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From Student Geek to Teacher Geek Chic – Reflections on how Computers were used while as a Student and then as a Teacher

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Abstract. This chapter is a reflection on the use of computers in the author's time as a secondary school student, and then subsequently five years later as a qualified teacher of Information Technology. Despite the uneven teaching of computing in the 1980s low student enrolments, and the marginalization of the subject, computing flourished in the 1990s. With ever increasing enrolments for computing subjects, and a strong demand to access the computer room, resources were stretched and tensions were high. Some of the early problems that surfaced with the introduction of computing have been resolved, whilst others continue to be challenge.

Keywords: Computers across the Curriculum, Access, Professional Development

1. Introduction

After the introduction of computers into educational environments in the 1980s, many attempts were made to facilitate and integrate their use into the curriculum. While it was revolutionary at the time to have, at great expense, a laboratory of computers in a school, a number of issues soon became apparent. These included: access to computers, appropriate professional development and leadership to enable an integrated approach to computers across the curriculum. Some of the issues that were discovered early in the introduction of computing in schools continued to be problems for at least three decades until technology became mobile and affordable.

The use of information and communications technology is comparatively new and, more importantly, expanding rapidly, so that there is little valid past experience to draw on in constructing a map of the future. When computers were first introduced into education, they were stand-alone machines. That is, they did not network or communicate with other computers. As the computers were located in one classroom, they did not lend themselves to be used in teaching and learning by others. Apart from the highly specialist nature of operating the computer, most teachers had no concept of how to navigate their way through the operating system, unless they were trained. It was also hard to imagine other uses for computers outside the traditional uses of these machines such as programming or word processing.

The main technical decision to be made in the 1980s was whether to choose between Apple computers or IBM clones. IBM clones were known to be business

machines. These computers would prepare students to enter the job market at the completion of their studies, unlike Apple, which were seen as an educational tool used in schools. Incidentally, Apple computers were considerably higher in price than the IBM clones that were flooding the market.

2. Computing in the 1980 through the Eyes of a Student

In Victorian secondary schools in Australia, computing first appeared as a subject in its own right in the classroom in the early 1980s, when Year 12 Computer Science was introduced as a Higher School Certificate (HSC) subject in the final year of secondary school. Computer Science was a formal subject that required a specialist understanding of the technology needed to teach the syllabus. Unlike other subjects, Computer Science required the use of computers, a thorough understanding of computer architecture, and the ability to navigate the operating system and use the command line interface [1, 2, 3]. Computers in the early 1980s were rather primitive and unfriendly when compared to today's machines. The teaching of Computer Science was not considered to be an easy task as there were limited classroom resources to aid in the teaching of the subject. Because there was no method study in teaching computers, teachers who taught Computer Science taught some other subject first – often Mathematics or Science. Usually teachers who taught Computer Science had either demonstrated an enthusiasm for computers or had been exposed to computers at university or work. This was because, as Jones et al. [1] pointed out:

> *Prior to 1970 very few Australian teacher education students had any contact with computers. While universities had computers and taught computer science, school computing activities were almost non-existent. Then teacher education institutions began to recruit mathematics and science staff with some computing background. [1]*

Kennedy [4] believed that "*computer teachers were seen to be 'science and maths' people capable of operating computers and were usually misunderstood*" [4]. May [5] argued that computers "*became the responsibility of people who were either interested in them or were required to use them in their teaching areas – usually the librarians and science/mathematics teachers*" [5].

In the early 1980s the Computer Science subject offered in the final year of secondary schooling in Victoria was regarded as a niche or a novelty subject as it was relatively new and attracted small numbers of students. The subject was largely technical and practical and comprised of programming, social implications of computing, hardware and electronics as an elective [6, 7]. The large capital outlay needed to purchase a classroom full of computers in a school in the early 1980s was seen to be prohibitive by some. This, combined with the high costs of insurance, and the extra effort required in security, ensured that the equipment was usually locked away [8].

