COMPUTER-ASSISTED TECHNOLOGY (CAT) STRATEGY TO ENHANCE CREATIVE ART IN CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

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Abstrak: Kajian ini bertujuan untuk melihat keberkesanan penggunaan Teknologi Komputer-Bantuan(TKB) dalam meningkatkan seni kreatif kanak-kanak Autism Spektrum Disorder (ASD) yang akan membantu perkembangan komunikasi dan emosi mereka. Dalam kajian ini pengkaji telah memilih 3 orang kanak-kanak ASD yang berumur antara 6- 9 tahun , 3 orang ibu bapa serta guru kelas murid-murid ASD. Dalam kajian ini kaedah gabungan pendekatan kualitatif dan kuantitatif digunakan untuk menganalisis dapatan data. Dalam kaedah kualitatif pengakji menggunakan borang temubual untuk guru manakala borang soal selidik digunakan untuk ibu bapa untuk menjawab tahap penggunakan komputer kanak-kanak ASD di rumah. Pengkaji menggunakan kaedah kuantitatif dengan Skal Likert (1-5) sendiri dalam kelas untuk memerhati tahap dan skor pencapaian kanak-kanak ASD dalam aktiviti seni kreatif dengan menggunakan Teknologi Komputer-Bantuan (TKB). Kajian ini mendapati kanak-kanak ASD menunjukkan minat dalam seni kreatif dengan menggunkan komputer riba manakala perkembangan komunikasi dan emosi juga turut ditingkatkan. Walau bagaimanapun, kekurangan alat Teknologi Komputer-Bantuan di sekolah merupakan masalah yang mempengaruhi penggunaan teknologi untuk belajar dalam memperkembangan kemahiran seni kreatif dalam kalangan kanak-kanak ASD. Pengkaji mencadangan supaya sekolah memperbanyakkan lagi kemudahan komputer untuk kanak-kanak ASD untuk meningkatkan kemhairan bahasa komunikasi serta sosial-emosi mereka.

Keywords: *Teknologi Komputer-Bantuan, Seni Kreatif, Autism Spektrum Disorder*

INTRODUCTION

Using technology can interest children especially children who lack attention, such as children with autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD).An individual with autism who is withdrawn may be approached through the objects and activities that he or she prefers (Kramer, 1979). Betts (2005) also mentioned that individuals with autism are drawn to the unfamiliar object when starting with the familiar object and thengradually being introduced to the new one.

Technology, especially the computer is now playing a key role in helping children with ASD to communicate and express themselves. Ploog (2010a) stressed thatin recent years, the trend of research in developing computer-based audio-visual technology is hence increasing language, communication, emotional behavior among ASD children besides enhancing their academic performance in the inclusive classroom.Peterson et al. (2005) noted that computersare the most popular technology for personal, professional and client-tasks such as art therapists with their clients. According to Thong (2011), professionals in art education and art therapy have now incorporated computers in order to create a new art medium.Different types of technological devices have been created for children with autism, such as Crayola Digi Tools Paint Pack which is a no-mess way for children to create digital art and Orbotix Sphero 2.0, a smart accessory for developing children's fine motor skills.Higgins and Boone (1996) and Panyan (1984) proposed that computers could be used effectively in teaching with children autism through using different instructional skills.

Martin (2009) stated that numerous studiesdescribed art makingas an effective, clinically-sound treatment method for individuals with autism in the fields of art, art education, psychology and other creative art therapies. According to Ullmann (2009), art making is a useful therapy for individuals with autism who tend to have difficulty speaking but react well to visual, concrete and hands-on therapies, while Betts (2005) proposed that certain art therapies can helpindividuals with autism improvetheircommunication skills,facilitate sensory integration,increase their sense of self,and thusbuild relationships. Ullmann (2009) noted that besideshelping childrenwith autism to improve their

interpersonal communication skills, expressive art therapy also facilitates their emotional development such that they will finally accept the connection with words as the therapeutic relationship carries on.

