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Multimedia Education in Australian Primary Schools in the Context of Curriculum, Policies and the Classroom

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Abstract

The ongoing debate about the validity of computer technology within the classroom and curriculum extends beyond why technology should be taught in schools to how technology should be integrated within the schools' curriculum framework. Much of the literature focuses on the pedagogical practices of teachers and the fear of technology and de-skilling, and how computer-based technology can be properly implemented to assist school students in their educational advancement. This article sketches some current contexts of multimedia in the Primary school in order to highlight some of the factors impinging on its effective implementation.

Keywords: multimedia education, Primary school, computer skills, technology literacy, educational policies, game simulation, technology games

The introduction of the personal computer into school classrooms has heralded the potential for pedagogical and learning changes. Considerable research has been undertaken on the computer's impact on the educational process (Altbach, 1997; Bigum & Green, 1993; Goldman & Hocking, 2000; Spender, 1995), on the pedagogical implications of computers in education (Anderson, 1998; Carey, 1997; Goldsworthy, 1997; Shearman, 1997; Windschitl 1998) and the ethical, equity and economic impact that computers have within education (Bigum & Green, 1993; Lewis, 1998; Oppenheimer, 1997; Postman 1993; Spender, 1995). However, little research has been conducted on the way students use the computer (Cognition and Technology Group at Vanderbilt (CTGV), 1997; Windschitl, 1998). Such research focuses mainly on the programs students use and how much time they are spending on the computer, rather than how effectively they are using the facilities offered by the computer. This article addresses some contexts of multimedia in the Primary School which appear to influence the nature of this effectiveness.

Interactive Multimedia

Multimedia, as defined by Provenzo, Brett & McClusky (1999; 176), is a 'combination of sound, animation, graphics, video and related elements into a single program or system'. Multimedia is the technological format, which rationalises all computer functions, where a great variety of types of computer programs can be used to assist the construction of, and be encompassed within, one multimedia program (Jonassen, 1996). Wordprocessing, music and graphics can all be constructed in programs familiar to the user, and then loaded into the multimedia program that he/she wishes to construct.

Multimedia is perceived as a positive tool for modelling the flexibility of multi-dimensionality, permitting open-ended exploration and flexible structures in learning experiences (Fitzgerald, Wilson & Semrau, 1997; Goldman & Torrisi-Steele, 2002). According to Troxclair, Stephens, Bennett and Karnes (1996), multimedia caters for varied learning experiences giving students the opportunity to develop flexibility, diversity and decision-making skills.

Interactive multimedia programs are able to provide flexible delivery of information, to students of all ages and varying literacy levels, because they can present information to incorporate nearly all the senses. The programs can deliver sound, text, graphics, scanned images and video, with the required user-input at any level or stage of the program.

Multimedia is educationally beneficial as it enables students, even with little experience, to become artists, publishers and video/music producers. Jonassen (1996) has termed the integrated parts of multimedia, and the use of problem-solving and cognitive processing as Mindtools. He believes that through the use of multimedia applications, such as Mindtools, students can engage in critical thinking activities which promote their construction of knowledge.

Such a structured conceptualisation is useful for teachers and students, so that they can identify the different programs, processes, and relationships of the multi-faceted aspects of multimedia. This would be particularly useful for upper Primary students who are learning a variety of new skills and processes (See Goldman & Krause, 2001, 2002).

Educational Context

One hundred years ago Dewey argued for a major change in the educational system, advocating a shift from the authoritarian, teacher-directed institutions to a more child-centred, experiential and experimental learning environment (Pappert, 1998). Such a shift appears to be occurring gradually, and today in the new millennium, there is still a great deal of debate on how children should learn and what they should learn (Anderson, 1998; Goldsworthy, 1997; Postman, 1993; Provenzo et al., 1999; Windschitl, 1998).

Bowers, (cited by Provenzo et al., 1999) asserts that even though there are many forms of technology, both mechanical and social, technology is still one of the most misunderstood aspects of contemporary society. Technology changes environments, and the residents in technological environments are not passive participants according to McLuhan (*McLuhan's Homepage*, 1996). Thus, educators cannot ignore the technological advances of computers, nor can they be taken for granted within our educational environment (Provenzo et al., 1999).

