This chapter explores the potential of computer technology in classroom environments. It considers the role of technology in elementary schools and suggests that computers will not be used effectively in educational contexts unless five conditions are met. These are that technology must be integrated into curricula in environments characterised by active learning, inquiry and problem-solving where higher order thinking skills are promoted. We need to use technology to present and represent ideas, and we need new definitions of play and what constitutes a manipulative. Finally, it is suggested here that both staff and students need to develop critical media literacy skills in their use of the new information technologies. The chapter provides examples of how each of these can be achieved today and extended to prepare our children as flexible and creative learners ready to meet the challenges of the new millennia.

“Across the world there is a passionate love affair between children and computers....I see the same gleam in their eyes, the same desire to appropriate this thing.” (Papert, 1996, p. 1)
The technological advances that have been made over the past 20 years have been staggering. Our society has changed dramatically in the way that we do business, communicate, and access information. Meanwhile, our schools seem to have been frozen in a time warp with change coming slowly and reluctantly, so much so that our experiences in them are often very different from the experiences of life outside. We have available to us computer hardware and software that can help learners to shape ideas in new and original ways. Unfortunately, we still seem ill prepared as a profession to take advantage of opportunities that are available via this technology. In order for computers to have an impact on existing curricula and pedagogy, changes will need to be initiated with both teachers and policy makers participating in the process. The results will be evident in more meaningful and engaging learning for children in our schools, that incorporate the use of technology, in all its manifestations.

Over the last two decades the computer hardware capabilities and software options available to consumers have undergone significant changes. However, these changes have not been reflected in classroom applications of computers over the same period of time. Indeed, in many cases computers are being used to perpetuate the mundane, rather than act as a catalyst for innovation in pedagogy and learning. What is significant however, is that, whereas in the early 1980’s few, if any children in our classrooms, had computers at home. In contrast, today many of them do, and they have machines that are far more sophisticated than those used in the classroom. Thus, the school experience of computers is often limited from the very beginning. Parents are now demanding that schools provide their children with access to the technologies that are appropriate to their child’s effective learning. However, this interest is often not pursued once the machines have been purchased and are actually installed in the rooms. Anyone interested in education should be demanding not just the placement of computers in classrooms, but also that the machines be used to their full potential. At the present time teachers need more information about ways of using computers creatively in their programs, yet competing elements from other areas of the curriculum mean that they do not often have the time or opportunity to find out how computers could be incorporated into the curriculum more effectively.

**Learning With Technology**

Since the introduction of computers and calculators into educational contexts, educators have been somewhat sceptical about the appropriateness of their use. For the teachers of young children this was particularly evident
in the literature of the 1980’s (Anzelmo & Zinck, 1984; Cuffaro, 1984; Hill, 1985; Elkind, 1988). It was a time when the predominant view was that computer was not appropriate for young children and would, in fact, be detrimental to the development of social and language skills. It was further contended that, as a two dimensional medium, computer based activities were not as effective as manipulatives in developing understanding and skills in the early childhood years. Additionally, many teachers expressed concern that basic skills, such as computation and handwriting, would become obsolete if computer use was encouraged in the school context. Even in the early years of the present decade it was reported (e.g., Bailey & Weippert, 1992; Kaden, 1990) that early childhood teachers still believed that the introduction of computers into their classroom would replace the use of the traditional materials such as blocks, collage, construction, and paints, and would thus have a negative effect on learning potential in these formative years. Such views were often grounded in the developmental approach to learning which suggests that learners need to be able to manipulate materials in order to make sense of ideas and that using a computer without having such experiences would be detrimental to learning and the development. They are often reinforced by early childhood educators, such as those who responded to an article in the New York Times about the use of computer technology by children, one of whom said, “I cannot think of any case in which computers could be considered developmentally appropriate for children in nursery school” (as quoted in Bredekamp & Rosengrant, 1994, p.54), but as these authors go on to astutely assert “Computers and the myriad available software packages are far too complex and diverse for us to make a singular judgement of appropriateness or inappropriateness” (Bredekamp & Rosengrant, 1994, p.54).