Computer networking was still in its infancy, with wires and cables exposed. This was bulky and cumbersome in contrast to today's standards where they would not meet occupational health and safety standards. Apart from the highly specialist nature of operating the computer, most teachers had no concept of how to navigate their way

through the operating system, unless they were trained. More importantly, it was sometimes hard to imagine other uses for computers outside the traditional uses of these machines. Moreover, Dowling [9] stated that computers used in education in the 1980s "were not developed with education in mind" [9], as they were created for and predominately used in business.

Nevertheless, shortly after the introduction of computers in schools, a great deal of thought and attention was given to using computers in educational settings and across the curriculum. Whilst the earliest approaches towards computing focused on understanding and using the computer itself, there were changes on the horizon [1].

2.1 My Student Journey

As a teenager attending secondary school in Victoria, Australia, my first interaction with a computer was in 1986. I was in Year 9 at a small, Catholic school for girls; Ave Maria College. This school was neither prestigious, nor competitive, nor affluent compared to many of the other schools in the vicinity. There were no strong female role models encouraging us that we could be anything we wanted to be, and the best we could hope for was perhaps a career in hairdressing, administration, nursing or teaching. Because the school offered domestic and commercial streams of study in addition to general academic subjects, there was a lab of electronic typewriters in place. In the 1980s, a lab of Apple IIes dedicated to learning about computing was developed in addition to the typewriting room.

Despite the school having other specialized rooms such as kitchens for home economics, textiles and science, the most expensive equipment in the school was the Apple IIe lab. Not surprisingly, these computers were heavily guarded, and locked away. As a student in Year 9 in 1986, computer classes seemed very sporadic as they were elective units and often school-planned activities seemed to interfere with them. Seemingly weeks went by without actually touching the computers.

As the prevailing idea was that we needed to learn about the computers before we could use them, very little time was spent in the computer room working on the computers. Instead, we studied theory from a textbook called *Welcome to Computers* [10] as we needed to learn about computer hardware, particularly the Central Processing Unit (CPU), the Arithmetic Logic Unit (ALU), input and outputs, memory and communication lines. Input and output were very simple in terms of keyboards, cards, magnetic ink character recognition, visual display units and printers. We spent time considering the difference between RAM and ROM and we had to recite the types of storage devices, such as magnetic tapes, magnetic disks, floppy disks and cassettes. Additionally, we studied the history of computers and the Information Revolution, Banking and Technology. We often did the theory outside of the computer lab.

Most of the theory was bland, and not very relevant to the interests of students studying computers. Much of what we were learning about computers was abstract, and irrelevant. The closest I got to a storage device was a 5¼" floppy disk, but even then, there were rules of engagement such as appropriate ways of holding the disk and replacing the cover when not used. There seemed to be a lot of rules that came with using computers, even before we were able to do anything with them.

Looking back, much of what I was taught seemed superficial. What I can't separate is whether what I studied as a student was challenging back then, or whether the standards have changed so much, that what we studied appears to be very watered down. Looking through my school reports, it was documented that the practical work we completed included using *AppleWorks – word-processing*, *Logo, Print Shop* and *BASIC*. Even programming using *BASIC* was rudimentary, as the most challenging aspect was to use variables and print output onto the screen.

My experience of using computers was limited by my teachers' own ability and confidence in using computers. Computing was only taught in the computer studies subject. However more optimistically, a report from the school Annual in 1986 mentioned the integration of computers into the curriculum particularly in Year 7 and 8, however revealing very little detail on how they were actually used [11]. As computer provision in schools was through desktops, it was difficult to provide computers for classroom use outside the computer labs, the solution was to bring the computer to the classroom as outlined in the school Annual. "*In addition, computers are trolleyed to other rooms according to teachers' needs*" [11]. The concept of bringing the computer to the classroom was way ahead of its time, but one has to question the wisdom of having a ratio of one computer to 33 students and the actual learning that took place.