The pedagogical practices of some educators who were trained in the print-dominant era has been queried by Haddad (1998) and Windschitl (1998). They challenge the autocratic attitudes and passive learning techniques, which are prevalent in the current Western education system. The structure of schools today is still highly task- and text-driven, notes White (cited by Carey, 1997), and is reminiscent of the industrial era rather than that of a global, information-rich society. Today's students, according to Green and Bigum (1993), have new capacities, needs and capabilities for the complexities of the new technologies.

While Windschitl (1998) poses the question of the way is technology is changing pedagogical practices, a further question is raised as to whether educators are trying to change *their* pedagogical practices to meet the new demands of technology as well as to meet the needs of their students. Much of the research in this area focuses on the implementation of the technology, rather than how these programs are assisting students to learn. For example, the Queensland School Curriculum Council (QSCC) (1999) states that technology education should involve the students in the initiating, designing, creating and using technologies as opposed to taking a passive role in learning. Technology education then, provides students with the opportunity to 'develop transferable knowledge, practices and dispositions necessary for functioning in contemporary societies' (QSCC, 1999; 6).

With current technological developments, a societal momentum has occurred, in that, whereas previously, communications took place through offices, in government or business buildings, they are now more accessible to individuals from within their own homes, (Pelgrum, 1998). People are now able to access information in databases all over the world, and need no longer rely on the data fed through the state or local educational system or community. United Nations Educational, Scientific, Cultural Organisation's (UNESCO) (undated) Secretary-General Manalo, also emphasises the importance of how technology impacts on all aspects of the way we conduct our lives. She notes that the

> . . . infusion of technology in a given system may be likened to the dropping of a pebble in a tranquil, limpid pool of water. From the point of impact, the waves fan out in ripples, moving the whole system, and even beyond. . . . we have seen how rapid technological developments are accelerating the rate of change within our lifetime. (undated, 1)

All of us are quickly becoming members of a global community where information abounds, and the skills required to decipher all the information are becoming more important and useful each day to everyone. Thus, Wright (1999) believes that children should commence technology education as soon as they commence their schooling year. However, it may be argued that there has been a long history of a variety of literacies being taught in the home *prior* to school, and that technology literacy need not be an exception. That is, basic technological skills such as booting, keyboarding, mouse usage and icon interpretation, may well be taught to the child by his/her family prior to entering school.

Goldsworthy (1997) stresses that computer skills should be taught as an essential subject within Australian schools and that it is important for all school staff to be computer-literate in order to teach these skills to students. Such objectives are part of Education Queensland's (1997) Schooling 2001 project which is being implemented to improve educational outcomes by integrating computers into the curriculum, and to computer-link all Queensland public schools. The New South Wales Department of Education and Training (DET) (1997) states that their agenda is to ensure that there is support for teachers, training and development programs. DET also supports the effective use of computers to improve learning and the use of new technology to help staff do their jobs. However, there is no mention of funding for this new technology.

The question may be posed as to whether the outcomes of such curricula frameworks would lead to an equitable classroom environment

(Hill, 1997). It is questionable whether all children would achieve the same level of knowledge and understanding in computerised technology when they do not have equal access to this technology (Lewis, 1998). Will the benefits be gained by all students, if there is not a focus on equal access? One solution is that in order to assist with equitable dissemination of knowledge about the use and skills development of information technology, multimedia and hypermedia programs could be implemented within a collaborative classroom environment. This would then give students a more guided learning experience with relevance to both educational and social skills (Cognition and Technology Group at Vanderbilt (CTGV), 1997; Goldman & Krause, 2002; Hill, 1997).

Role of Computers in Education

The use of computers within education, both in Australia and throughout the Western world, has been seen from a number of perspectives. One perspective extols the virtues of technology, stating it is the way to cure whatever is ailing the educational system, and is a way to replace outmoded educational approaches (Bracewell & Laferriere, 1996; McCarthy, 1996; Moersch, 1996; Tergan, 1997). Another perspective (Postman, 1993; Oppenheimer, 1997), suggests that technology will contribute to the degradation of our educational system. Yet another perspective claims that while the system is failing, the effects of computerised education have, thus far, been successfully railroaded (Garrett, 1997). A further perspective places a realistic, although not always a positive, role on the use of technology, its applications and impact upon our society (Altbach, 1997; Smith, Curtin & Newman, 1996).