It has also been suggested that far from being detrimental to learning, the use of technology in schools, can have a positive effect (Clements, Nastasi, & Swaminathan, 1993). This is not only apparent in terms of the social aspects of learning but also in relation to understandings and children’s motivation to learn. Clements et al (1993) have also suggested that we now stand at a cross-roads in terms of the use of technology in education. We can use it to reinforce existing practices or appropriate the technology to develop new curricula that are both more meaningful and stimulating to the learning process. If we choose the former route technology becomes an add on to the current curricula and often will consist of activities that act as a reward for finishing traditional work ahead of schedule, usually with software that reinforces content in a mechanistic way. In this context computers become a control device, rather than a resource that could be appropriated for learning. It is this second route that will be explored in this chapter. It is my
belief that until curricula change so that the use of technology becomes embedded in them, teachers will not use technology as a resource for learning with the children in their classes. This has to be achieved with current technology in classrooms. As Shade has stated “computer labs are not across the curriculum, they are across the hall.” (Dan Shade, personal communication, July 4, 1998). Additionally, at the present time we have curriculum documents that ignore the use and power that technology, in particular computer technology, can have for learning. This is most clearly evident in the areas of Mathematics and English, where as previously stated, there is a fear that the use of traditional skills would be harmed if computer based activities were promoted. Further, computers have the potential to create powerful problem-solving environments (Papert, 1980) and provide the resources for sophisticated investigations to access information from local environments, with collections of data with cameras, sensors, and palm top computers, as well as from the international resources associated with the Internet! Access to appropriate technology is the key issue in such scenarios that can extend thinking and learning in new ways to dimensions that we have not had time to even consider.

One potential area for the use of technology with children to create opportunities for collaborative learning has been modeled with students in the Computer Supported Intentional Learning Environments Project (CSILE) that originated at the Ontario Institute for Studies in Education (Scardamalia and Bereiter; 1991). In this project students from Year one of school have participated in collaborative problem-solving projects that have ranged from making animals to solving complex mathematical problems. The process involves sharing of notes in both text and graphical formats contained in a networked hypermedia system, and on-line discussions of the progression of ideas. Children are able to access each others notes in a systematic manner by searching for key words. There are many features of the CSILE environment that make it a good one for the development of a community of knowledge builders who reveal high levels of use of higher order thinking skills in their interactions and problem-solving. These include:

- projects are initiated by the children themselves,
- communication is often initiated and maintained by the students,
- children have a high level of control over their own learning,
- communication is not always mediated by a teacher,
- ideas are shared and a record is kept in the data base that not only consists of information / knowledge about specifics but also is a record of processes that have been adopted in order to solve a particular problem, and
competition is minimised as collaboration and the sharing of ideas come to the forefront.

The work has illustrated the ways in which such a learning community would not have been possible without the technology and reveals ways in which computer mediated learning can have a powerful effect on the ways in which children interact, access knowledge, build their own knowledge base and learn about objects, and ideas that are both a part of their world and part of future worlds.

We stand at the gateway of the new millennia with important issues to consider. How will our education system cope with even more rapid advances in technology? How can we prepare our children to lead productive and creative lives in the 21st century where the new information technologies will impact on nearly every aspect of their existence?

At the outset, it is important to emphasise that it is contended here that children learn best when:

- they are actively involved,
- there is an emphasis on experimentation, play, problem-solving, self-directed learning and co-operation,
- they are engaged in a rich variety of experiences,
- they receive positive responses to their attempts, and
- perceive some relationship to their real world knowledge and experiences.

With these features in mind it is evident that computers can make a unique contribution to learning in a number of ways. This is because:

- children like them,
- children are afforded the opportunity to play and explore (with good software) and get feedback that means if you have to make changes to your plan or idea in such a way that it is not a “big deal,”
- they can extend cognition,
- they can promote thinking and problem-solving skills,
- they can asset in building new understandings via explorations,
- they act as effective manipulatives (Clements, 1994) to:
  - offer flexibility,
  - facilitate the process of changing representations,
  - assist in storing and later retrieving configurations, and
  - are used to record and recall student’s actions;
they are a context for using and extending language,
they support the development of projects and/ or ideas, since in computer environments children can:
communicate easily; with each other, the teacher, and remote sources of information and people,
share their work and ideas with others easily,
explore, develop ideas and play with them and keep records of what they have done; and
computer activity allows children to collaborate on projects that encourage collaborative problem-solving.

