THE USES OF MULTIMEDIA FOR CHILDREN’S LEARNING PROCESS

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ABSTRACT

Today’s children are growing up in a rapidly changing digital age that is far different than before. Young children live in a world of interactive media. They are growing up at ease with digital devices that are rapidly becoming the tools of the culture at home and school. Going a step further, those computer programs that one grew up with may have actually had some effect on how they learn things. Computers have become a common and needed part of life in today’s society, making computer education imperative for children. This leads to the question: do educational computer programs have positive effects on children's learning? This paper has reviewed several works by scholars such as by Mayer and Anderson who found that learning significantly improved for students who possess low prior knowledge when verbal and visual information are presented simultaneously and that they performed better on recall and problem solving test when both the verbal and visual systems were utilised.

Field of Research: Computer Technologies, Multimedia, Animation, Education.

1. Introduction to Computer Technology in a Society

It is a commonplace that the influence of technology in the modern world is pervasive. The allure of finding easier, faster, better ways of accomplishing a task is compelling. Nowhere is the seduction of technology more evident than in the increasing reliance placed on computers. Computers have moved from corporations to schools and into the home with little or no thought that they may have an aversive impact. The virtues of computer use are everywhere extolled. The sales pitch warns that to deny our children access to computer literacy is tantamount to keeping them from high-powered jobs in a future world that will surely be governed by those who have mastered the reigning technologies.

An appropriate usage and the timing of exposure to technology are critical to integrating computers into young lives. Computers are not demonic in nature. They are certainly useful tools and should be suitably and thoughtfully integrated within the educational system.
2. The Computer Technology to Children

Computers have become a common and needed part of life in today’s society, making computer education imperative for children. Young children will typically begin to show an interest in the home personal computer by their toddler years.

The children may access or use a computer in a number of ways such as free playing, typing, playing games or learning software on the computer; playing or striking computer input devices (for examples keyboard, mouse, joystick); watching pictures, colorful images, or motion displays on the screen; or observing or imitating parents or adults using a computer. Preschool age children can learn to turn the computer on by themselves and will quickly learn to operate the mouse. Simple games that teach and reinforce basic school readiness skills are great for this age.

Research has shown that 3 and 4 year old children who use computers with supporting activities that reinforce the major objectives of the programs have significantly greater developmental gains when compared to children without computer experiences in similar classrooms gains in intelligence, nonverbal skills, structural knowledge, long-term memory, manual dexterity, verbal skills, problem solving, abstraction, and conceptual skills (Haugland, 1992).

The benefits of providing computers to kindergarten and primary grade children vary depending upon the kind of computer experiences offered and how frequently children have access to computers. The potential gains for kindergarten and primary children are tremendous, including improved motor skills, enhanced mathematical thinking, increased creativity, higher scores on tests of critical thinking and problem solving and increased scores on standardised language assessments. In addition, computers enhance children’s self-concept, and children demonstrate increasing levels of spoken communication and cooperation. Children share leadership roles more frequently and develop positive attitudes toward learning (Clements, 1994; Cardelle-Elawar & Wetzel, 1995; Adams, 1996; Denning & Smith, 1997; Haugland & Wright, 1997; Matthew, 1997).

Much of the current research about information technologies including computers, is concerned with how these can be used to support children’s literacy, learning environments and curriculum experiences.

Papert (1998) stresses that computers have an impact on children when the computer provides concrete experiences, children have free access and control the learning experience, children and teachers learn together, teachers encourage peer tutoring, and teachers use computers to teach powerful ideas.

Structured games and activities give young children an opportunity to explore the way a computer works. Games that require dragging objects across the screen are excellent for building mouse skills in beginner users. Children must be exposed to age-appropriate software and websites that involve alphabet and colour recognition, shapes, counting, or short stories that are read aloud. Activities that feature music are also enjoyable for a preschooler’s computer time.

Kindergartners are normally still exploring the basics of computer use and will probably do best with activities that reinforce simple skills. As children become more comfortable with the computer, more
complex games and activities can be introduced. Computer education for kindergartners typically consists of short sessions of no more than an hour, playing games that correlate with their classroom learning material.

Early elementary age children are ready to move beyond simple reinforcement and skill drill activities to the many different functions of a computer. Software programs that allow children to create, like an art or publishing suite designed specifically for kids, can boost creativity along with providing exposure to technology. Grade level skills can also be practiced and enhanced with math, reading, and spelling computer games. There are a number of kid-friendly websites that provide search engines, games, and interaction opportunities.

3. The Benefit of Learning Computer for Education through Graphics and Computer Animation

*It is proven by scholars that learning through graphics and computer animation can increases the academic performance and help children’s development.*

One way to bring about a change of emphasis in teaching, from the teacher directed approach to a facilitated approach, is to change the medium of instruction (Kearsley, 2000; Kiili, 2005). Multimedia offers an alternative medium of instruction to the current learning process. The nature of interactivity and discovery in multimedia learning bears a beneficial boost to the monotony of passive learning (Mayer & Sims, 1994; Mayer, 2000).

According to Kommers, Grabinger and Dunlap (1996), multimedia refers to computer-based applications where users are provided with information through different types of media. Mayer (2000) defines multimedia as the presentation of the learning material using both pictorial form and verbal form such as spoken and printed text. Through it, instruction may include motion, voice, text, graphics and still images (Moore, Burton & Myers, 1996).

One important combination of media is animation, that been define as an images in motion (Dwyer & Dwyer, 2003). Animation capable features are innovations which can enliven the learning experience. The flexibility of learning through animation will allow a wider range of stimuli thus increase the student engagement in learning.