Moersch (1996: 52) called for educators to '. . . embrace a new paradigm that positions technology as a powerful catalyst in the school reform process'. This is now occurring within Australian schools confirms Anderson (1998) when writing about the Australian Computers in Education Conference, where he reports that many educators are now looking towards the pedagogy of technology education rather than the technology itself (See also Goldman & Hocking, 1999, 2000: Goldman & Krause, 2001, 2002; Goldman & Torrisi-Steele, 2002). He emphasised that educators are becoming more concerned with the process of learning and how a more effective design of delivery strategies could be employed to engage students in utilising computers. Other researchers (Carey, 1997; Goldsworthy, 1997; Moersch, 1996; Shearman, 1997) also raise Anderson's concern regarding the way in which computer technology is being taught and presented in schools where, frequently, the classroom computer is left idle in the corner, because it is considered too old to do anything with, no one knows how to operate it, or there is no appropriate software to use with it (Moersch, 1996; Scherer, 1999; Shearman, 1997).

Research on effective computer usage in the classroom reported by Shearman (1997) indicated that the problems associated with classroom computers were exacerbated by the number of times that outdated computers broke down and the lack of, or incomplete, installation of associated equipment, such as printers and multimedia software (See also Goldman & Hocking, 1999, 2000). It may well be "expensive" for schools to rectify the problem of outdated hardware and possible lack of access to personnel with the proper expertise, due to the lack of funding. However, mass production of computers and programs has resulted in decreased prices for both hardware and software. The lack of teachers' operational knowledge could be addressed through training, knowledge of cross-curriculum integration and by utilising the appropriate pedagogy (Goldman & Torrisi-Steele, 2002; Goldsworthy, 1997; McCarthy, 1996; Pappert, 1998).

Global Networks of Technology

Goldworthy (1997) urges the Australian government to implement professional development programs to increase educators' skills in information and technology subjects. This idea is extended by Lewis (1998) in viewing the globalisation of technology and communication as a form of digital utopia or Digitopia. Through the globalisation of technology, all citizens will have access to and participate in the information process (See Goldman & Bradley, 2001). However, according to Cope and Kalantzis (1997), the globalisation of our communities has transformed the world into a pluralist society, due to the increased influence of information technology and global communication networks (Altbach, 1997; Giddens, 1993; Riley, 1998).

European and American Governments' Educational Policies on Technology

It has been ten years since UNESCO had its first world education conference involving 180 countries (UNESCO 1999a, 1999b). It surveyed school students all over the world to see how successful education has been in the past decade. The results showed that exceptional changes have occurred, and with rapid growth in technological advances and the movement towards globalisation, there will be greater challenges ahead for governments and educators.

Challenges have already started for educational systems around the world, with the opening of an educational portal in Denmark. This site is regarded as one of the three largest sites in Europe and is the first in Denmark to provide free educational programming to teachers and students. At the EMU shop (in Danish EMUtikken), the user can shop around and read about the products. While a large amount of educational material and programs are available free and can be downloaded immediately, there will also be commercial products which can be paid for online (European Schoolnet, October, 1999a).

Other advances taking place throughout Europe, include a new computer network. The European Schoolnet's network relay was intended to assist European educational networks by building permanent sustained contacts between the national networks, and the relay helps to show how each national network can give added European value for educators and students (European Schoolnet, October, 1999b).

Canada's SchoolNet sites are:

> dedicated to helping Canadians reap the benefits of new technology and the Internet . . . [representing] . . . Canadians from the private sector, the volunteer sector, governments or individuals working together to prepare themselves for the third millennium (Canada's SchoolNet, 1999).

Canada has also united with other countries to strive to achieve technological proficiency. The three founding members forming the Global Learning Consortium (GLC), Canada, Pennsylvania (USA) and Singapore, have created a collaborative Internet site which distributes information such as;

> models for educational networking; to provide opportunity for technology transfers between each other; to support research and development cooperation in the area of learning technologies and to promote a knowledge-based 21st century global learning community where educators and students can learn at anytime and from anywhere (Canada's SchoolNet, 1999).

The United States government is also taking measures to ensure that its population receives appropriate technology education. In 1998, President Clinton's State of the Union Address included, as part of his government's ten point plan, connecting every classroom and library to the Internet and helping students become technologically literate (Watson, 1999: 1). Thus, the USA and European countries are surging ahead in opening up the availability of technologically-derived educational access to their general populations, including all their school students.