Interestingly, the school maintained and ran both a computer lab and an electronic typewriter lab. The electronic typewriter lab was where we learnt touch-typing and no consideration was given that perhaps touch-typing could be taught in the computer lab. However, there was differentiation between touch-typing and word processing as the school had seven desktop PCs in the back of the Typing room segregated by glass. These PCs were dedicated to word-processing as documented in the school Annual: "The students have the opportunity to use modern equipment both for typing and word processing. All typewriters are electronic and there are seven computers available for word processing using WordStar Software" [12]. Not surprisingly, the electronic typewriters disappeared after my secondary schooling and computers prevailed!

Year 10 Computer Studies in 1987 got off to a rocky start. The first teacher who was allocated the subject resigned before the school year began so we did not have a computer teacher for the commencement of the school year; therefore we were not permitted to use the computer lab. The next teacher then only stayed for a few months and she too resigned. We were not particularly unhappy as most of our classes were dedicated to cleaning up the computer room. Upon reflection, this was a time wasting activity to avoid using computers as was replenishing the printer paper supplies by retrieving boxes of paper and bringing them up to the computer room.

For some weeks after the departure of this second teacher, we were unable to use the lab again. The school tried desperately to fill the teacher gap, and the best it could do was to find two *teachers in training* who were not fully qualified but could fill the hole. *George* and *Russell* were young, enthusiastic and brought the subject to life. Gone were the days of cleaning up the room, or learning theory. They sourced equipment that the school didn't have and demonstrated it to us, brought in guests, let us use AppleWorks and played games such as *Super-Bunny* and *Bubble Bobble*. Incidentally, that year, we were expected to purchase a textbook called *Programming Is Fun!* [13]. To this day my copy has remained unopened.

Notwithstanding the disruptions that came with learning about computing, we had to make some serious choices about our future and the subjects that would assist us to make these decisions. My father encouraged me to *like* computers not necessarily from an academic perspective, but rather because he thought it was good for me even though he wasn't sure precisely how. My father was a blue-collar migrant and he wanted a university education for me. He sacrificed a large amount of money and purchased a brand new Apple IIe with a mouse, a green monochrome screen and a LaserWriter printer. My mother disliked my Apple IIe at home as she blamed it for not having a well-deserved holiday - or money to renovate her kitchen. This expensive computer was a contentious object in the house.

Nevertheless, despite how badly computing was taught at this school, and my personal experiences, I persevered with the subject and selected it in Year 11. Gone were the days that we had to learn theory in different rooms, pick up rubbish off the floors, or do *fill in* work because we didn't have a teacher. As a result of the poor introduction to Computing in Years 9, and 10, there was a marked decline in student enrolments in this subject with fewer than 10 students studying Year 11 Computing. There was the right balance of theory and practical and the room was ours! The textbook we used was *Computer Science for Year 11* [14] focusing on word processing and databases using AppleWorks, problem solving and programming in Pascal.

At the same time, there was a big push by the Victorian Government for girls to *do* Mathematics in the late 1980s. The media campaign urged girls to realize that, *Maths Multiplies Your Choices* and encouraged parents by telling them to *Don't Pigeon-hole Your Daughters* [15]. The campaign to encourage girls to study Maths did not apply to Computing. Although the school provided computer classes, we were nevertheless conditioned that girls' didn't *do* computers and the subject was not seen as important as Mathematics. Despite these barriers in Year 11, I cemented my interest in computing. I found a geeky interest that nobody really shared, especially none of the students in my year level.

In my final year of schooling, the school did not offer Computer Science, as there was not enough interest to formulate a class. Not deterred by this, and determined to study something I was interested in, I chose to study this subject at Footscray TAFE (Technical and Further Education – an education institute for students who wanted to pursue a vocational career) on Saturdays as well as continuing to study my final year of secondary schooling at my home school. The home school did not offer Physics either – and the two students who wanted to study this subject had to also make alternative arrangements. Computer Science [3] was a real computing subject! It was rigorous, challenging and stimulating. It focused on programming and engineering and the class was predominately male, and taught by an American whose pronunciation of computer terms such as *data* and *iteration* somehow made the subject feel authentic! Computer Science challenged me, especially the programming activities, and it was the first time that I understood the importance of studying Mathematics, applying logic to solving problems and the study of Science. It was in my final year of secondary school that I found what I really enjoyed, making sense of my world and that this was the career I wanted to move into, the teaching of computers to students. After completing an Education Degree I began teaching in 1994.

