People in Taiwan are fascinated by technology and its part in the success of Taiwan becoming a leading country in the technology industries. This is accredited to the efforts of the government and of all citizens. This is also seen as reflecting Chinese values of academic excellence, and the effect these values have had in Taiwan’s success as a nation. Parents believe that success in life is rooted in a good education, especially in the early years. This paper provides an overview of early childhood education in Taiwan and how children learn through the use of technology. Key implications for early childhood teachers are highlighted.

Introduction

Since 1999, the government of Taiwan has invested heavily in high-tech production and has become a global centre for the electronics industry (Babb, 1999; Taiwan Review, 2004). Taiwan’s output of computer products, such as personal computers, monitors, and scanners, has given the nation prominence in the global industry (Babb, 1999). Taiwan has been ranked as the world’s fifth most competitive economic country and is considered to be a leader in the widespread use of information and communications technologies (Dahl & Lopez-Claros, 2005). People in Taiwan are strong supporters of education in computer literacy and information technology. Technology education has flourished in Taiwan. In part this is due to the new curricula emphasising technological literacy and foreign language proficiency that has been in place since 2000. Computer literacy is now considered a core curriculum subject area at all levels (Ministry of Education [MOE], 2005a). The government has even promoted media as a second curriculum subject area (MOE, 2006) to reinforce students’ education in information and internet technology.
Parents’ expectations have also contributed to the success of technology education. Having long been influenced by Confucianism, most parents highly value children’s academic achievement (Hsieh, 2004; Lin & Tsai, 1996; Zhang & Carrasquillo, 1995). Children in their early ages are taught to read, write and do simple arithmetic before they start school (Schneider & Lee, 1990; Zhang & Carrasquillo, 1995). Additionally, children attend skill developing classes after school to meet their parents’ expectations in dancing, drawing, mental arithmetic, piano, English, or even computer classes. Not only has English been requested as a common course in kindergartens but also computer classes have been included to recruit new students in many private kindergartens. Many young children also have ample opportunities to access computers at home (Fang, 2003). Young children already have background knowledge related to multi-media and computer technologies before they attend preschools or kindergartens.

Playing computer software/video games is a very popular leisure activity for children and young adolescent in Taiwan (Tseng & Liang, 2002). Computers have been considered as multifunctional learning tools and toys to help children’s cognitive development in many studies. Yang (1998) accredits the educative function of computer software, noting that computers are versatile tools that can assist children’s growth at home. Children demonstrate their love and active involvement in learning through the implementation of information technology in kindergarten (Fang, 2004). Lü, Zhang, Lin, and Xu (2007) promote children’s literacy abilities through the use of international pen pal e-mail and blogs.

This paper illustrates how computer technologies have been used to promote Taiwanese children’s learning by focusing on three aspects related to current technology education. The first section describes current preschool education in Taiwan, including the cultural value of education and government support of technology education. The second part explains computer technology as a tool for children’s cognitive development. The last part presents the implications for early childhood education.

**Current preschool education in Taiwan**

Children at age six have been required to attend schools since the inauguration of the nine-year compulsory education program introduced in 1968 by the MOE (2005b). Although preschool education has not been made mandatory in Taiwan, the importance of preschool education has become the main focus of educational innovation in the past decade. The policy of ten-year compulsory education, which includes one year of preschool education, has now become the focus of the government education reforms (Fang, 2004).

The curriculum standards for preschool education issued in 1987 include six core areas: health education, play, music, work, language arts, and general knowledge of science and mathematics (Hsieh, 2004). Thematic teaching or unit teaching is also recommended to integrate the six core areas into curriculum activities (Zheng, 2004).

Early childhood education in Taiwan includes kindergartens, educational organizations, supervised by the Ministry of Education (MOE, 2005), and childcare centres, that are regarded as social welfare organisations, supervised by the social departments. Kindergartens are managed privately or publicly and teachers who work for kindergartens are known as kindergarten teachers, while teachers in childcare centres are called caregivers (Hsieh, 2004). Privately owned kindergartens dominate the
majority of preschool education organisations, and childcare centres are all run by private organisations. Public kindergartens are either affiliated with elementary schools or are run by the local government. Preschoolers (ages three to six) are expected to attend at least one year of kindergarten or preschool before they attend elementary schools, however, many young children attend preschools at the age of three.

Because there are no standard textbooks for preschool education, schools have their own choice of contents and instructions (Hsieh, 2004). This makes early childhood curricula rich and more flexible. Most preschool curricula are designed to meet the needs of parents and the society (Fang, 2004; Hsieh, 2004; Lin & Tsai, 1996). In order to distinguish their programs and to recruit more students, many privately-run kindergartens adapt preschool education programs from other countries. These programs include Montessori, Waldorf, the Reggio Emilia approach, and High/Scope (Hsieh, 2004; Zheng, 2004).