Australia's Educational Policies on Technology

While there are great advances occurring in Europe and America, Australia has also been progressing. In 1989, The Common and Agreed National Goals for Schooling in Australia was endorsed as the Hobart Declaration. From that, a number of State governments commenced research/development programs in educational technology advancement. The then Department of Education, Queensland (now Education Queensland) implemented the Queensland Sunrise Centre project in 1990 after viewing the success of a similar program in Victoria. The objective of the Sunrise project was to investigate ways to encourage students in technologically competent classroom environments. The Lighthouse Project as part of Schooling 2001 continues this (Education Queensland, 1999).

While education departments in Europe and Canada were still developing the idea of an Internet Portal, Australia had already established one. In 1997, Education Network Australia (EdNA) Directory Service was launched linking more than 5000 core websites, and accessing 20,000 more. It was the world's first single entry point to online education resources and services for all ages.

Just as technology itself is changing, so too, are Australian government policies on technology. Current policies of state, territory and federal government education departments are focusing on the new millennium, and enhanced computerisation of education. Each of the states' policy approach will now be briefly addressed.

Queensland

Education Queensland (EQ) (1998a) currently displays, on their website, their view of technology education as being;

> . . .the planned learning process to enhance the technological literacy of all students to enable them to fully participate in the technological society and economy in which they live and work. (EQ, homepage, 1998a)

The Queensland School Curriculum Council (QSCC) is currently developing a new Technology Syllabus for Years 1-10 which is being implemented in Queensland state schools from 2001.

A draft of the new syllabus states that;

> Technology involves the processes of exploring possibilities and envisioning the development of practical, purposeful, and innovative products that meet human needs and wants, utilise opportunities and extend human capabilities. Products (artifacts, processes, systems, services and environments) are developed using combinations of technology processes and information, materials and systems) (Source QSCC Years 1-10 Technology Syllabus-in-development Trial Draft - Term 4 (1999: 4).

QSCC (1999: 4) concludes that products of technology impact upon our society and have consequences for individuals, local and global communities, and on the environment they create. These products and their use are influenced by contexts, issues relating to management, and their appropriateness. That is, technology is seen as permeating society structures and processes, resulting in consequences and products.

New South Wales

The Department of Education's (DET) agenda for their 'Foundations for Learning 1999' was to install $186m of hardware into the public school system and to give those schools access to the Internet (DET, NSW, 1999; See also Goldman & Hocking, 1999, 2000). DET is also focusing on teacher development, where teachers are required to be computer literate (DET, 1999). Teacher proficiency has been a focus of DET since 1997 when the report of the Council on the Quality of Teaching Computer Proficiency for Teachers was released.

Victoria

The Victorian Department of Education's (1998: 9) policy on technology is ' . . . for all schools to have implemented a Learning Technologies Plan by the year 2001, which results in principals, staff and students:

- having access to computers, a range of applications and curriculum products and on-line information and communications as a routine part of the school's educational and operational program;
- being regular, competent and discriminating users of learning technologies in the daily activities and programs of the school;
- developing skills in the use of a range of technology tools showing leadership and innovation in the use of learning technologies.'

The Department of Education (1998: 9) views the achievement of these objectives as essential if ' . . . schools are to innovate and adapt to opportunities which will prepare students to operate successfully and confidently in a technologically-enhanced community'. A set of goals has been written which will ensure that learning technology is implemented with effective teaching and is used in curriculum programs. The school-specific objectives, set by the Department (1998: 21) include the use of the Internet, establishing new technologies within the classroom, implementing cross-curricula frameworks and developing classroom activities to broaden students' confidence and learning experiences. While the Victorian government appears to be focusing its attention on access to technology and skills development, other states appear to be looking at staff development.

South Australia

The South Australian Department of Education, Training and Employment's Strategic Plan for 1999-2002 (1999: 7):

- 'develop and implement an aligned information technology strategy which provides stable, reliable, current technology infrastructure throughout the department
- improve the skills of all staff in the use of IT and establishes information management systems which are accessible to all staff
- continue the implementation of the DECS tech strategy
- maximise the use of innovative information technology and multimedia across all sectors in education and training delivery'.

The South Australian education department and the NSW DET appear to be taking similar approaches to technology education. They are focusing both on staff development and access.

Western Australia

The vision of the Education Department of Western Australia's (EDWA) (1998: 1) is to acknowledge the potential of learning technologies to improve teaching and learning. Its focus is on identifying and utilising technology resources, such as multimedia, Internet, video-conferencing and remote access, to assist students and teachers in cross-curricula activities. There is also a focus on growth and development of the school system with the technology available to promote the skills required to use the resources effectively.

