rather than normal mathematics classes.
- A major commitment should be made to in-service education of teachers for Computer Awareness and Computer Studies.
- Each school should own a microcomputer or interactive terminal facility with at least the BASIC language, a standard typewriter keyboard and disk storage.
- A large pool of courseware programs for use in a wide variety of subject areas must be developed.

Also in 1980 the Secondary Computer Education Curriculum Committee was formed with a membership made up from members of the Secondary Mathematics committee, the Board of Inspectors of Secondary Schools and a number of practicing teachers (Tatnall 1992). The brief of this committee was the production of Computer Awareness course guidelines, the investigation of Computer Science as a discipline, the publication of computer education articles, the collection and propagation of public domain software and the provision of in-service education.

3.   Computer Awareness at Watsonia High School in 1979

In the late 1970s computers were just starting to appear in Australian high schools, the most common being the Apple II. In 1977 Watsonia High School, in the northern suburbs of Melbourne, obtained an Apple II microcomputer with 16Kb RAM, a television monitor and a cassette tape drive as the result of a curriculum innovations grant submission to the Federal Government. (The authors of this paper were at that time teachers at this school.) In 1979, Watsonia High introduced what was to be one of the first Computer Awareness subjects in Victoria into the Year 10 curriculum. This was to be a core subject taken by all 150 Year 10 students. The new subject came mainly from the initiative of one science teacher at the school who was then also a member of the Education Department's Secondary Computer Education Committee. The idea was for the subject to run for the whole year and consist of three parts, each of one term's duration and delivered by a teacher who understood and could relate to this area (Tatnall and Davey 2004). The teaching team consisted of this science teacher, a commerce teacher and a teacher of social science. Together they then set out to determine the requirements for the new subject that consisted of the following units:

> How a computer works, computer programming, history of computer technology.
> Business and commercial uses of information technology.
> The social implications of increased use of computers.

As secondary school curriculum in Victoria was school-based and a matter to be determined by the whole teaching staff of the school, the next step was to convince

the remainder of the teaching staff to vote for this change to the Year 10 curriculum. Given the interest in computers at the time, convincing other teachers did not prove to be too difficult.

In its first year, with only one microcomputer and some access to a mark-sense card system at a nearby university, the new subject involved a good deal more theory than practical use of computers. With additional hardware however, the subject became much more practical in subsequent years. The subject was immediately popular with the students most of whom were intrigued by the new computer. It was also seen as worthwhile by their parents, many of whom saw the possibility of better jobs for their children if they learned how to use these new machines. The subject remained in place at the school until the late 1980s.

4.   Secondary School Computer Awareness Courses in Victoria

In Victoria, the Secondary Computer Education Committee put an early priority on the introduction of Computer Awareness in the middle secondary school years, and was also involved with the development of a new Computer Science subject at senior secondary school level. In a 1980 curriculum document (Secondary Computer Education Committee 1980) the Committee noted that although computers had become indispensable in the operations of science, business and government, they did not currently play a significant role in Victorian secondary education. The justification made by the Committee for introducing computers into the curriculum went along the lines that as computers and related technology were beginning to exercise such an important and growing influence on society, that part of the school curriculum concerned with preparation for living in society should contain at least some elements of computer education (Secondary Computer Education Committee 1980). The Committee's Year 10 curriculum guidelines noted that: "... we define Computer Education in terms of computer 'awareness' – the possession of skills and knowledge to enable informed judgments to be made on the basis of what is seen or heard about computers." (Secondary Computer Education Committee 1980 :1). It added that "... the future citizen, ignorant of computers, will be functionally disadvantaged in a computer oriented society. In terms of 'social obligation' therefore, a strong case can be made for Computer Education. Since computers have significant social, political and economic consequences, an awareness of these consequences is essential to informed decision-making and to the democratic process." (Secondary Computer Education Committee 1980 :1).

Of course there were those who argued that there was no need to introduce a new curriculum area to teach about computers as if computers were to become common in society then students would find out what they needed to know about them informally without the need to study them at school. They would do this in the same way that they found out about telephones, television or aeroplanes. In reply,

McDougall (1980 :4) notes that "... this argument does not allow for the fact that computing technology is developing at a rate much faster than the other three technologies mentioned, and there are very few adults who can tell students what they might want to know about computers."