Of course all these things are only possible in a learning environment that is stimulating and encourages active exploration of objects and ideas. Not all computer software has the structure or potential to achieve any of these things. Teachers and parents should be aware that both software and contexts for learning need to be conducive to problem-solving and the creative development of ideas and knowledge.

**Transforming Today Into Tomorrow**

It is suggested here that we need to consider five goals in order to make our classroom environments more effective in the years to come. These are:

- the integration of technology and curricula,
- the promotion of active learning, inquiry and problem-solving environments that engage the children in individual and collaborative work using higher order thinking skills,
- the use of technology to present and represent ideas,
- new definitions of play and a reconceptualisation of what constitutes a manipulative, and
- the development of media literacy skills that involve a critical analysis of the use of the technologies and the information derived from them.

**The Integration of Technology and Curricula**

It is suggested here that technology should be integrated into programs, so that its use becomes a natural or seamless aspect of the learning processes that are a daily occurrence in education. If this was achieved, learners
would be empowered and engaged with learning using technology as a just another resource that can assist them to think and present their ideas.

This will involve reconceptualising policy and practice.

The cyberostriches who make school policy are determined to use computers but can only imagine using them in the framework of the school system as they know it: children following a predetermined curriculum mapped out year by year and lesson by lesson. This is quite perverse: new technology being used to strengthen a poor method of education that was invented only because there were no computers when school was designed. (Papert, 1996 p. 25)

At present, there are many interesting projects going on in schools, but in a large number of schools computers are there as an “add on” for those children who finish work early, as a reward for finishing regular school work before the majority, or as reinforcement for the drill and practice of basic skills. It is recommended here that we should take time to reflect on the ways in which computer software can become an integral part of the curriculum, so that we can do things in different ways. For example, computer activities are embedded in the *Investigations in Number, Data, and Space* mathematics curriculum. A new version of Logo, called *Geo Logo* and *Shapes* software, a two dimensional version of Pattern Blocks and associated activities are built into units of work for Kindergarten to Year five children. The units of work contain on and off computer based activities that compliment each other.

In a similar way, the use of word processors must be built into the process writing approach, as should electronic books be part of the regular reading program which includes the use of innovating on text. There would even be a case for using interactive programs to assist children to develop phonic skills which are essential to the development of effective reading.

The use of software such *Sim Town* and the *Carmen San Diego* series could also reinvigorate the social studies curriculum. When using *Sim Town*, young children can create their own environment, and in the simulation experience learn about complex notions such as supply and demand, and engage with important environmental issues. This has been shown to be more effective than reading about such phenomenon or watching a video since the learner can participate in the process and experiment with changes in the system in dynamic ways. Other new technologies such as the use of palm top computers with sensors are now available at a cost, which facilitate children going out into their own local environs and conducting research about various aspects. Where this has been done with the generous
support of research funds the results have been staggering (Global Lab, TERC) and the students have indicated how valuable the experience has been in terms of their understanding of complex issues and use of task specific skills.

*Carmen San Diego* can extend problem solving, while at the same time taking the students on a journey in space, time, or over the world. The potential of *Carmen* to stimulate children’s interest in the associated topics, such as geography, history, and the exploration of space is readily apparent. A new dimension can be added to the learning environment which might already include study with materials such as books, video, and film. It enhances the learning environment by constituting another medium for exploration but also affords the opportunity for the student to actively engage with ideas in different ways that they might be able to with a book or video. Such variety of experiences enriches opportunities for making sense of our world and acts as a further catalyst for research.

These are just three examples of the ways in which computers can be integrated into existing curricula to create new and interesting ways of interacting and making sense of materials and ideas. Other opportunities exist for incorporating the use of the new information technologies in all areas of the curriculum and indeed more importantly across the traditional subjects area, where effective staff development is essential and needs to assume a high priority in strategic planning.

What is evident today as we approach the new millennia is that teachers should be provided with examples of how particular software and hardware can be incorporated into existing curricula so that they become an integral part of the program. They should act as additional resources or media for exploration and understanding of content matter and the develop skills. Unless this is made explicit computer use will remain and add on for teachers—another thing they have to cover, and this will be to the detriment of everyone.