3. Issues in the 1990s as Faced by Teachers

3.1 Computers across the Curriculum

Anderson [16] noted that in the early 1980s, Australia was one of the countries enthused about the use of computers in education. However, he also remarked that:

> *A majority of Australian teachers have been reluctant users of drill and practice type programs, preferring the newer possibilities offered by the use of computers in the tutee and tool modes where students direct the learning to a greater degree. [16]*

Downes and Fluck [17] noted how the "focus shifted toward emphasizing the computer as a pedagogical tool for improving learning (OECD 1987)" [17]. The term *Computers Across the Curriculum* was used to refer to the sea change that was about to occur.

The National Advisory Committee on Computers in Schools [18] released a report called *Teaching, Learning and Computers* which advocated the extended use of computers across the curriculum. The idea was to open up the computer room and invite non-specialist teachers to use the equipment in their teaching and learning. This was to be a big leap forward in integrating computers across the curriculum. However, despite the early enthusiasm and optimism by teachers, a number of factors started to emerge that hindered the progress of what appeared to be a simple enough idea. Kennedy [4] summed up these problems at the time:

> *Poor machine performance, inappropriate software, lack of organisation techniques in timetabling and time framing, difficulty in gaining computer laboratory access, inferior machine integrity and no training or awareness of proper management strategies, all compounded to cause frustration, alienation and 'fear' of the computer by the uninitiated in the schools. [4]*

3.2 Access

In the 1980s and early 1990s teachers, particularly in secondary schools experienced what was almost a universal problem of access to computer rooms. Kennedy [4] argued:

> *A laboratory is not always the ideal. Students may see the computers as a separate entity, a special area of study, a tool divorced from their learning in other curriculum areas. Music labs, art departments and trade workshops are dedicated specific areas and usually these rooms have purposeful applications and hardware/software, peculiar to a certain discipline, and are the exception to this philosophy. Computer must be accessible as possible. [4]*

Despite the large push to integrate computers into a variety of subjects, gaining access to computer laboratories was seen as a major obstacle. Teachers who were motivated to improve the teaching and learning outcomes for their students using

computers found it very difficult to access the computer room as this facility was often dominated by scheduled computer studies classes.

The problem of access continued to be an issue as the popularity of Information Technology subject increased. Means, Olsen and Singh [19] put the view that:

> *Technology cannot become a useful support for students' work if they have access to it for only a few minutes a week. Technology supported, project-based instruction requires a higher degree of access to the tools of technology and to communication systems. Schools are faced with the reality of a limited budget for equipment, telecommunications, and software, and they must make hard choices about how to get the most out of what they have. [19]*

Even though Means et al. [19] were referring to student access, it was obvious that the same conditions of access in schools impacted on the teachers' ability to use computers in the classroom

3.3 Emerging Technologies

In the early years of computing in schools, the technological focus was on hardware, software and programming [20]. The major decisions that had to be made were based on which platform to implement within each school. This, in turn, also influenced the software used within the classroom. Apple computers were student friendly and were easy to use and there was considerable educational software commercially available to use in the classroom. Despite this, Dyson [21] found that software belonging to the "Apple II family and the type of software that it uses has not facilitated the integration of computers into the classroom" [21].

Some schools preferred to use IBM compatible computers, which were specifically business-oriented machines. One of the drawbacks of using an IBM compatible machine was that the need to know DOS commands made it more difficult to use than the Apple machines. Moreover, much of the software was not specifically written for educational purposes. Part of the justification for moving to the business machines was to expose students to industry used software such as word-processing, spread-sheeting and databases.