As determination of the details of junior and middle secondary school curriculum in Victoria was seen as a matter for each individual school to decide, the Committee was not able to be prescriptive but only to offer guidelines and advice. The guidelines for the proposed new Year 10 Computer Awareness subject (Secondary Computer Education Committee 1980 :4-14) specified the following content:

Section 1 (15% of available time):
>   Historical development of the computer: from the abacus, Pascal's adding machine, Babbage's difference engine and early electronic computers through to the microcomputer.
>   Structure of the computer: Analogue and digital computers. Input and output, processing, backing store.

Section 2 (25% of available time):
>   Hands-on experience in operating a microcomputer (booting the system, loading programs, running programs, creation and use of files, word processing, general computer usage).
>   Algorithms – the concept of an algorithm, simple flowcharting.
>   Elementary programming in BASIC.

Section 3 (60% of available time):
>   Use of computers in Government, industry/commerce, science/research, the arts, at home.
>   Implications of computer use for society. Political, economic and social implications.

The document strongly stressed the interdisciplinary nature of this subject matter and that Computer Awareness should not be equated with Computer Programming.

5.   The Commonwealth Computer Education Program

In April 1983, the Federal Minister for Education and Youth Affairs announced that the Government would set up a National Advisory Committee on Computers in Schools. In its report *Teaching Learning and Computers in Schools* (Commonwealth Schools Commission 1983) the Committee then made comprehensive recommendations covering curriculum development, professional development, support services, software/courseware, hardware, and organisation. The report indicated that priorities for curriculum development should be:

1. The provision of Computer Awareness activities for all students in the earlier years of secondary schooling.
2. The integration of computing into the school curriculum: 'computers across the curriculum'.

3. Optional, in-depth Computer Studies courses at the secondary level.
4. Curricula which meet the special needs of relevant disadvantaged groups.

As the first priority in curriculum development, Computer Awareness courses around the country were given a considerable boost. In the period 1984-1986, the Commonwealth Government provided Aus$19m to support the program.

6.   Computer Awareness in Victorian Technical Schools

Up until the mid-1980s, the Victorian Education Department had three very separate (and often non-cooperating) divisions: Primary schools (year P-6), Secondary Schools (year 7-12) and Technical Schools (year 7-11), each of which pursued its own policies and directions. This was in evidence in the Computer Education area, particularly in the often apparent friction between the Secondary and the Technical Divisions (Tatnall 1992). These divisions had radically different ideas on policy; that of the Technical Schools Division being towards *industry standard equipment* and training for employment, while the main concern of the Secondary Schools Division was (after the recommendations of the McDougall report) for Computer Awareness. This important distinction in policy was partly due to the historical differences between the two divisions, the Secondary Division having (traditionally) considered its role as in both provision of a general education to all students, and in preparation of some students for tertiary studies; while the Technical Division had always been primarily concerned with preparation of students for apprenticeships, and training students for employment. It is thus not surprising that the Technical Division should have stressed *computer industry compatibility* as important in education. The problem remained until 1983 when the divisions were finally abolished.

In 1983 the Technical Schools Division brought out its own guidelines for a Computer Awareness course (Computer Studies Curriculum Committee 1983). These guidelines indicated that such a course should contain the following components: familiarity with computing equipment and processes, knowledge of the variety of computing technology and the way it is used, and an insight into the implications of the implementation of computing technology both for society as a whole and for the individuals in that society. The course was structured around the following main sections:

- Computer applications and implications   40%
- Using a computer   30%
- Components of a computer   20%
- History of computers   10%

7.   Computer Awareness Courses in Other States

Victoria was not alone in placing emphasis on Computer Awareness courses and most other Australian states also produced Computer Awareness curriculum guidelines. One example is the state of Queensland's Guidelines for Secondary School Computer Awareness (Curriculum Services Branch 1983). In much the same way as the Victorian course guidelines this suggested the following elements of such a course:

- Computer   history: pre-computer   age,   computer   development, establishment of computers in society.
- Computer applications: information and data processing, simulation and modelling, artificial intelligence, computer control.
- Computer effects: positive and negative effects of computer usage.
- Computer technics: operation, peripheral devices, software and programming.

8.   Drivers for Computer Awareness Courses in Australia

A number of factors in the 1980s acted to drive the concept of Computer Awareness courses into a significant place in the school curriculum. Some of these drivers acted right across the country, while others acted primarily only at the local school level. Firstly there was the sincere belief by many proponents of Computer Education that it was vitally important for all future citizens to have some understanding of computers, what then could do, and perhaps even more importantly, what they could not do. This driving force came from a small number of pioneering educators rather than from students, parents or the general public. This force acted right across Australia.