**Technological Environments That Promote Active Learning, Inquiry and Problem-Solving**

Effective problem-solving environments are characterised by the use of higher order thinking skills and the use of metastrategic processes (Sternberg, 1985). They involve activity that:

- is authentic and therefore meaningful,
- is interesting and engaging,
- is sensitive to the need of diverse populations of students,
- is able to be achieved at different levels of understanding,
allows for initiative,

- can be extended in a variety of ways,

- can be discussed and summarised into statements that have meaning for the child,

- allows the child to use what knowledge he or she knows and then explore new concepts, and

- does not have one path to solution or has a variety of acceptable solutions.

There are a variety of computer based activities that can be regarded as being conducive to the development of problem-solving skills. Research (e.g., Clements, 1994; Yelland & Masters, 1994) has shown that the role of the teacher in scaffolding children’s learning is crucial to the development of such skills not only while the children are engaged in the task but also in the creation of a problem-solving environment that encourages young children to actively play and/ or explore the objects and ideas that they encounter. This has been the case with software ranging from Logo to interactive fiction on CD-ROMS, graphics, and presentation packages, and more recently the creation and development of on-line communities of learners. It resonates with the Vygotskian (Vygotsky, 1978) perspective that suggested that learning occurs on a social plane before it is internalized and made sense of by the individual learner.

Several studies (Yelland, 1995a; Yelland & Masters, 1994; Yelland & Masters, 1995b) have noted children’s engagement with learning and involvement within a Logo environment and the activities that were part of it. When analyzing these, it is apparent that there are a number of factors that contributed to the quality of the environment in terms of affect and specific performance outcomes. For example, in one study with Year three children (Yelland & Masters, 1994) the environment was structured so that it promoted collaboration and was conducive to problem-solving in the following ways:

- the children were encouraged to work **collaboratively** in their pairs and actively encouraged in this if it was apparent that they were not doing so,

- the children were asked to **think and discuss their plans** before they started to direct the turtle in order to ensure that they might choose the most efficient route,

- the researchers **supported exploration with questions** about moves that were designed to facilitate not only reflection about strategies, but also to consider the modification of strategies that were not optimal,

- groups sessions took place in which the children brainstormed ideas and shared problem-solving strategies,
researchers provided models as a base that children could build from, and
open ended tasks were provided that had intial structure but then the children could decide their own strategies for completion.

In contrast, in another study (Yelland, 1998), the children were only given the instructions for specific tasks and adult intervention was minimal. They were advised that they would receive help if they needed it if they experienced difficulties in using the computer (technological scaffolding), and they frequently needed assistance when they seemed to be totally stuck (affective scaffolding), but no strategies for solutions (cognitive scaffolding) were provided.

Some of the differences in outcomes between the two situations were clear and unambiguous.

The children in the earlier study:

- completed the tasks quickly and efficiently because they were highly motivated,
- demonstrated high levels of collaboration in order to solve the task,
- spent more time on task and levels of concentration were high,
- were able to explain their strategies they were able to articulate what they were doing and planning in a very effective manner, and
- did not become frustrated when things did not go as planned or they made errors. We were able to support them in their thinking so they could extricate the turtle from the problem situation and this gave them increased levels of confidence and experience so that if the same or similar situation emerged later in the task they were able to gradually figure out the solution independently.

In contrast, in the second study the children:

- rarely spent time planning and launched into the task immediately without consideration or concern about what might be the best way to complete the task requirements,
- spent a great deal of time off task,
- would leave a task unfinished rather than work through problems or attempt to rectify errors,
- did not demonstrate high levels of collaboration. However, it was evident that the gender composition of the pair was of importance when considering this aspect of performance, with girl pairs showing more collaborative behaviours than boy or boy/girl pairs, and
displayed a sense of frustration, loss of confidence and motivation for the task when they did not meet the task requirements.