Whilst in the 1980s the issues of information technology integration into education focused on hardware and software, the 1990s saw the emergence of other technologies such as portable computing, networking of computers and then the subsequent explosion of the Internet [22].

3.4 Learning and Teaching

How students used computers in education continued to be a major issue in schools. A distinction could be made between how computers were being used in school and how they were being integrated in school. Computers being *used in education* often meant a variety of applications such as playing computer games, creating banners, word-processing and using clipart which did not have a curriculum focus. On the other hand, computers integrated into the curriculum referred to computers being used

within subject content. The negative aspects of computer usage drew criticism such as that made by Dyson [21] who concluded:

> *Being used, rather than integrated, meant that the computers were used for games or activities that had nothing to do with the classroom curriculum. This information indicated that very little integration of computers into the classroom was in reality occurring. [21]*

From early on, there was a drive to introduce the use of computers into other subjects and not just in specialist computer offerings. Applications such as word processing, spreadsheets and databases were the most common types of software tools taught to students in specialist subjects such as Computer Studies or Information Technology [23]. There were several problems with this approach. It began to emerge that there was an expectation that the software application would be taught in the Information Technology subject, with the result that some teachers *opted out* of improving their own understanding of computer skills. Moreover, applications taught in the Information Technology subjects lacked a context outside that subject. Students found it difficult to make the connection of how a particular software tool solved a particular type of problem outside of the specialist computing subject. Spreadsheets, for example could be used in Mathematics and in Accounting; however, when taught in a specialist computer studies subject students, often found it difficult to apply their skills in other subjects. It was not until the use of computer based software was mandated in the final year of secondary school in Accounting that there was a formal requirement to use computers in a non-computing subject.

3.5 Professional Development

From the outset, professional development was a major issue for the integration of computers into the curriculum. The need for teachers to be confident in using and managing computer hardware in a classroom situation was important. They not only needed to be self-assured in being able to perform simple troubleshooting such as feeding paper into a printer, fixing paper jams and being able to switch on and off computers, but also competent in how to integrate computers into their subject content. However, the problem was that teachers had no formal training in how to use computers or integrate them into their specific subject area. It wasn't mandatory to learn how to integrate computers into subjects and so training was done on an ad-hoc basis.

A number of questions arose around the responsibility of who did the training. Where was training performed and who coordinated the overall way training was to occur? Leadership in this area was clearly lacking. Whilst some organizations such as the Computer Education Group of Victoria (CEGV – a subject association for the teaching of computers) were providing professional development, Keane [8] stated that attempts were made by various government agencies to in-service key staff who would act as change agents in the schools. It was evident that teachers required further, ongoing and sustained support on how to use computers in education.

Many excuses for not being able to integrate computing across the curriculum were evident, however the main problem was that the integration of computing in content-

based subjects was seen as an add-on rather than a seamless integration. Little [23] believed that:

> *for computing to become integral to, not additional to, the whole curriculum, not just individual subjects or indeed a separate subject itself. Computing needs to be seen as the vital and integral part that it is of all teaching and learning. [23]*

However, in a secondary school context the integration of computers into the various subjects was problematic. It was sometimes difficult to persuade teachers of the usefulness of information technology in their specialist areas. Professional development was seen as the key to dealing with this but the way forward was not altogether clear. Professional development was seen to be system wide problem rather than being related to any one school. This point of view was expressed by Graham and Martin [24] who argued:

> *There is a need for an overall professional development strategy rather than the existing fragmentation. Professional development programs should revolve around the best practice dissemination and sharing good models, action research linked to the curriculum and collegial training in work groups. Internal training is preferable as there is often a mismatch between external professional development and an individual school's software and hardware. [24]*