Another important driving force, acting mainly at a local level, was a need to involve more teachers in the use of computers. If you were teaching in a school where you were the only teacher with any knowledge of computers what you needed most was some other colleagues of like mind. Few teachers had studied computing anywhere in their own university courses and there was no time to wait for teachers to be given in-service professional development training, even if you could find enough people to deliver this training. There is an old saying that the best way to learn something is to try to teach it, and teaching Computer Awareness offered a fairly gentle introduction to computing for a number of teachers who were then later able to go on to other better things. To make good use of computers in the classroom however, what do teachers really need to know? At the very least they need to be computer aware and delivering, or even observing and discussing school Computer Awareness courses made teachers also computer aware. At a later stage, after the commencement of the Commonwealth Computer Education Program, in-

service education for teachers was given a very high priority in Victoria and stress was placed on professional development activities that were aimed at a 'non expert' clientele. The results of this stress on beginners were mixed with some of those who received this training soon finding that they were unable to get any assistance to make any use of computers when they returned to their schools.

The third driver, also acting mainly at a local level, was a need to justify putting more computer equipment into the school (Tatnall 1990). If your school had only a single Apple II computer, how could you convince those with the funds to purchase more? One answer was to offer courses, such as Computer Awareness, that were seen as worthwhile and attractive to students, that could be run initially with a small amount of computer hardware, but which would clearly run much better with more. This offered a powerful argument to the proponents of the technology.

We are not suggesting that these forces were enacted in the 1980s with a full understanding of their consequences. It is only with hindsight that they are apparent.

9.   The International Perspective

Authors such as Moursund (1983) trace the beginnings of computer awareness courses in the USA to the late 1960s, leading to the development of a number of courses and individual units in the early 1970s. Writers at the end of this period (Kurland and Kurland 1987, Brooking 1983) suggest that early use of computers was for administrative use in schools that blossomed into computer clubs and programming instruction. The emergence of US Federal initiatives, such as the NSF sponsored PLATO system, produced CAI applications spread fairly widely through that country.   Writers of this time trace real penetration of broad computer awareness programs to the introduction of the microcomputer.   Several authors (including Kurland, Spresseer and Dyck) suggest that the publication of Seymour Papert's "Mindstorms" in 1980 and the associated discussion were the real beginnings of computer literacy courses in the USA and the UK. During this period David Morsund, Alan Kay and Seymour Papert were all invited to Victoria (at separate times) by the Computer Education Group of Victoria.   Through these contacts between thinkers in the USA and Australia, much of the history of development in Australia was synchronised with that in the USA, but in a much smaller breeding ground, with much more local autonomy. It seems to have been the case in both countries that the education system was being dragged into computer literacy courses by local groundswell. Kurland reports (1987) that "In the 1981-1982 school year, for example, an estimated 27% of the money used to purchase computers came from sources outside of the normal school channels".   In the parallel world of the UK, Brooking (1983) laments "... there is a remarkable lack of computer expertise as more and more schools require micros." It can be

argued that the picture of computer awareness courses presented here from the Australian perspective is a reflection of those changes taking place in the USA, and the UK. A parametric demonstration of this is that each country produced its own manufactured computer in response to the educational needs of schools at the time. In the USA the Tandy TRS 80 and Apple II, in Australia the Microbee, and in the UK the BBC computer.

10. Conclusion

In 2006 in Australia, like most developed countries, secondary school students are generally very *computer aware* and also quite *computer literate* so that there is no need now for any form of formal Computer Awareness course in schools. Many subjects in the school curriculum now make good use of computers in various ways and so all students get considerable exposure to this technology. The only people who need additional computer literacy training now are mainly those who have not, for any reason, worked their way through the normal school system.

Given that it is not still offered by schools, one way that they can easily obtain access to such training is to undertake course such as those leading to an International Computer Drivers Licence (Australian Computer Society 2005). These courses have modules such as: basic concepts of IT, using the computer and managing files, word processing, databases, presentations, and information and communication. The Danish Ministry of Education also have a Junior Computer Drivers Licence (Danish Ministry of Education 2004). Many public libraries also offer introductory computer courses.

While school students and the public at large knew and understood little of computers in the early 1980s, ready access to a wide range of technologies has now made such knowledge and understanding widespread. While there was a significant need in the 1980s to offer formal courses in what computers were, what they could do, and the implications of their use, the need for such courses died with the 1980s. There is still a need to ensure that students are computer literate, but this can now generally be done through computer use in normal school subjects.

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