Available online at www.sciencedirect.com

ScienceDirect

Procedia Social and Behavioral Sciences 2 (2010) 3055–3059

Procedia
Social and Behavioral Sciences

WCES-2010

The use of ICT in preschool music education

Christina Panagiotakou[a] *, Jenny Pange[a]

[a] *Laboratory of New Technologies and Distance Learning, Department of Pre-School Education, University of Ioannina, 45110, Ioannina, Greece*

Received October 26, 2009; revised December 2, 2009; accepted January 13, 2010

Abstract

This study has been carried out in order to evaluate the music perception and creativity of preschoolers by using two different means of ICTs. Children were tested on computer based music activities with a most efficient method for a common educational goal. An interactive music environment was used for children aged four to six years old (N=28) in order to stimulate their inherent musical skills through interaction with the computer and other additional audiovisual mediums. Specifically, there were two cases:
Case I: Use of computer mouse by the preschoolers.
Case II: Use of automatic movement recognition technology.
The second case appeared to be more effective in preschoolers as they provided better results in concentration and interest. Such results have further implications concerning the use of alternative technological equipment in preschool music education.

Keywords: music creativity; ICT; preschool music education.

1. Introduction

During the last decades, a number of experiments concerning computer-based music activities have been taking place, mainly by academics and music educators working in schools (Lissette Jansen, 2008; Kersten, 2006). Additionally, there is a growth in music software for young children, because of the advances in computer design, affordability and the fact that software designers are becoming more sophisticated in the environments they create (Webster, 2002). There are studies concerning a wide age group, but there is little research available for preschoolers (Plowman, 2003). Furthermore, ICT (Information and Communication Technology) is used either as a tool by children or as an apparatus by researchers to evaluate and measure the music perception, cognition and aesthetics response to music (Paul, 2008).

It has been a long time since the first electronic music equipment for children was created. Back in the 1950s, the earliest electronic music keyboard named "Eltronovox" was invented (Nardo, 2008). In 1989, Upitis and Webster were some of the pioneers who pinpointed the significance of children's use of computer based music technology as

* Christina Panagiotakou. Tel.: +30-26510-05722; fax: +30-26510-05816
E-mail address: xpanag@cc.uoi.gr, jpagge@cc.uoi.gr

1877-0428 © 2010 Published by Elsevier Ltd. Open access under CC BY-NC-ND license.
doi:10.1016/j.sbspro.2010.03.464

a creative tool for manipulating sound (McDowall, 2003). According to Nardo (Nardo, 2008), several years later, the first large growth in publication of children's software boomed in 1998 with 869 titles.

The majority of music educators agree that the first five years of life are critical for a child's music development. Additionally, the process of reading and playing music stimulates important 'areas of the brain' (McKinnon, 2005). Software that follow some quality standards can provide new opportunities for children's learning and engage them in complex musical processes using new forms of literacy which links sounds and visual symbols (McDowall, 2003). Even though computers do not replace the valuable activities of early childhood that are widely applied (books and storytelling, art-making and crafts, movement and dance, all forms of music making), computer music activities can have a positive impact, as long as the child is able to connect their virtual experience to the real world (Nardo, 2008).

However, still nowadays, ICT activities in preschool years appear to be less common and they are often brought into educational environments as '…a useful supplement to existing resources…'. (Plowman, 2003; Pachet, 2005). The international bibliography concerns mainly computers and early childhood, excluding often music as a discipline (Webster, 2002). In Greece, the situation is even more complicated. According to a case study which took place at the University of Ioannina, Department of Preschool Education, the majority of preschool teachers is not that familiar with computers and ICT and often lack basic linguistic skills in order to use computer technology effectively (Pange, 2006). The aim of this study is to examine the use of ICT in musical studies, in preschool children in Greece. According to the Greek cross-thematic curriculum framework for music, preschoolers are able to be trained to identify various orchestral instruments (P.I., 2003). In other words, the discrimination of timbre is a successful activity that is supposed to be used by the preschooler (Miyamoto, 2007).

2. Materials and Methodology

In this study, the educational scope was to teach children how to distinguish different musical instruments by listening to them and clicking on the correct image. Music software from KIDePEDIA series (2009) was used, with variations in the technical equipment. Specifically, this study examines the way the technological equipment can affect preschoolers' performance in music activities. In this experiment, there where two cases with a variation in the way the mouse pointer was handled. In case I, participants used the typical computer mouse, whereas in case II participants used the Camera Mouse, a freeware software that involves automatic movement recognition technology (Camera Mouse, 2009).