Northern Territory

The Northern Territory, like Queensland, has been conducting research and development programs. However, its Department of Education appears to be pursuing multimedia implementation and skills attainment. The Department has an exciting new prospect for technology education, in the development of the new multimedia technology laboratory. The founding of the Darwin QANTM multimedia centre will assist in educating staff and students in the skills required to be proficient in the use of the latest multimedia products and services (Northern Territory Department of Education, 1998, 1999).

Tasmania

The Tasmanian and Western Australian Education departments also have a multimedia and skills focus. The Tasmanian Department of Education's (TASED) (1999) policy on technology included enabling students to critically analyse and appraise technology education and take an active role in technological issues. The policy also aims to promote problem-solving skills using collaborative measures, non-technological input, as well as using technology. The Department is also researching new ideas for cross-curricula applications for technology, and its uses in education.

All Australian education departments appear, then, to be focusing on varying areas of technology. Some are focusing on access (South Australia), others mainly on staff development (New South Wales and South Australia), while others are focusing on implementing new software technology and assisting all staff and students with the skills to utilise the technology effectively (Queensland, Tasmania, Western Australia and Northern Territory).

Access and Equity

While it is admirable for these departments to be focusing on areas they deem appropriate for their bailiwick, the question arises as to whether they are being equitable in their dissemination of technological advances. For example, Education Queensland (EQ) (1998b), as part of the Schooling 2001 project, has introduced the Equity Programs Unit which was developed to assist in finding ways in which learning technologies are being accessed and used within schools. EQ (1998a; 1) states that there is evidence that technology within schools is not being equally accessed by all students, with some groups of students ' . . . assuming a greater degree of ownership of equipment on the basis of their membership of a particular group'.

Equity and access has been addressed also by the National Council for Educational Technology (NCET) (1994) listed what it perceived as the potential learning outcomes for information technology. The list of learning outcomes included:

- providing the flexibility to meet the individual needs and abilities of each student;
- reducing the risk of failure at school
- presenting information in new, relevant ways which help students to understand, assimilate and use it more readily
- enhancing learning for students with special needs;
- encouraging analytical and divergent thinking;
- offering potential for effective group work; (NCET, 1994:1).

Computers in education can play an important role for marginalised learners, including those students deemed as below average (See also Goldman & Bradley, 1996a, 1996b, 1997; Goldman & LaCastra, 1998). Students can benefit immensely from technology through the use of appropriate programs, and having the opportunity to view how others think, and it could readily become a vehicle for new ideas to be shared (Goldman & Krause, 2001, 2002). However, Provenzo et al., (1999) state that teachers need to be aware of how they perceive the role of computers in an educational environment, and, if they, themselves, value that role. Provenzo et al., (1999) also warn that the attitude teachers have about computers is conveyed, overtly or covertly, to students. If a teacher has a negative attitude towards using computers in education, this attitude may result in students having less computer-time, and thus less access and experience.

Research into gender equity has shown that girls have either less access to, or spend less time working on computers in the classroom, than their male classmates (Spender, 1995). Joiner (cited by Department of Education, Community and Cultural Development, 1997) states that there are a number of ways of overcoming gender inequality in technology education. Some of the suggestions include: 'providing androgynous software; using computers as tools for learning in a variety of subject areas; providing good role models; and employing appropriate group work' (Department of Education, Community and Cultural Development, 1997:34).

Further, in the debate on equity and computers in schools, Provenzo et al., (1999) point out that there are two important factors students need to be informed about, namely the etiquette involved in using computers called netiquette, and also using software responsibly. Thus, girls should not be dominated or bullied in their access to computers. All students need to be informed about the copyright laws, so that they are not encouraged to use pirate software, or download information from the Internet without permission, and to acknowledge the authors' information and graphics used in assignments. The issues of access and equity in computer usage and experience, are essential to be addressed in all departments of education and schools.