Professional development, or training, remained necessary to support the innovations in teaching and learning using technology. Many educators believed that if teachers could manage computers, that is have some very basic level technical knowledge on how to maintain computers in a computer laboratory, that was sufficient. However this did not address the problem that the focus of using information and technologies should be leveled at learning and teaching. Cuttance [25] believed that:

> *This problem was exacerbated . . . by the focus of systemic training and development initiatives on technical skills, with little or no provision of programmes to support professional development in the integration of technology into the practice of teaching and learning. [25]*

To maximize the efficiency of professional development to teachers, it was important to focus on how information technology could be used in a classroom context, and the derived benefits from its use needed to be highlighted. Simply showing teachers how a software package worked was not adequate on its own, but showing how it could be used within context, and examining how it would be assessed was equally as important.

There were widespread discrepancies in information technology usage in the Independent, Government and Catholic education systems. Some Independent schools made leaps and bounds with their use of information technology through the use of Notebook computers which was pioneered at Methodist Ladies College in Melbourne (MLC – Private Independent girls school) by then Principal David Loader [26, 27]. However, there were many other schools that did not have a vision, or lacked direction in terms of infrastructure and staff professional development needs. What was apparent though, according to Roberts [28], was that:

> *Professional development is needed that is an integral part of daily practice for all teacher and schools. Such activities should respond to targeted needs and, in all facets of their planning, delivery and evaluation, model the behaviors that they advocate. [28]*

While professional development was understood to be important what form that professional development should take was by no means clear. One approach was a just-in-case mode of delivery with the danger that there was little or no consideration about the needs of the learner. Teachers may learn a skill using a particular software package, however this skill may never be applied as the teacher (learner) does not need to use it. The other, *Just In Time*, approach to professional development refers to training that is provided for a particular purpose, or as suggested by Glazer, Hannafin and Song [29], "support on demand" [29]. The advantage of just-in-time mode of delivery provides teachers with confidence to use the software just as they need to use it. Schrum [30] offered the suggestion that if information technology professional development were offered in a *just in time* model perhaps teachers would be more embracing and willing to experiment with software.

Professional development still continues to be a challenge for schools, even in the 21st century, where there are mixed abilities amongst the teaching profession to incorporate information technology into the prescribed curriculum.

3.6 My Teacher Journey

I commenced my teaching career in 1994, working at Parade College a large Catholic Boys school in the northern suburbs of Melbourne. The school had 1600 students and I was located on the Years 11 & 12 senior campus. In my first year of teaching, I taught four Year 12 (final year of secondary school) classes of Information Processing & Management (IP&M – a final year IT subject). Two of the classes had a programming focus and the other two classes were dedicated to the use of applications. For most of my early teaching career, my workload was predominantly with Year 12 and I often taught four Year 12 Information Technology classes. I also introduced Information Systems (IS – a final year IT subject focusing on programming) into the College and this subject became more popular than IP&M. Statewide, students enrolments in Information Systems were considerably lower than in IP&M, given it was a niche subject that focused on programming. However, this was not the case at Parade College, where there were, at one time nearly 60 students were studying it. Many students preformed excelled in Information Systems and the College did well amongst the top ranked schools in the State of Victoria for a few years.

Despite only five years separating my experience as a teacher from that of a student, the educational landscape had changed. Students really enjoyed studying Information Technology at Parade College and this was evident from Years 7-12. Students flocked to the elective units in Years 9 & 10 to study Information Technology. Parade College had four large computer labs scattered across the vast campus and they were heavily used, mostly by students studying Information Technology. The labs consisted of Apple Classic Macintoshes and served their

purpose well. Computing was popular at Parade College and was a subject in demand. It was not something that was only for 'geeks'; rather it was a mainstream subject.

The strength of computer studies at Parade College was a reflection of the health of the subject across the State. In 1989, there were 1627 students studying Computer Science at Year 12. Information Systems, the successor to Computer Science, attracted approximately the same number of students with an enrollment 1660 students in 1995. It was the addition of the more application focused Information Processing & Management subject which saw enrolments skyrocket to 12,109, peaking in the year 2000 with 14,004 students [31].