Camera Mouse works with Windows 7 (32 bit or 64 bit), Windows Vista (32 bit or 64 bit), and with Windows XP (32 bit or 64 bit) with Service Pack 2 or 3. A standard webcam is required, either one built into the monitor or a standard USB webcam. If the webcam is very low quality, the video image may be noisy and Camera Mouse might have a problem with tracking.

Figure 1. Graph of music software KIDePEDIA

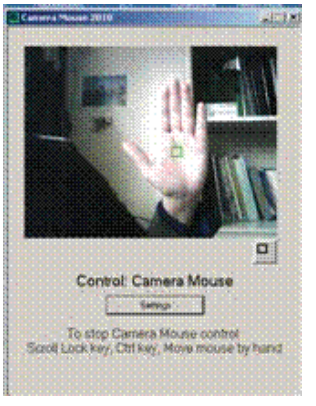

Figure 2. Graph of software Camera Mouse

The music software used in both cases is presented in Kidepedia series (2009), a specialized edition in children's education. Through this software, children listened to a sample of music and simultaneously images of three

different musical instruments appeared on the screen of the computer. The children who participated in this study had to click on the correct image which corresponded to the sound of the music instrument that was previously heard. By making the right choice of the image, they were encouraged by the researcher to proceed to the next music quiz. In sum there were 5 quizzes for each preschooler to complete. In both cases, the whole process was videotaped and analyzed by the researcher.

This study took place in kindergartens in northwest Greece. A randomly selected group of 28 preschoolers (N=28), aged 4-6 (12 boys and 16 girls) were randomly divided in two groups. Each group was split in smaller self-selected groups of three preschoolers each and participated in only one case.

There where two cases with a variation in the way the mouse pointer was handled. Precisely, in case I, participants used the typical computer mouse, whereas in case II participants used the Camera Mouse, a software that enables the user to control the mouse pointer just by moving a part of his/her body that is framed (Camera Mouse, 2009). In case II, preschoolers had the opportunity to see themselves on the screen and were instructed by the researcher to choose whether the mouse pointer would be controlled by their nose or their hand.

The experiment in case II was inspired by a team group, university of Toronto, Canada (Cynthia Tam, 2007). This research group used equipment that included automatic recognition technology, widely used with people with severe physical disabilities. In our experiment, the technology was adjusted to be used by preschoolers in order to inherent their inner musical creativity.

3. Results

For a period of 4 weeks, preschoolers spent 15 minutes per week so as to learn how to use both the computer mouse and the Camera Mouse efficiently. Based on observation, computer mouse was easier to use comparing to the Camera Mouse. Preschoolers were initially more reluctant to use Camera Mouse comparing to the typical computer mouse, as it was difficult for them to understand the way the move of their hand or their nose that was framed could control the movement of the mouse pointer. Furthermore, preschoolers got prepared for this experiment with questions oriented towards what the technology equipment is doing. The questionnaire was based on Kersten (Kersten, 2006) and the questions given to children were: 1.“do you like music and computers”, 2.“What do you think is happening on the screen”, 3.“do you recognize yourself on the monitor”. In both cases, the image of the mouse pointer was enlarged, so as to make it easier for preschoolers to control the computer mouse.

At the end of this process, the researcher completed the questionnaire concerning the attitudes of children towards technology in both cases. In the first case, out of 14 preschoolers (8 girls and 4 boys, mean age 5.1 years), eight (60%) clicked on the left mouse button successfully, having no problem to follow the vocal instructions and complete the music game. Two preschoolers had some difficulty to control the computer mouse (14%) and two (14%) gave up (2 boys, mean age 4.7) in the middle of the music game, as they were having problems to use the computer mouse effectively.

In the second case, preschoolers who used the webcam and other technological equipment were more excited than the others (6 girls and 8 boys, mean age 5.2). They showed sustained attention, and even though the level of difficulty was higher, they insisted on completing the game. One preschooler (girl) asked “will the webcam hurt me”, implying radiation. Two preschoolers (14%), a boy and a girl, mean age 5, could not complete the game successfully, as they were having problems moving slowly in order to control the mouse pointer. The majority of them (9 out of 14) preferred to use their nose in order to control the mouse pointer. It is significant that it was more difficult for the teachers to use the Camera Mouse comparing to the preschoolers during the preparation meetings.

Preschoolers from case II performed better comparing to case I. It is important to point out that each group of three from case I needed average of 1.7 minutes to complete the music quiz where the self-selected groups from case II required approximately 3.1 minutes. Preschoolers from case II needed more time to complete their quiz due to the difficulty to control the mouse pointer. At the same time they performed much better (18%) comparing to preschoolers from case I, probably because they spent more time listening to the music samples while trying to click on the right image.

The total 120 responses (five from each preschooler, two preschoolers from each case gave up in the middle of the experiment) were used for further analysis. In case I, preschoolers gave a total of 35 correct answers (58%), where in case II, preschoolers gave a total of 46 correct answers (76%).