The research thus supported the use of scaffolded learning in the technological environment, so that learning experiences are not only more meaningful and engaging for young children, but also so that children may use metacognitive strategies more effectively and consistently. Furthermore, two of the most outstanding observations of these studies has been the high level of engagement that the children had with the tasks and their applied use of mathematical concepts well beyond that expected of them in traditional curriculum documents. This was particularly salient when the children planned their own designs for computer projects. An example is shown in Figure 1. When they did this it was evident that they were:

- analysing geometric figures in order to determine their role/place in the final product,
- understanding that shapes can be moved to new locations, and flipped and turned without loosing their essential properties, that is, the angles in a square were always 90 even when the square was tilted, and
- using their mathematical knowledge, especially related to number and operating on them to produce length and turns for different functions.

At the planning stage, a planning sheet was developed and proved to be particularly useful in assisting the children to organise their ideas in a coherent form. It also served the function of helping the children to decide what constituted a viable project. At first when they made elaborate drawings they did not appear to recognise how difficult they would be to develop as Geo-Logo designs. However, when they came to record their ideas as component parts and procedures it became immediately apparent that the plans would have to be considerably modified in order to enter them as code. The resulting graphics not only indicated a sound understanding of basic mathematical ideas, but also, a well developed skill in programming involving the development and combination of procedures.

What we often see in classrooms today is almost the complete opposite of this. Computers are used to keep children who have completed their required work early or as a reward for good work in many cases. Research (Clements, 1994; Yelland & Masters, 1997) has shown that not only does the computer work need to be embedded within the curriculum, it also needs the teacher to take on an active role in the process, not only to scaffold learning but also to provide opportunities for children to brainstorm problem solving strategies and to discuss and share solutions and techniques.
Figure 1. "Sailor" by Alice and Alisya
Technology to Present and Represent Ideas

Kid Pix Studio enables a child to create pictures with a new media and then extend this work by incorporating it into a slide show presentation that may be heard and seen on screen. In a similar way children can present their stories and or research using the package and incorporate information that has been scanned in from books, photographs, or via a digital camera or video source. The software is particularly relevant for storytelling by young children because it means that they can develop their ideas using oral language and present their story in both pictorial and verbal forms without having to manipulate text which is a very difficult skill for them. An example is provided in Figure 2. In this instance a five year old, Year one student, created a series of six pictures telling a story about her pets. She then recorded a narrative for each page and created the slide show using Kid Pix so that the “pages” were sequenced and there was a transition from page to page in her electronic book. The result was not only an innovative piece of literature but also an exciting event to both create and listen to, that all children could participate in.

Figure 2. My dog and cat like to go for long walks
Additionally, the software has features which are unique to creations with technology. These include a digital puppet section in which you can create your own puppet and develop both movements and sounds to accompany it. An interesting feature of the drawing package is that of Moopies. In the Moopies mode a young child can create a drawing using a multicolored paintbrush, for example, and then when the creation is finished the painting becomes animated. This can be done with a range of media from trees that when located seem to sway in the breeze to a log fire burning at a camp site.

In terms of developing experiences that will act as a focus of learning for young children, Kid Pix offers opportunities that are not available in the real world, and it is not suggested here that the use of kid pix should in any way detract from the use of traditional media. This is important to state as the suggestion that this type of use of technology will lead to the demise of early childhood practice as we know it is often touted as a justification for not using computers in the first three years of school. Use of packages like Kid Pix will not replace the role of crayons and paints or other traditional art materials, but they compliment such experiences for the young child. One of the strongest traditions in early childhood education is centred on providing a variety of experiences from which the child may extrapolate generalisations and contradictions which lead to new discoveries being made. In this way experiences with technology not only afford the opportunity to extend traditional media but also create opportunities that would not be available without the use of technology. However, it is also apparent that the use of this media can not only enhance presentations but also offer alternative ways of representing ideas and presenting research that would not be possible without the technology. It is also evident that engaging with software like Kid Pix can provide a myriad of opportunities for problem-solving and creative exploration with new media if used in an unstructured way in a programme.

