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Using Technology in Pre-school Education

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Technology is the collection of machines, processes, methods, transactions, systems, administration and supervision mechanism, which serves as a bridge between science and practice and helps meet human needs using available information, materials, sources and energy. The developments in technology and educational aims follow a parallelism, which requires the use of technological products at different education levels to improve thinking and learning forms. It is imperative that children are introduced to technology starting from pre-school ages. An education setting surrounded by suitable technological products both promote, the children's development and increases motivation to learn. With this respect, this study was carried out to investigate the contribution of technology to children's developmental areas, technology use in pre-school ages, the role of educators in technology use in pre-school ages, and to increase consciousness drawing attention to the topic since limited number of research with limited scope was found in literature.

Keywords: pre-school education, technological products, technology use in pre-school programs

Introduction

Due to the rapid developments in science and technology, children today grow up in technology. Technological developments influence the structure of education, teaching-learning environments and learning process. In order to adapt to developing technology, benefit from opportunities technology provided for people, and catch up with technological changes, there need to use technology in every stage and area of education. The use of technology is very important to improve the quality of education and support the children's developmental areas in pre-school education as well as in every stage of education.

Technology covers the efforts to determine human needs and fulfill these needs using available knowledge, materials, sources and energy. Computer and other electronic products are handled in the term "technology" (Arı & Bayhan, 2000). Technology, which enables systematic knowledge to be applied in

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practical areas systematically, has been defined as all machines, processes, methods, transactions, systems, administration and supervision mechanism, which serves as a bridge between science and practice and is utilized in the process of science being applied systematically in problems related to production, service, transportation, etc. (Alkan, 2005; Saban, 2006). Technology could also be defined as the ability of humans to overcome biological restrictions (Aktaş-Arnas, Günay-Bilaloğlu, & Aslan, 2007). Technological developments and educational aims go parallel to each other, which provide a lot of possibilities to improve thinking and learning.

Edwards (2005) stated that technology cannot be thought to separate from education (Stephen & Plowman, 2008). The NAEYC (National Association for Education of Young Children) (1996) pointed out that technology needs to be effectively integrated in educational programs. According to Fischer and Gillespie (2003), the educator's role in children's effective use of technology is important. Lesisko (2005) stressed that a good planning is required for effective use of technology in educational settings and stated that this process is going to be difficult for both educators and children, if planning is not carried out effectively (Lesisko, Wright, & O'Hern, 2010).

NAYEC (1996) reported seven standards for pre-school educators to be able to use technology effectively in educational settings. While making use of technology, educators need to pay attention to:

(1) Age, developmental traits, interest and needs, cultural characteristics and individual differences of children;

(2) Supporting children's developmental areas (cognition, language, psychomotor, and social-affective development);

(3) Its ability to be integrated in learning environment;

(4) Accessibility for all children and their families;

(5) Providing suitable role models, supporting problem-solving skills and not involving violence;

(6) Working collaboratively with families;

(7) Having required knowledge and competency about technology use.

It is vital that children are introduced to technology at early ages. Educational environment surrounded by suitable technological materials will both support the children's development and increase their motivation to learn (Çelebi-Öncü, 2010). Researches show that the impact of technology use to support education has on children's developmental areas (Clements & Swaminathan, 1995; Fletcher-Flinn & Suddendorf, 1996; NAYEC, 1996).

The use of technological products in pre-school education helps develop various learning strategies supporting technology developments of both children and educators (Kandır & Orçan, 2010). Technological products which are used according to children's developmental traits and needs provide them with the opportunity to live the information age. Children whose developmental areas are supported gain suitable knowledge in making best use of and developing their potential. Therefore, children should be encouraged to develop different perspectives in pre-school education using technological products and helping them to have rich experiences. It has been observed that there are limited comprehensive studies on effective use of technological products in pre-school education. With this respect, this study was carried out to investigate the contribution of technology to children's developmental areas, technology use in pre-school ages, the role of educators in technology use in pre-school ages, and to increase consciousness drawing attention to the topic since limited number of research with limited scope was found in literature.