Children and Technology Games

The globalisation of technology may be seen through communication networks which are being utilised by many Primary School (and Preschool) children today. The widespread language of Nintendo, Play Station, and Sega appears to have grown with the new forms of available computerised technology. These games are often viewed as another form of mass media for mass communication, with one in three homes owning a Nintendo by 1990 (Fuller and Jenkins, 1995). These games evolved from the simple PacMan, to Space Invaders and finally making Nintendo, Play Station, Sega, the Super Mario Brothers and Donkey Kong household names. Fuller and Jenkins (1995) believe that this form of technology is already firmly entrenched within Western society. Introducing new technologies into the educational environment promotes 'interest in learning, making it more student-centred, collaborative and encouraging cooperative, creative problem solving' claims Kimber and Deighton (cited by Deighton & Hocking, 1999: 1). Provenzo (1991) agrees, stating that today's children are more technologically aware and open to the use and understanding of interactive multimedia than ever before.

Some researchers raise concerns about simulation games, conjecturing that these games do not have any educational advantages (Oppenheimer, 1997; Postman, 1993; Rukeyser, 1998). However, as Smith, Curtin and Newman (1996) point out, these concerns are mainly directed at the portrayal of violence and the physiological effect of playing these games. Some researchers infer that interactive technology could cause a breakdown in community standards, as they believe those who play simulation games have a passive role, and that these programs will eventually dull the senses, giving the effect of dumbing-down society (Oppenheimer, 1997; Rukeyser, 1998).

Game Simulation

Game simulation may be seen as the aesthetic to cognitive mapping and could be interpreted as assistive technology for educational purposes according to Jameson(1991). The Postmodern era has become transformed, on the spatial level, in that we are being pushed along with the monumental changes that have accompanied technology. For Jameson (1991), our minds can no longer contend with the continued changes, and we are now having our minds programmed along the way (Jameson, 1991). Multimedia is transforming the policy-making of governments (Lewis, 1998). Through globalisation, students can interact, explore and communicate using various methods and they are no longer tied to the physical classroom (Fraser, 1998). Consequently, even though games have varying levels of interaction they are still contained within a form of pedagogical, social and political culture, which is seeking to bestow the individual with an enhanced sense of the global system through a creative awareness of other realms, realities and perceptions of differing cultures.

Postman (1993) does not agree. He believes there should be a focus on education as being a worthwhile part of our culture, rather than focusing on implementing new technologies. He raises concerns about releasing the Nintendo Kids from the Gutenberg trap, as the book is still an integral part of our society. Disputing Postman's position, Pagram (1997) explains that children need to be released from the Gutenberg trap, as they are becoming more familiar with a multimedia approach to education, as opposed to one which is just pen and paper. This will be the future challenge for educators and the educational system, concurs Bigum and Green (1993), as the push grows for the uncoupling of the curriculum from the book. Haddad (1998) explains how new technologies can be powerful tools in education, affording new approaches to learning and involving students in more interaction and collaboration with fellow students and teachers. This is especially so when information can become more easily accessible through the use of floppy-discs, CD-ROMs, DVDs, interactive television and other forms of available media. Haddad (1998) believes that it is important to link computers and the advantages of a variety of software to the school curriculum.

Hyperreality

Harraway (1989) is not concerned with a passive role or the dulling of the senses. She is concerned that children may be transformed into cyborgs; that is an amalgamation of human and machine. Harraway (1989) cautions against the continual use of simulation games, fearing that children may become caught up in the fluidity of the new freedom found in computerised technology, become fully reliant upon their computers and no longer be able to function without technology. While Provenzo (1991) agrees that the video game player, while playing a game, may journey into another reality, he contends that this is done by a conscious decision, not through irrational or passive thought as suggested by Oppenheimer (1997), and Postman (1993). Baudrillard (cited by Provenzo et al., 1999:79) also warns that television and computers only mimic the real world, and our society is now being immersed in these simulations where we are increasingly being drawn into a hyperreality, where the simulations could become our real world. Rukeyser (1998) agrees stating that because computer images are only two dimensional, they rob the child of the real world, where he/she would be able to reach out and touch the images in front of them. He adds that children are also limited by their choices when using a keyboard and mouse, and that the options given are only an illusion of choices, as they are not really allowed to make their own decision, and they in fact have to choose one option which has been previously selected by a programmer. Provenzo (1991:37) disagrees, pointing out that people are drawn to video games because they can enter a '. . . setting in which individuals can take a series of risks with

few negative consequences attached'. This affirms Turkle's (1984) view of game players as having a sense of urgency, in order to hold power over the game, as it is the game, in the beginning, which holds all the power. She explains that the player must master the elements and rules in order to wrench the power away from the game into his/her control.