This dramatic increase in interest in studying Information Technology did not automatically mean that students were naturally adept at studying computers. Parents often told me that their children were amazing with computers and how much they assisted family, friends and neighbors, or how they would spend hours on their computer in their room. This conversation almost universally came up at parent–teacher interviews, when it was brought to their attention that their children were not doing as well as expected. Despite all their know how, students were often not very good with theory. They did not understand how information was managed, processed and manipulated. Some students were not very competent or proficient at creating spreadsheets with mathematical formulas, or understanding different types of systems. Some were very good at playing games, but not much else.

Whilst these numbers were remarkable statewide, at the local school level, it put a lot of pressure to accommodate the demand. As computer rooms were a finite resource, schools could not simply turn an ordinary classroom into a computer lab, due to the substantial costs involved in setting up the room such as wiring, providing adequate furniture, adjustable chairs, air-conditioning, anti-static carpets and the hardware and software licenses required. At one point when I raised the need for more computer labs with the Principal, he firmly, but politely stated that he did not have an infinite pool of funds to build another lab – and each room taken to build a new lab would be one less classroom. There were limits to how many computer labs could be utilized and we would have to make do with what we had.

To add to the complex task of balancing the number of Information Technology subjects offered within the timetabling constraints, there needed to be teachers who could teach the subject. This proved challenging, as there were many teachers who thought they could teach computing, simply because they knew how to use a computer, however without a theoretical background in Information Technology, they often preferred to teach the subject exclusively through a practical, hands-on approach. Schools struggled to employ trained Information Technology teachers who had real expertise and could teach a balanced course. These teachers were hard to find, especially ones who were also able to teach Information Systems and provide students challenges and opportunities that pseudo Information Technology teachers couldn't.

The final year of secondary school Information Technology subjects provided challenges such as the Problem Solving Project assessment task in Information Systems which made great demands on students' abilities in programming and testing. There were also groundbreaking opportunities where students could be involved in something innovative. One of the highlights in my teaching career was preparing my IT students to talk to the MIR Cosmonauts as they did a pass over

Australia as part of researching telecommunications. An amateur radio station was set up at the school with the assistance of an Information Technology teacher from another school – Maggie Iaquinto (VK3CFI), to enable the communication with three space scientists – Russians Valeri Korzun and Alex Kaleri and US crew member Jerry Linenger. Whilst students in several countries had quizzed cosmonauts in the past via ham radio, this was the first time that the questioning was from Information Technology students and the questions ranged from people, procedures, hardware and software. Ten students asked questions in a space of nine minutes, and they learned that Russians used Windows 95, they used anti-virus software and they spoke about the few communication difficulties because all crewmembers spoke both Russian and English. This was the first time that students were introduced to information technology in a global context with relevance and engagement [32]

At the same time as the significant increase in enrolments in Information Technology there was a push to integrate *computers across the curriculum* whereby teachers in other areas would try to use computers in their subjects. In this era desktop computers located in computer labs was still the dominant model for computer use and, due to timetabling constraints, the rooms were often used for Information Technology classes and there were few opportunities for others to get into the computer room.

Often private arrangements were made between teachers to swap rooms – but this was not a long term, sustained proposition. There was pressure from teachers who taught other subjects to make Information Technology teachers give up their teaching space in the lab so that others could be accommodated on a long-term basis. I fought this long and hard, as I did not want the timetable dictating how to teach. Perhaps my early encounters as a student left some deep-seated scars about not spending nearly enough time in the computer room. I never divided computer classes so that X number of days were dedicated to theory and the other days were dedicated to practical classes as I often intertwined theory with practice in any given class.

In my teaching career, my office was often attached to a computer room, providing me with opportunities to observe students from other classes. On many occasions, I couldn't help but notice that some non-Information Technology classes would book the computer room for a period and play games. There was a culture that it was acceptable for teachers to use the computer room so that they could get some respite and let their students play games. On one hand, there were teachers who wanted to use the computer room to do genuine activities with their students, and on the other, there were teachers who just wanted to treat and reward their students.