Kearsley (2002) studies show that students who learn from animation have greater self-esteem and motivation. His studies also show that students may retain information and sustain the learning process increases.

According to Reeves (1998), animation learning can stimulate more than one sense at a time and that may be more attention-getting and attention-holding. Animation has been the focus of recent attention and interest and become more and more popular.

4. Information Processing & Dual Coding

Information processing theories described human brain as similar to a computer and human learning as similar to how computer processes information (Chandler & Sweeler, 1991). There are three main storage structures in the memory system (1) sensory register, which registers stimuli in the memory
system; (2) short-term memory (STM), which serves as temporary storage; and (3) long-term memory (LTM) where information is permanently stored.

Short-term memory can only hold five to nine chunks of information (Miller, 1956) before it is processed in LTM. Not all the information stored in the LTM can be retrieved. Retrieval is more likely when appropriate cues are provided in the encoding process (Driscoll, 1994). Pavio’s (1986) dual coding theory further stated there are two separate information processing systems which is a visual system which processes visual knowledge and a verbal system for processing verbal knowledge. According to Paivio (1986); Riber (1994) animation that combines visual and verbal knowledge may store information into long-term memory thus facilitates encoding and retrieval process. Dual coding theory also suggests here are three distinctive levels of processing that can occur between the verbal and visual system: representational, associative and referential (Rieber, 1996).

Representational processing connects the incoming stimuli from the environment to either the verbal or visual system. Associative processing constructs connections within either of the verbal or visual systems, and referential processing builds connections between the verbal and visual systems (Rieber, 1994).

5. Animation as an Aid to Information Processing

Previous studies revealed that animation had facilitated the learner encoding process than static visuals (Lin, 2001). Rieber, Boyce and Assad (1990) suggested that animation helped decrease the time to retrieve information from long-term memory and then subsequently reconstruct it in short-term memory. Reiber (1990) further explained that animations facilitate the reconstructing process during retrieval by encouraging organisation.

Mayer (1994) in his study show that computer based animations can be used to promote scientific understanding. Finding also found that students performed better on recall and problem solving test when both the verbal and visual systems were utilised. Mayer and Anderson (1992) found that learning significantly improved for students who possess low prior knowledge when verbal and visual information are presented simultaneously. Varied animation strategies will improve the performance of the students identified as possessing low levels of prior knowledge.

Animation with a support of text had reduced cognitive load of a student’s (Mayer, 1996). His research found that animation complemented with a textual explanation enabled students to take greater advantage of their capability to process information on two levels by stimulating the visual system and by reducing the load placed on the verbal processing system. This reshuffling of information in working memory increased their ability to make meaning out of the information in preparation for storage in long-term memory. The placement of the supporting textual explanation next to the animation further reduced cognitive load and enhanced performance (Mann, 1995; Moreno, 1999; Lai, 2000).

6. A Model of Animation, Dual Coding and Information Processing

Gagne and Driscoll (1988) created a basic model of learning and memory underlying modern information processing theories. It shows how animation works as an aid to dual coding and information processing. According to Mayer (1997, 2001) this theory integrates theories that focuses on presenting information in dual mode without increasing the cognitive load. This theory claiming that human process two separate but interdependent systems for processing verbal and pictorial materials. Each
channel is limited in the amount of material that can be processed by the learners at one time (Chandler & Sweeler, 1991). The active connections between verbal and pictorial representations will ensure active learning and cognitive process happened. Learners will engage in selecting, organising and integrating knowledge.

Animation is processed as a part of the visual information. Animation as an attention gaining strategy helps to gain attention and reduce the processing demands in STM, while animation as an elaboration strategy not only helps reduce the processing demands in STM, but also facilitates encoding and retrieval processes by connecting information and providing alternative retrieval pathways (Gagne, 1985). This layout would encourage the learners to read the instructional text as well as build connections with the static graphic or animations.

Visualisation, included in all treatments seemed to be a powerful factor in learning this multimedia teaching material. The results were in accordance with many previous literature and animation related studies with different level of prior knowledge. Penny (1989) justified the modality effect by states that students learn more deeply from multimedia lessons when words explaining concurrent animation rather than onscreen text using coordination presentation of explanation in visual format (Clark and Mayer, 2003).

7. Conclusion

Children as early age of 3 and 4 years are developmentally ready to explore computers, and most early childhood educators see the computer center as a valuable activity center for learning. Timing is crucial. Children need plenty of time to experiment and explore. Young children are comfortable clicking various options to see what is going to happen next. Frequently, just a quick word or two, even from across the room, reminds children what they need to do next to reach their desired goal. Providing children with minimal help teaches them they can operate the computer successfully. In addition, by observing what children are doing, the teacher can ask probing questions or propose problems to enhance and expand children's computer experiences.

Through exploring computer experiences, children can build their memory skills, learn how to seek out information, use knowledge until they have a clear understanding from multiple sources, and integrate their knowledge of how each ecosystem functions. In the process, they learn to delegate responsibility, interact with others, solve problems, and cooperate to reach a goal.

As children enter kindergarten and the primary grades, it is important that they continue to have access to a computer center with a library of developmentally appropriate software. Children need opportunities to make choices about some of their computer experiences. In addition, kindergarten or primary-grade teachers will want to use the computer for more directed activities that match their learning objectives.

Children must be continuously being exposed to this technology with parental supervision. Computer technology helped children and students in achieving better performance in schools. This can be done by animation and graphic techniques of presenting the modules and subject to gain the student attention. It is important to know that active connections between verbal and pictorial representations in multimedia or graphic animation tutorial will ensure active learning and cognitive process to happen and therefore help student to retain the information and sustain the learning process increases.
References

Nicole Munoz (2009), *Computer Education for Kids*. 