The user's search for power and control, through game simulation, has continued and increased with the arrival of more advanced technologies, such as Compact Discs, digital video, and high-speed user-friendly computers, and, moreover, has the potential for increased computerised educational programs (Rheingold, 1993). While Oppenheimer (1997) disputes that there are any educational advantages in simulation programs, Jones (1995) notes that all forms of this media have undoubtedly been advertised as being appropriate mediums for use in the education process. Provenzo (1991) concurs stating that games and the advancing technology will become a significant component in the media scene. However, Provenzo et al., (1999) caution that parents (and educators) should continue to censor the types of games that their children play, as not all these games could be classified as educational, and they may influence children's attitude towards computing tasks in school.

Hypermedia

The synthesis of all media into one singular medium formed the technological term 'multimedia' explains Pearce (1997: 360). She notes that this backdrop of integrated media forms a global community, where we have a parallel existence between the real world and that of cyberspace. This era has helped launch the ideas of multimedia into hyperspace, forming the new medium of hypermedia. The main support vehicle for hypermedia is the Internet, opening up global opportunities for educational advancement and entertainment. This opportunity of communicating with people, on a global scale, is an important factor in humanising computer interaction, according to Smith, Curtin and Newman (1996).

Accordingly, Pagram (1997) believes that with the advent of this progressive interaction, first through games and then the Internet, people could be freed, just as Gutenberg's press freed those since his time. A combination of paper and technology could exist in a new form of Gutenberg technology concurs Kenner (1993), where the typed word, through a computer screen, can assist in directing communication just as effectively as opening a book. Although Toffler (cited by Altbach, 1997) argued that the technological revolution and the

Internet would make everyone equal, Altbach believes this has not occurred, concluding that those with the power to disseminate the information can also control the information disseminated.

Riley (1998), a United States Secretary of Education, reflected that the 1990s heralded the information age, and it could be viewed that the new economic currency will soon be information. Consequently, those without the tools to access or participate in the information exchange will be eradicated from the marketplace. However, Bigum (1997) counters that while the business sector's demands are valid for the use of computerised technology, this is giving the justification for using computers within the classroom a strong social framing. He believes, therefore, that the fear of reduced teacher-input into the future educational system is a valid concern. If the educational system were adjusted to allow for an interactive pedagogical model, and if professional development were continually updated, then the fear of de-skilling or de-schooling could be alleviated (Fraser, 1998).

Computer as Tool

While Smith-Gratto (1995) recognises that teachers are concerned about meeting the needs of the curriculum, she agrees with Fraser (1998) that the fear of computers in education could be overcome. She also believes that computers should be used as tools, and that they are one of the easiest ways in which individuals can construct meaning in the educational world. When students are involved in 'authentic situations', then their comprehension will increase. Provenzo et al., (1999) agree, stating that a computer can be used as a tool by those wishing to extend their capabilities. Mindtools such as, hypertext, databases and multimedia can be used to support individuals in constructing knowledge in authentic ways suggests Jonassen (cited by Smith-Gratto, 1995). Trinidad (1997) also notes the advantages of the new multimedia technologies and how the debate of the so-called harmful effects of these technologies should be negated. She views the compact disc (CD), graphic arts, surround sound and video cards as being the world of children, where parents and educators should facilitate the use of these technologies to encourage the changing culture to be equitable for all, in terms of access.

The disparaging comments of Postman and Oppenheimer towards technology are addressed by Featherstone and Burrows (1995). They explain that the passive pastime of viewing television has been extended, or even propelled, into interaction, through the medium of multi-player games, interactive CDs, mobile phones, portable faxes and notepad computers, which are now readily available. Jonassen

(1996: 9) agrees, stating that when computers are used correctly, they can extend the cognitive functioning of learning 'to engage learners in cognitive operations while constructing knowledge that they would not otherwise have been capable of . . ..'

The computer was at the centre of educational changes in the 1980s, transforming computerised technology into a tool for education (Bracewell & La Ferriere, 1996). The use of interactive technology and the role it will have in preparing today's students is important for a world where technology is commonplace. Technology as a tool, enables students to connect with others and to enhance their learning environment, especially with the resources of multimedia programming (Jonassen,1996).