Some non-Information Technology teachers believed that if they could not get access into the computer labs, then they would not have to incorporate and integrate computers across the curriculum. Often these teachers lobbied for Information Technology teachers to teach generic skills such as spread-sheeting, word-processing and databases in Information Technology classes so that the responsibility would be shifted away from them. All too often school leaders, while recognizing that this approach was far from ideal, supported the teaching of these skills in Information Technology classes on the basis that they could point to the fact that the skills were being covered somewhere.

Given that computer rooms were bookable spaces, working with students sharing common equipment in computer labs created challenges. The vandalism that occurred

in computer rooms was in most cases minor, but enough of a disruption especially when the computer could not be used and students had to share. One common transgression included the removal of mouse balls so the mouse wouldn't work, or the throwing of the balls around in the room. The first line of defence to minimalize disruption was to have a large bag of spare mouse balls. However as students realized that the Information Technology technician would simply replace them, the mouse balls would be taken and not found. The technicians decided that it was best to glue the casing that held the mouse balls, however the trade-off was that when dust and dirt got into the groove, the mouse was inoperable and had to be thrown out. As technology progressed, and students had more exposure to information technology, other disruptive action was taken, such as the cutting of the cords of both the mouse and the keyboard. Other destruction included the swapping of keyboard keys so that the *qwerty* keys on a keyboard were rearranged, or that paperclips, or foreign objects were pushed into the 3½" disk drive space. Colleagues from other schools that used PCs often reported stolen RAM chips, as memory was expensive. The vandalism generally happened prior to my classes, and when I used to drill down to which class was last in the computer room, it would appear that vandalism often took place when there was an emergency teacher or when another class had done a swap with another Information Technology class.

As I was considered to be an *expert* in Information Technology simply because I taught the subject to students, I was asked to deliver professional development to my colleagues. There were two main reasons why the school believed it was important to provide professional development. The first was due to the large financial outlay in equipment and room setup the school needed to ensure that the computers were being used, and secondly because the Principal wanted to empower teachers on how to use the equipment. It was fair to say that many staff did not have any formal training on how to use computers much less how to use them in their classroom. The other reason was that the school had to be seen to be proactive in providing professional development in this area. Sending staff to one off professional development in how to use computers was expensive, but also counterintuitive as one off professional development sessions were often forgotten and did not add value [33]. I was asked to provide professional development workshops to teachers in the use of the common software used in the College: Hypercard, Word, Excel and Quickmail.

Parade College was exclusively an Apple school until 2001. Students and parents alike would often ask, why do we have Macs, and why don't we use business machines? This question was one of the key debates of the 1990s, along with access to computer rooms, content of Information Technology courses and appropriate professional development for teachers. Developments over the past decade and a half, including recent Australian Government policy has meant that some of these issues have been largely resolved [34].

4. Concluding Comments

Since the introduction of computers into educational environments, many attempts have been made to facilitate and integrate their use into the curriculum. Central to the problem of the integration of computers into the curriculum has been that each step along the way has been into unchartered territory. The use of information technology was comparatively new and, more importantly; expanding so rapidly that there was little valid past experience with which to construct a map of the future. Those who chose to replace their Apple computers with IBM clones in the 1980s because the clones prepared the students for business, could have hardly have imagined the current context of a world wide web, e-mail, Intranets, portals, tablets, apps, podcasts, blogs, and virtual spaces.

When computers were first introduced into education, they were considered to be stand-alone. That is, they did not network or communicate with other computers. As time has passed, and more progress has been made with technology, they have filtered down into schools where it is now the norm for computers to be networked to other computers, including the Internet. Whilst some of the early problems of computing may have been resolved, there are some that are still ongoing such as teacher confidence in using information technology tools and practices, the amount of curriculum devoted to the teaching of applications and the assessment of theory and practice.

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