Although the MOE has issued preschool education standards, many kindergartens develop their own curricula heavily focused on the needs of parents (Hsieh, 2004). To meet their needs, handwriting, art, mental arithmetic, mathematics, English, and computer activities are implemented in the kindergarten classroom (Hsieh, 2004; Lin & Tsai, 1996). Computer skills related courses have become honor programs in many private preschools to recruit more students (Lai & Chiu, 2006). Bilingual kindergartens or even kindergartens where only English is spoken are also very prevalent and popular in Taiwan (Zheng, 2004).

The cultural value of education

The cultural values and beliefs of parents reflect the way they rear their children. Traditional Chinese culture which emphasises the importance of family and education sets the stage for early childhood education. Based on Confucianism, becoming a well-educated person has the most prestigious social status in Chinese culture. The majority of parents believe that to have a brighter and successful future is to achieve academic success, and they take education of their children seriously. They believe that early learning is related to academic success hence most parents start to plan a child's education at a very young age. There is a strong belief in Taiwanese society that you must "not let your child lose at the starting point" (Lin & Tsai, 1996, p.162). Helping children to excel academically is the predominant expectation for most parents.

To help young children achieve such success, there are many cram schools (or so-called Buxiban) in Taiwan. Parents and other family members consider computer technology literacy and the ability to speak English as essential skills for children to connect with the international community. Hung's (2004) study gives a vivid picture of how learning English has become a national movement:

With the rapid advance of technology, the development of international economy and business … Not only has English been taught for the fifth grade of elementary schools, but also students and adults hurry to a short-term language institutes to learn English after school or work (p. 1).

Providing both English and computer programs has become a selling point to recruit more children for preschools and kindergartens in Taiwan. Because of the declining rate in birth in Taiwan, parents tend to have one or
two children, and they are desperate to educate their children to become the outstanding students. In this sense, allowing young children to have access to computer technology has become prevalent among Taiwanese families (Yang, 1998). In Lai and Chiu’s (2006) study, more than 60 percent of parents agreed to have computer programs in kindergarten settings. To meet their needs, kindergartens offered such programs (Lai & Chiu, 2006). In Fang’s (2004) study, most teachers and administrators agreed with the integration of information technology into early childhood curriculum. They believed that integrating information technology into the curriculum to be far more important than discussing the appropriateness of introducing computer programs into schools since young children already have access to computers outside school settings (Fang, 2004).

**Government’s support on technology literacy**

There are two key points that the government has made about the success of a high-tech centre today in Taiwan. These include various educational reforms, policies, and the government’s support of the establishment of high-tech parks, such as *Hsinchu Science-based Industrial Park*, to attract talented electronic engineers to work in Taiwan (Babb, 1999).

Increasing the competitiveness of e-generations is one of the leading goals among the Taiwanese government’s policies. The new curriculum standard of *Grade 1-9 Curriculum* highlights the importance of technology education in the following seven major learning areas: Language Arts, Health and Physical Education, Social Studies, Arts and Humanities, Mathematics, Science and Technology, and Integrative Activities (MOE, 2003). To promote students’ abilities for lifelong learning the ministry suggests that students “Acquire the ability to utilize technology and information” so that they can access, analyse, and evaluate information for lifelong learning through technology. To develop this ability, science and technology are subsumed as one of major learning area in the *Grades 1-9 Curriculum* for Elementary and Junior High School Education.

In order to meet the needs of a rapidly changing society and the advancement of technology, the government has promoted media as a second curriculum subject (MOE, 2006). The administrative plan: *Policy White Paper on Media Literacy Education* outlines the role of media education:

> As the hours children and youth are exposed to the media (including the Internet and computer games) already exceeds the time they spend in the classrooms of elementary and high schools, it could be claimed that the media is the first education curriculum rather than the second (MOE, 2006).

For their efforts to increase students’ competitiveness, educational authorities are urged to “pay special attention to education through the media,” and are encouraged to create a digital learning environment (MOE, 2006).

**Computer technology as a tool for children’s cognitive development**

As noted above, computers play an important role in family activities, and playing computer/video games is very popular among teens and children (Tseng & Liang, 2002). There are almost 60 million online video game
players in Taiwan, and 43 percent of the players are under age 19 (Tseng & Liang, 2002). Playing video games has become one of their daily activities, and much game software has been found to be helpful to students in developing mathematical and scientific concepts, as well as problem-solving and languages skills (Rosas et al., 2003; Dylak & Kaczmarska, 2001). Students in Taiwan are motivated to learn if they are playing video games in their leisure time. One study found that students who have played video games since they were in elementary school perceive video games to be helpful for learning a second/foreign language (Lee, Cheon, & Key, 2008). Through video games students in Taiwan use different language learning strategies to solve language barriers (Lee & Key, in press). This implies that video games can be used for learning outside the classroom. Although video games still have negative influences on players such as aggression and addiction (Ballard & West, 1996; Hauge & Gentile, 2003), playing such games has become a common activity among teens.