The Pedagogical Process

Learning technologies have challenged all teachers to reflect on their teaching philosophy and practices (Victorian Education Department's Report, 1998: 12). The key issue for computer proficiency is pedagogical rather than technical. While basic skills will assist teachers to advise and supervise students, the most important competency associated with computers is the ability to structure classroom and student-centred learning (DET, NSW, 1997). There are a number of problems with the use of computers in education, or 'school-created obstacles' as Pappert (1998: 96) calls them. He believes that there are many teachers who will not be capable of providing the knowledge and skills required to use computers as an educational tool (See Bradley & Russell, 1997; Goldman & Torrisi-Steele, 2002). Some teachers, particularly those with little computer training, will have problems, in implementing a curriculum with the use of computers. Teachers will be selective in using new technologies and will 'alter classroom behaviour selectively to the degree that certain technologies help them solve problems they define as important and avoid eroding their classroom authority' (Cuban, cited by Provenzo et al., 1999: 137).

Teachers will resist or be indifferent to technological changes which they deem irrelevant to their pedagogical practice. Teachers do need to be motivated and encouraged to develop the skills for interactive multimedia usage within the classroom environment (Bradley & Russell, 1997; Carlson, 1994). Teachers become discouraged as there are not always the facilities available to implement their ideas (See also Goldman & Hocking, 1999; 2000). This problem may be overcome, asserts Cincoski (1994), by conducting a 'needs assessment', where representatives from all areas of the school discuss and consider the necessary technology, and plan for the development of these programs. This concurs with Stemler's (1997) view that educators need to access the appropriate packages, which will give students full advantage of multimedia experience.

It is not necessarily the fear of the technology, which restrains teachers, but the fear of redundancy, which comes with technology, according to Bigum (1997). Redundancy is currently an option for older NSW teachers. Conversely, McCarthy (1996) chooses to look at the reduction of teacher input into interactive multimedia projects, as a positive measure. He views this form of technology as a prize for the educational system, as it enables teachers to take a more facilitatory role, which in turn enables the students to embark on a learning discovery. Teachers need to change their perception of technology in the classroom, says Windschitl (1998). He extends his argument, by adding, that, if teachers played a facilitatory role, then they would be able to set the scene for a collaborative classroom environment with multi-disciplinary tasks evident (See Goldman & Krause, 2001; 2002). Teachers can work effectively, with a computer functioning as a mediator for the students to process what they are learning.

Instead of teachers struggling to make the curriculum fit with the available technology, Garrett (1997) suggests, they should select the technology which supports their curriculum. Deficiencies may be overcome when the information processing approach is taken (Tergan, 1997). Smyth (1997) also tries to quell the fears of diminished teacher input, as she reassures us that with the use of technological resources, teachers can now engage with the students in a more prominent role, as an expert in the educational process of learning. Provenzo et al., (1999) agree, stating that when a teacher uses multimedia programs and facilitates a constructivist approach to learning then the student's creative work can be enhanced (See Goldman & Torrisi-Steele, 2002).

Students with access to interactive technology are more competent in their organisational and problem-solving skills according to Dwyer's research (cited by Riley, 1998). Technological creativity is shaped by 'a myriad of personal and social values, knowledge, education, personality traits and a host of other factors' and the teacher, as the creative technologist, could be instrumental in assisting the development of these skills in their students (Dasgupta, 1996: 180).

Conclusion

This article has sketched some current contexts for multimedia in Primary schools with particular reference to the debates on curriculum, policies, and pedagogy within Australian education. It is evident

that the difficulties associated with the implementation of technologically-based education are being witnessed by teachers, policy makers and researchers. As with any major change in paradigm, the strains of implementation are evident, with some resistance from some classroom teachers and others.

It appears that the shedding of the 20th century passive pedagogical culture based on "chalk and talk" in Primary schools, in favour of technologically based education is now undergoing strains and severance like none seen before. The promises of technology and multimedia to be able to engender more active learning, more personal involvement, and greater understanding of the world, without time restraints, is still upon teachers, policy makers and learners themselves, and as yet, not wholly embraced by them. Although we are just at the dawn of multimedia education in the classroom, and at home, it may well be that the generational factor, namely the passing of the Baby Boomers out of the teaching profession, and the entrance of Generation X teachers who are more computer-comfortable, into it, may well bring about one of the most profound changes in the history of education. The onus, however, remains upon all educators to extend their technological skills in order to develop their educational professionalism. It is the right of all students to be equipped with the appropriate knowledge and skills to be active participants in the encompassing technological society. If teachers neglect to address technological advances, they will surely find themselves stranded within a global community unable to communicate with the world in which they and their students live.

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