Table 1. Summary of results

	Average age of preschoolers	*Average time required to complete the music activity*	*Correct answers In total (%)*	*Preschoolers who failed to complete the music activity (%)*
Case I Using the computer mouse	5.1	1.7 min.	58	14
Case II Using the Camera Mouse	5.2	3.1 min	76	14

4. Conclusions

From the results of this study, it comes out that children showed a great interest in computer based music activities, especially in case II. The use of an alternative way of controlling the mouse pointer gave to preschoolers the opportunity to spend more creative time with this computer based music activity. In the first case, preschoolers used the computer mouse, combined with the appropriate music software, in order to complete the activity. As it was predicted, children's conversation reflected the successive efforts to gain physical control of the mouse device and share the technology with their partners as they worked in groups of three (Shahrimin, 2002). In the second case, preschoolers used the same music software and a webcam, which incorporates automatic movement recognition technology for controlling the mouse pointer. The part of the body that is framed, e.g. the nose, became the "new mouse pointer".

The second group used the same music software combined with a webcam and other technological equipment. At this case too, preschoolers where previously asked questions on whether they recognize themselves on the monitor and detailed instructions were provided on the way the music game should be played. Preschoolers had the opportunity to choose whether the mouse pointer would be controlled by part of their nose or their hand that was framed.

The results of the study indicate that computer based music activities combined with an alternative way to control the mouse pointer can be considered as an educational tool which attracts preschooler's interest and keep them concentrated for a longer period of time. According to the findings of this research, children seem to be familiar with the computer mouse and at the same time they enjoy to play and learn through computer based music activities. These types of activities can be used in many different ways in order to accomplish various tasks as far as it concerns the use of ICT in preschool music education. It should always be taken into consideration that each young child has a different mental level of readiness, which can be higher or lower than preschooler's chronological age (Kersten, 2006). For this reason, Camera Mouse is not always the best choice for preschoolers who have not yet the appropriate level of mental and physical readiness.

Conclusively, music ICT can successfully contribute to young children's musical learning, music creativity and cognitive development. The use of alternative technological equipment can stimulate their interest and keep preschoolers focused in completing music activities. Preschoolers in case II probably performed better comparing to preschoolers in case I, for the reason that they spent more time listening to the music samples and were more careful on the way they controlled the mouse pointer. However, the sample is limited and the same experiment in a bigger sample is needed to be applied in order to have safe results. This research can be taken into consideration in future research concerning computer based music activities for the early childhood. Aspects that should be examined are the role of the teacher, evaluation of the software related to educational goals and expectations.

References

Camera Mouse. (2009). Retrieved from http://www.cameramouse.org/

Cynthia Tam, H. S. (2007). Movement-to-music computer technology: a developmental play experience for children with severe physical disabilities. *Occupational Therapy International , 14* (2), 99-112.

Greece, P. I. (2003). *A cross thematic curriculum framework for music.* Retrieved 2009, from Pedagogical Institute of Greece: http://www.pi-schools.gr/download/programs/depps/13deppsaps_Mousikis.pdf

Kersten, F. (2006). Inclusion of Technology Resources in Early Childhood Music Education. *General Music Today , 22* (1), 15-28.

KIDePEDIA. series (2009) V.1, Athens, 4π

L. Plowman, C. S. (2003). A 'Benign Addiction'? Research on ICT and Pre-School Children. *Journal of Computer Assisted Learning , 19* (2), 149-164.

Lissette Jansen, B. v. (2008). A Music Educational Entertainment Enviroment for Preschoolers. In *Fun and Games* (pp. 194-202). Berlin Heidelberg: Springer-Verlag.

McDowall, J. (2003). Music Technology: new literacies in the early years. *Proceedings of the international federation for information processing working group 3.5 open conference on Young children and learning technologies* (pp. 83-88). Australia: Australian Computer Society.

McKinnon, I. (2005). Children's music journey: the development of an interactive software solution for early childhood music education. *Computers in Entertainment , 3* (4), 1-10.

Miyamoto, K. A. (2007). Musical Characteristics of Preschool-Age Students: A Review of Literature. *Update: Applications of Research in Music* (26), 26-40.

Nardo, R. (2008). Music Technology in the Preschool? Absolutely! *General Music Today , 22* (1), 38-39.

Pachet, A. R. (2005). Experiments with a musical machine: musical style replication in 3 to 5 year old children. *British Journal of Music Education , 22* (1), 21-46.

Shahrimin, M. I. & Butterworth, D. M. (2002). Young children's collaborative interactions in a multimedia computer environment, *Internet and Higher Education*, 4, 203–215.