The Impact of Technology on Children's Developmental Areas

Since development in pre-school ages is very fast, it is necessary to keeping up with this development educationally and increase children's development to the highest degree possible. Technology use has important contributions to support children's developmental areas (NAYEC, 1996; Arı & Bayhan, 2000; Clements & Sarama, 2003; Inan, 2003). Forcier and Descy (2008) stated that children who have different skills and pre-knowledge get the chance to work collaboratively and can learn from each other. According to Jonassen, Howland, Marra, and Crismond (2008), technological products increase children's motivations to learn and contribute to intellectual development encouraging inductive thinking and problem-solving skills.

The impact of technological products on developmental areas is a gospel truth.

When studied the terms of cognitive development, technological products enable children to learn various concepts, realize different characteristics of entities, understand piece-whole relationship, develop problem-solving skills, develop cause-effect relationships, develop mental processes, such as reason, judgment, memory, perception and attention, develop feelings of curiosity and discovery, for the information learned to be more permanent, motivate them to learn and develop skills like making decisions and critical thinking (NAYEC, 1996; Clements & Sarama, 2003; Cooper, 2005; Mitchell & Dunbar, 2006; McCarick & Xiaoming, 2007).

With regard to language development, technological products giving the chance for children to speak, think, listen, tell and communicate with each other positively affect the children to improve word treasure, receptive and productive skills (effective listening, explaining, questioning, giving orders, making requests, guessing, dramatizing, re-telling, etc.), communication skills, reading writing skills, audio-visual perception skills, and the skills to express emotion, feeling and dreams (Clements & Sarama, 2003; Cooper, 2005; Mitchell & Dunbar, 2006; Brewer, 2007; McCarick & Xiaoming, 2007).

One of the developmental areas that technological products contribute is psychomotor development. Small and big muscle developments, hand-eye coordination, the ability to use the body in a coordinated way and body flexibility skills in children interacting with technological products in pre-school ages are supported (Arı & Bayhan, 2000; Mitchell & Dunbar, 2006; Çelebi-Öncü, 2010).

In terms of social-affective development, technological products support the children's abilities to enrich emotion, behavior and thinking skills, improve self-respect and self-confidence, develop a sense of belonging, making decisions and taking initiatives, overcome social problems with trial and error, develop sense of success, take risks knowing that mistakes are natural, learn with feelings of pleasure and happiness, cope with emotions, improve pro-social skills (helping, cooperation, sharing, empathy, waiting for their turn, etc.), improve the skills to overcome fear and anxiety, respect differences, develop skills to behave in a way that will not endanger self and others (Arı & Bayhan, 2000; Cooper, 2005; Mitchell & Dunbar, 2006; McCarick & Xiaoming, 2007; Stephen & Plowman, 2008).

The most effective learning for children at pre-school ages takes place with games. It is important to use different materials along with technological products in order to enrich children's learning environments (Işıkoğlu, 2003; Cooper, 2005; Siu & Lam, 2005; McCarick & Xiaoming, 2007). It is needed to structure a learning environment with a good quality to support children's effective learning and development (Kandır, Özbey, & Inal, 2010). The selection of technological products to be used in educational settings is determined by children's level of development, objectives, gains and concepts in pre-school education programs, and finally general characteristics of the school (Inan, 2003). Mitchell (2007) stated that culture, content, fostering

creativity, acknowledging the freedom to discover and children's developmental stages are important in choosing technological products to be used in early childhood programs. Technological products used in pre-school education settings need to be suited to modern technology and be equally accessible for all children (Tuğluk, 2010).

Computer, computer-supported educational software, the Internet, projector, overhead projector, TV (television), camera, video-camera and CDs (compact disk) could be viewed as technological products that can easily be integrated into pre-school education programs and support children's developmental areas (Mitchell, 2007).