A computer is also an important tool for children's cognitive development and the development of family literacy (Nelson, Duvergé, Gary, & Price, 2003; Yang, 1998). Nelson and others (2003) believe computers can be used as a multifunctional learning tool. Yang (1998) accredits the educative value of computers in family activities by asserting that computers are helpful for children's cognitive development, and that they can promote children's development at home because computers can be used as story books (digital books), tape recorders, TVs, or even toys. Computers can engage children in learning through visual (pictures and animations) and auditory (sound and music) interactions. They can provide different stimuli to children of different ages at different times to promote cognitive development (Yang, 1998).

In addition to the educational value of computer technology in the family, many studies in Taiwan have demonstrated how kindergarten teachers apply computer technologies to help children's cognitive development (Fang, 2004; Liang, Wang, & Cui, 2005; Lü, Zhang, Lin, & Xu, 2007). Most children increase their interaction with peers and adults (teachers) and learn how to negotiate with peers to take turns when they play with computers (Fang, 2004; Lü, Zhang, Lin, & Xu, 2007). To take advantage of the positive use of computers, teachers have introduced them into kindergartens in the following two ways: learned as a skill in a computer classroom, and integrated into teaching (Lai & Chiu, 2006). Seventy percent of kindergartens in central Taiwan teach children computer skills in computer classrooms. Children learn basic computer skills using computer software, and most instructors are computer teachers rather than kindergarten teachers (as cited in Chiu & Chuang, 2004). Such teachers integrate computers into thematic teaching, and students not only learn the basics of computer hardware but also learn how to use a computer to draw pictures, to print their works, and to watch movies (Fang, 2004).

Through the implementation of information and computer technology, children develop their abilities to negotiate with others. They learn to be patient with each other while waiting for their turns to play with the computers, and computers also help them to develop the concept of shapes, symbols, and the sequence of numbers. Computers are used as toys to motivate students to learn, and to develop children's social and cognitive skills (Fang, 2004).

Likewise, a study conducted by Lü et al. (2007) has found that computers promote children's cognitive development and social skills. They have implemented the 'International Netpal Project' into their thematic teaching.
Children in Southern Taiwan have been netpals with a kindergarten class at a Montessori school in the United States and with a picture book writer in Japan through email. The email contexts include pure texts, pictures, and pictures with texts. The results have indicated that children understand that computers can be used to find information through the Internet, to write (type), to draw pictures, to see pictures on others' websites, and to send emails. They also learn that computers can be used for video conferencing. This study has revealed that children enjoy using computers and have rich peer interactions with others. Children have helped each other in solving problems while using computers and have shared their own experiences. Children have also increased their interests in printed words and have improved their reading and comprehension skills. They have increased their writing skills and sometimes have created their own symbols to express their ideas in writing (Lü et al., 2007).

In sum, kindergarten teachers in Taiwan have been introducing computer and information technology to their classrooms. The results have revealed a positive improvement in children's cognitive and social development. The results of these studies imply that computer and information technology can be implemented in kindergarten curricula to support children's learning and development. However, to achieve higher success in implementation, kindergarten teachers’ competence in integrating such technology also needs to be improved (Fang, 2004; Lai & Chiu, 2006).

**Conclusion**

Technology literacy is a part of everyday activity for young children in Taiwan. Kajder (2004) claims that teachers need not be tech savvy, but knowing the “right tool, right task, and right student” is very important (p. 7). To use technology effectively, educators need to know how to support their students’ learning styles and how to implement appropriate software in the classroom.

As argued in Chiu’s (2006) study, the majority of educational software is not appropriate for children because of age inappropriateness. To help teachers seek the appropriate software to foster children's cognitive and social development, they need to know how to select appropriate technology. By adopting an appropriate technology-based curriculum, teachers can become strong proponents and advocates for children. As shown in early childhood classrooms in Taiwan, young children learn to work on technology at an early age, and parents, educators, and others involved in children's education are committed to their education through the use of technology-related activities. The more they understand the appropriate use of such activities, the more they can assist their children's cognitive and social development. When competent teachers understand the use of technology and how it can best be used to enhance learning, they can strategically support children's learning and development. In doing so, students can also become technologically competent, which will likely make them more competitive in future job markets.

Early childhood teachers’ practices are based on their cultural belief that children should have the opportunity to access technology at an early age and to experience different kinds of skill-oriented activities. Understanding their way of implementing technology has universal implications for educations as all educators and parents strive to promote their children's development and learning. The following suggestions can be used in a classroom of young children:
Provide ample opportunities for children to play with technology-related activities and encourage their interactions with each other.

Introduce children to different technology-related activities such as netpals through the use of emails in order to interact with children from different countries.

Increase children’s interests in the printed word, and allow their creative symbols to express their ideas.

Inform parents and family members about children’s technology-related activities at school in order for them to reinforce such activities at home.

Educate teachers about the effective use of technology because when they have knowledge about this, teachers can support children’s learning and development.

References