In a similar way, upper elementary students are often required to present their project work in a written or oral format. Those who may want to do this with technology and software such as *Powerpoint* may have the facilities at home or school to do this but rarely have the opportunity to actually go through the presentation process since their school may not have the projector needed in order for a whole class to view the work effectively. In fact, in many instances the main barrier to the use of technology in the school context is that funds are not made available to purchase equipment. In times of financial restraint it is often difficult for educators to justify the expenditure of large sums of money on expensive pieces of technology. A new mind set is needed to view such machines as the basic equipment for an effective education rather than a luxury.
As stated previously, one of the initial reactions to the use of computers with young children was that they would cease to have opportunities to interact with three dimensional materials. Additionally, it was thought that many of the activities associated with computers would not encourage creativity and in fact required only that the child press buttons. However, the potential of computers to enable children to encounter and play with ideas has been increased over the past five years with hardware and software that allow the child not only to manipulate objects and ideas that are available in the real world but also to do things that are not possible. This is especially true of software applications such as Logo and Kid Pix where you can create objects and play with them in a variety of ways using the “tools” available to you in the package. In such environments the children often spontaneously discover mathematical ideas and engage in interactions with other learners that would not have been possible without the technology.

Into this body of literature, we are now faced with the potential of the new information technologies not only enhance learning but assume the mantle of edutainment; that is the fun aspect of learning, as opposed to the more pedantic and traditional forms, where the learner is passive and the teacher the conductor of content and actions.

Certainly the nature of the concept of “toy” has changed considerably over the last decade with the advent of new technologies which have had the effect of bringing additional dimensions to objects that had previously been relegated to a passive role in their interactions with their owners. Now dolls can communicate their emotions to owners, and electronic devices have more appeal than simple objects that are simply made of basic materials. As Papert (1996) suggested “…our concern must be to ensure that what is good about play is at least preserved (and hopefully enhanced) as the concept of “toy” inevitably changes” (p. 188). Papert predicts that social toys will develop in many directions, one that will be the creation of “digital dolls” that have all the characteristics of conventional dolls but only exist as bits in a computer.

*My make believe castle* is an example of digital dolls that exist in a mythical computer microworld (Figure 3). It contains all the basic elements of traditional play scenes such as the medieval castle complete with prince, princess, knight and wizard. A witch can be sent wandering in the forest looking for basic ingredients for her spell while the prince looks on and then goes riding back to his home. These “dolls” can assume identities as defined by the players but are different than dolls made of atoms, yet they
are still toys since they assume the same functions of traditional toys. Papert (1996) envisages a more dynamic role for such toys in which they are able to assume personalities that are defined by the user rather than at the production level and further that such toys are transportable to a wide variety of digital worlds where the child who has been responsible for the transportation embark on new adventures, take risks, and create new identities and stories that stimulate, excite, and promote learning in a different dimension.

![Image of a make believe castle](image)

**Figure 3.** My make believe castle

In a similar way, what we now consider as a manipulative is under scrutiny. As Clements & McMillen (1996) have stated, “What is concrete to the child may have more to do with what is meaningful and manipulable than with it’s physical nature” (p.273).

Clements (1994) has also highlighted the unique characteristics of computer manipulatives and suggested that they include:

- flexibility,
- the ability to change arrangement or representations,
- the storage and availability of configurations,
- recording and replaying children’s actions,
- linking the concrete and the symbolic and providing feedback,
- dynamic linking of multiple representations, and
- focussing the children’s attention and increasing motivation.
The challenge for parents and educators is to maintain a balance between the real world (3D) toys and the new digital ones. Clearly there is a space at the moment to include both in play opportunities for young children and in many ways the digital ones are inferior since, like digital books, they cannot be cuddled and taken to bed to snuggle up with! Yet the aspect of software like *My make believe castle* which makes it more attractive than many examples of software, and dolls, which come with ready made personalities is that the characters can be instructed or shaped by the user and such identities can be changed as the game changes.