Technological Products and Their Use in Pre-school Education

An educator's role in preparing, organizing and using appropriately technological products is very important.

Today, children meet computer at very early ages. Before even starting school, children who see adults using computers take an interest in computers and want to use computers (Cooper, 2005). While it is still discussed at what age children should meet computers, Haugland (1999) stated that children can meet computers from the age of three.

When used properly as a development tool, computers are sources and tools that make learning easy. Computer is faster than any other tools, devices and methods in providing feedback. Computers positively affect children's cognitive, language, psychomotor and social-affective development, and contribute to learning when integrated into the educational setting in a way that does not hinder social communication and cooperation. Computers make it possible to arrange the education process according to the children's abilities, knowledge and pace of learning and meet individual needs. Children who have control over their own learning when using computers develop self-respect and, thus, develop skills of problem-solving and overcoming difficulties (Arı & Bayhan, 2000; Clements & Sarama, 2003; Mitchell & Dunbar, 2006; Schirrmacher, 2006; McCarick & Xiaoming, 2007; Brewer, 2007; Kandır & Orçan, 2010).

Besides, educators can use computers effectively in educational settings to record and archive observations about children, anecdotes, stories, songs and poems invented by children and activity photos and images (Mitchell, 2007).

Educators are required to have knowledge and experience as to use of computers when using them in educational settings. Children's use of computer in pre-school education needs to start in the educator's supervision. Educator should firstly teach children switch on/off functions and later how many parts a computer has and how these parts are used. The educator should be present for children to focus their attentions and get answers for questions. For the daily plan to flow smoothly, computers need to be integrated in the natural classroom environment (Arı & Bayhan, 2000; Sığırtmaç, Yılmaz, & Solak, 2007). For children to make effective use of the computer, it should be placed where children can see and reach it easily. The computer should be placed so that the natural light in the room does not reflect on the screen and tire the eye, necessary precautions about the cables need to be taken and tables and chairs need to be fixed and adjustable according to children's height. Besides, the screen should align with the children's eye and a screen shield of good quality need to be used (Schirrmacher, 2006; Brewer, 2007; Jackman, 2009; Tuğluk, 2010).

While using the computer, the educator can work with children individually or in groups of two or three. As children proceed to gain experience, the educator should reduce guidance and have a more observer role.

Because children's concentration span is short, the time for study on computers need to be kept short. Working with children aged three to four, five to seven minutes, and with children aged five to six, 10 to 15 minutes should be allocated for each child at most. The ideal computer/child ratio in pre-school classes is 1/10 (Sığırtmaç et al., 2007; Dereobalı, 2009).

Another factor in using computers properly and effectively in educational settings is software and education programs. The content of software and education programs should be planned very well. While choosing software and education programs, the educator should pay attention whether they are easy for children to use, they teach knowledge stage by stage, they vary exercises, they are interactive, suitable feedback is provided timely and they have error check according to children's age, developmental stage, needs and interests. In addition, educational software and programs should be organized as concrete to abstract, simple to complex, close environment to far environment, support pre-school education objectives and gains, the visuals and audio used should be authentic should have fun elements and sustainable educational characteristics. Supplementary software and programs suitable for children's development, age and interests providing the opportunity to discover freely should be practiced in a timely fashion (Clements & Sarama, 2003; Işıklıoğlu, 2003; Schirrmacher, 2006; Brewer, 2007; Kandır & Orçan, 2010).

The use of the Internet is also important in providing children with various educational opportunities. Internet use in education provides important chances of developing new knowledge and skills, varying and enriching experiences in children. Children and educators can make use of Websites on the Internet as information sources. There are many Websites from which pre-school children can benefit, but most of them are not suitable for children's developmental stages and have complicated contents. For this reason, Websites to be used in class should be examined beforehand by the educator (Bayram, 2006; Schirrmacher, 2006; Brewer, 2007; Dereobalı, 2009).

Computer, software, and educational programs along with the Internet can be used to promote children's problem-solving, communication, judgment, building connections between concepts and processes, numbers and operations skills in free time, music, science, creative drama and literacy preparation activities in pre-school education programs (Kandır & Orçan, 2010). For example, computer-supported education programs related to various concepts suitable for pre-school education objective and gains could provide discovery and research opportunities and support concept development in children for literacy preparation activities.

A projector is used to project all activities prepared on computer and computer-supported activities. Projector helps to project three dimensional visuals effectively, with the help of visual presentation, a projector can draw children's attentions and make them take active roles in activities and support learning to be permanent because of integrating audio and visuals. Projector is a technological product that projects slides prepared by the educator, story books downloadable from various websites, visuals and photographs taken or downloaded by the educator, namely, every audio-visuals in motion or motionless on a curtain or wall in a darker room and makes it possible to convey them to children (Bayram, 2006; Çelebi-Öncü, 2010). Moreover, educators can take advantage of projectors in meetings and conferences within the framework parent involvement activities.

In addition to being used in language activities as techniques of storytelling, story completion and formation in pre-school programs, projectors can be used in free time, game, music, science and creative drama and literacy preparation activities.

Transparencies are used through overhead projectors to project visuals on a curtain or wall. Transparencies

have the characteristics to be used repeatedly, draw attention and concretize concepts. Furthermore, it enables educators to present visuals fast. Visuals or figures can be drawn on transparencies with special pens or computer prints of images from the Internet can be copied on transparencies. Projecting colorful and pictured transparencies on a curtain or wall help the children get engaged and see in details, thus, provide different but satisfying experiences. Overhead projectors can be used along with other technological products, such as music sets or computers in educational settings. When using overhead projectors with small or big groups in educational settings, the size of the visuals could be arranged according to number of children and physical conditions of the classroom (Lucido & Borabo, 1997; Bayram, 2006; Çelebi-Öncü, 2010).

The use of transparencies and overhead projectors in different activities in pre-school education will provide children with different experiences. For example, in art activities that take place in free time activities, the fact that children draw different figures and drawings, making connections between drawings and talk about them, could help children develop problem-solving skills and their creativity and imagination at the same time.

Cameras and video-cameras that can be connected to a computer and TV are technological products through which language, game, music, art, science and literacy preparation activities, activities on special occasions can be recorded audio-visually that children have done both inside and outside the class. In addition to recording children's experiences, cameras and video-cameras can help the educator to build activities and provide visual and audio records which can make the children get concrete experiences. Cameras and video-cameras enable children to have different experiences bringing the events and phenomenon that cannot be brought in the educational setting. Phenomenon, events and creatures that are brought into the class with the help of cameras and video-cameras enable children to get information apart from the educator. Along with the activities children do in the learning environment, they can use cameras and video-cameras themselves to share their observations with their friends.

In addition to the fact that cameras and video-cameras are used in pre-school education in different activities, educators can use visuals and audio taken by children in parent involvement activities. In this way, families can be informed about pre-school education program and activities.

CDs are used to store visuals and audio recorded with cameras and video-cameras. CDs make it easier to store and archive visuals and audio for a long time. Besides, visual or audio CDs available in the market for pre-school education also make the learning environment rich (Arı & Bayhan, 2000).

CDs can be used to make learning easier by making activities fun in free time, language, game, music, science, creative drama and literacy preparation activities in pre-school education. For example, according to objectives and gains of music activities education program, by making children watch or listen to visuals or audio on CDs from different cultures, children can learn about different cultures, how to live in harmony with different cultures and, thus, an environment where children respect differences could be created.