**Developing Media Literacy Skills in Schools**

I was in a classroom in New York city last year engaged in a discussion with a year five class about their research projects and the use of the Internet in the process. There was a computer in the classroom that had access to the Internet, but most of the children did their research outside of school hours, either at home or in libraries that were connected and had the added advantage that if you could not find any information on the web you were located near a wide range of print information. Most of the children indicated they felt the information they found in books was superior to that which they discovered on the web, and they also indicated that it took a lot less time to locate. One student noted that it depended on the type of information you wanted. She said that if you wanted the current weather, profiles of sports personalities, or information about the planets, there were sites that could provide you with the latest information that no books could offer. We then went on to talk about the authenticity of the information that was being retrieved and the students embarked on a heated and well argued debate about the pros and cons of print versus the Internet and the censorship and sponsorship of particular viewpoints, and it was not possible to. What was interesting about the whole context of these discussions was the debate, and the ways in which the children were able to articulate their criticisms of the various forms of information sources and argue the relative merits of each. The school had a philosophy that encouraged such discussion and dissent. The students not only engaged in debates about the relative merits of the internet, but they also discussed the way in which women are portrayed in the media, how advertisers target their campaigns to decide how they, the students, should spend their money, the ways in which products are marketed after a blockbuster film to saturate the market and make huge profits, the notion of web TV, the glorification / presentation of violence on TV, film
and video games, children’s programs on Television, and many other such issues. What is important here is that these students were becoming media literate in the process. They were not accepting that the various manifestations of technology were good per se, they were using, evaluating and often critical of the impact on their lives. They were developing strategies to help them decide which form of technology was appropriate for the task they were in the process of doing. They were not simply accepting that it was inevitable or good that they should use technology. We need to provide all of our children with such opportunities for discussion and scrutiny of the various issues that face them and their families today. These are children who may, by the end of elementary school have witnessed 8,000 murders and 100,000 acts of violence on the TV screen (Levin, 1998), who may average 35 hours a week watching TV or playing video games, who watch 20,000 advertisements a year, and cartoons which contain more than 20 acts of violence per hour.

At the present time the use of the Internet in classrooms is being hailed as the advent of the century. Access remains a problem, as does the quality and authenticity of the materials that are located. Further, it has been said that we live in an era of Data Smog (Shenk, 1997). Skills in the location of information that is useful are becoming very important as are skills of deciding which parts of the information are useful.

CONCLUSIONS

We have to ask ourselves the question: How has our use of technology improved as machines have become more sophisticated? In his book Being Digital, Negroponte (1995) wrote:

In the 1960’s, most pioneers of computers in education advocated a crummy drill-and-practice approach, using computers on a one-to-one basis, in a self-paced fashion, to teach those same God-awful facts more effectively. Now, with the rage of multimedia, we have closet drill and practice believers who think they can colonise the pizzazz of a Sega game to squirt a bit more information into the heads of children, with more so called productivity (pp. 198-199).

With this in mind it could be construed that much of the software that is available for use in early childhood classrooms can be characterised as “electronic crack for kids” (G. Stager, personal communication, July 22, 1995). Teachers have to be particularly discriminating in their choice, and
use of, computer applications and ensure that the primary goal of using the resource is engagement and learning, via active exploration and the deployment of problem-solving processes. This chapter has attempted to show how this can be achieved with reference to specific examples. It has highlighted environments that are conducive to meaningful engagement with ideas, via the use of technology, and provided some ways in which educational contexts can be organised in order to achieve mastery over the machine, while motivated by the task and the magic of the moment. In the immediate future the challenge will be to provide opportunities for children to extend exploration in technological environments in more dynamic ways with the delivery of virtual reality experiences via the Internet.

Negroponte (1995) has also suggested:

While a significant part of learning certainly comes from teaching—but good teaching from good teachers—a major measure comes from exploration, from reinventing the wheel and finding out for oneself. Until the computer, the technology for teaching was limited to audio-visual devices and distance learning by television, which simply amplified the activity of teachers and the passivity of children.

The computer changed this balance radically. All of a sudden learning by doing became the rule rather than the exception. Since computer simulation of just about anything is now possible, one need not learn about a frog by dissecting it. Instead, children can be asked to design frogs, to build an animal with frog-like behaviour, to modify the behaviour, to simulate the muscles, to play with the frog.

By playing with information, especially abstract subjects, the material assumes more meaning (p. 199).

It is important for us to realise that technology has the potential to change the context of school learning and pedagogy. However, it will take time and brave decisions that are difficult to make in a decade where “accountability” and “competency based learning” are the war cry of government agencies. Such decisions will require us to rethink the role of teaching and learning for the new millennium.

References