TV, which can appeal to various senses with its audio-visual features, is the most suitable technological product for education. The fact that can reach many individuals simultaneously and can cater for wide ranges of people's needs makes TV the most common educational tool. If used correctly, TV can affect children's cognitive, language, psychomotor and social-affective development positively. TV provides children with information about events, phenomena and creatures that children may never experience in their whole lives. It creates chances for children to learn having fun and good time in an environment where they take part whenever they want. Children meet events in motion hearing and seeing objects on TV. TV provides imaginary behaviors for them to imitate so promotes creativity (Christakis, Ebel, Rivara, & Zimmerman, 2004; Önder &

Balaban-Dağal, 2007; Öztürk & Karayağız, 2007; Dereobalı, 2009).

On condition that it is not used by the adults around a child for educational purposes, watching TV is a one-way passive activity. Children watching TV with adults share what they see and what they feel, which reinforces learning. Watching TV with adults gives the chance to correct wrong information or language, control advertisements, question and talk on the values shared. Using TV as an educational tool with children viewing time is important. It is suitable for children up to age two to watch TV for 15 minutes; for children between two to five ages, 30 minutes; and for children aged five to six, one hour. Handling TV watching habits at early ages will prevent addiction (Önder & Balaban-Dağal, 2007; Dereobalı, 2009; Christakis & Garrison, 2009). Educator in pre-school education needs to work with families collaboratively to prevent TV addiction in children and develop critical TV viewing skills.

TV programmes to be integrated into pre-school education settings should be suitable for children's age, interests, needs and developmental stages. Educators need to view the programmes beforehand to choose good quality programmes to use in learning environment. Because children in pre-school ages cannot differentiate between real and imaginary, they are influenced by what they see on TV. For this reason, it may cause unwanted situations, if children watch TV alone without adult supervision (Aktaş-Arnas, 2005). Educator needs to watch the programme with children, so that children can grasp what is conveyed better and clarify any misunderstandings and talk to children about the programme. After a programme watched on TV, educators are required to organize what children viewed in a way that they can comment on and associate the activities with real life. In pre-school education setting, TV should not be kept on for long, purposeful activities should be used during viewing. Studies pointed out relationships between watching TV for a long time and eating habits, physical activity scarcity and increase in obesity and cholesterol levels (Vessey, Yim-Chiplis, & MacKenzie, 1998; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; Dennison, Russo, Burdick, & Jenkins, 2004). Therefore, educators should not let children watch TV during meal times. Educators need to put a strong stance for programmes that they believe are not suitable for children and should be guiding by parents in developing appropriate viewing skills in their children (Christakis, Ebel, Rivara, & Zimmerman, 2004; Önder & Balaban-Dağal, 2007; Dereobalı, 2009).

TV could be used to enrich free time, language, game, music, science, creative drama and literacy preparation activities in pre-school education programs. For example, a documentary about ant life chosen according to objectives and gains in language activities can help children get information about physical characteristics, accommodation, eating and working habits of ants and provide concrete experiences comparing similarities and differences between ants and other creatures.

Findings and Suggestions

As a must of being an information society in information age, it has become imperative to use technological products that play an important role in improving education process and quality in every stage of education institutions. Technological products integrated into educational settings suitably, according to children's developmental stages and needs, are important in raising educational quality. With this respect, the following suggestions could be made to educators in pre-school education:

(1) The fact is that guiding educators in increasing their knowledge and experience about technological products could enable technological products to be better integrated into educational settings, and it could be effective in promoting efficient learning;

(2) The fact that educators introduce technological products and guide them how to use these products might encourage children to use them more;

(3) Technological literacy could be improved by organizing seminars, conferences or in-service training activities for educators on effective use of technological products in pre-school education;

(4) Families could be guided about the influence of technological products on children's developmental stages and on their proper use in home settings under adult supervision;

(5) Education programs on the role and importance of technological products and their use in supporting developmental stages could be prepared and practices could be evaluated;

(6) Projects about technology use in pre-school education could be developed collaboratively with Ministry of National Education, universities, local governments and non-governmental organizations.

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