PURPOSE OF THE STUDY

The investigation examines the effectiveness of using Computer Assisted Technology (CAT) strategy among children with Autism Spectrum Disorder (ASD) about creative art which can enhance their communication, psychosocial and emotional development. In particular, the task is to examine interest of children with autism in doing creative artusingcomputer devices such as laptop, iPad,desktop and others. Laptop is the main device used in this study due to lack of other computer facilities in the particular school.

THEORETICAL FRAMEWORK

Gestalt Art Theory

Rhyne (1980) described "Gestalt" as the ability to perceive whole configuration to perceive one's personality as a totality of many parts that together make up the reality of oneself. Malchiodi (2003) defined Gestalt theory as an experiential and humanistic approach which emerged in reaction to psychoanalysis. The purpose of a Gestalt approach is to encourage and create a communication which is reliable, honest, direct and true between client and therapist. When Gestalt theory is applied in a therapy, it is actually a mutual exploration of feelings and thoughts between client and therapist. In Gestalt therapy, the therapist is also part of the overall "Gestalt" and is considered part of the whole configuration (Malchiodi, 2003). In Gestalt art therapy, people contact each other through the piece of drawing, seeing the interplay of lines, shapes and forms within the wholeness of it as a Gestalt (Rubin, 2001). These concepts can be easily reached and realized in a therapeutic painting where the inner side is totally opened up to draw something on a piece of paper but easily distracted in verbal therapy.

Besides, Gestalt art therapy demands that clients must "do the work", not only of creating the representations, but also of recognizing their own self-configurations (Rubin, 2001). Arnheim (1969) says that those who practice the arts are "thinking with their sense".The gestalt art therapists encourage their clients to "carry out their own therapy as much as possible" (Corey, 1982). Gestalt art therapy encourages people to explore and experiment themselves by doing the sensory activities which will facilitate problem recognition and clarification.Zinker (1977), a painter as well as a Gestalt practicing therapist, believed that "all creative activity begins with movement". He believed that the art expression is therapeutic because it helps people to know themselves as whole persons in a short time and being able to perceive the whole is consonant with Gestalt theory.

Use of Computer-Assisted Technology in Children with Autism

Inan et al. (2010) proposed that computers are now commonly used as instructional tools for children with disabilities. Murdock, Ganz, and Crittendon's (2013) review reported the perspective of all the teachers towards children with autism and typical peers either strongly agree or somewhat agree on motivation to use technology.Goldsmith and LeBlanc (2004) stated that electronic visual strategies offer many advantages such as increased attention and motivation, and decreased challenging behaviors. Emmons (2008) commented that computer-assisted instruction (CAI) was used to increase time on task and improve learning. Collet-Klingenberg (2008a) proposed computer aided instruction (CAI) included using computers to teach academic skills and to promote communication and language development skills.Murdock et al. (2013) stressed that current advanced technology is time saving and cost effective to combine elements of scripting, visual strategies and video modeling to carry out intervention with children with autism. Moore et al. (2000), Panyan (1984), Silver and Oakes (2001) highlighted that computer-based interventions benefit individuals with autism, such as software programs created which may provide clear routines and expectations, reduce distractions, and control the stimulus overselectivity which is one of the characteristics of ASD.

Numerous research studieshave been conductedon usingCATfor enhancing language development and social skills in individuals with autism. Blischak and Schlosser (2003) found the use of word processing software with synthetic speech capabilities combined with computer-based intervention helps to improve individuals with autism in spelling and speaking.In addition, Murdock et al. (2013) found the use of iPad play story helps to improve play dialog in three preschoolers with autism while one withdrew during the intervention. According to Murdock et al. (2013), digital

tools with the association of static images and sound cues can function as reminders for individuals with disabilities. Hence, the use of CAT can also increase the independence of children with autism.

Teaching Art to Children with ASD

According to the findings of Pring,Ryder, Crane, andHermelin (2005), most of the savants are identified as individuals with ASD. Gardner (1982), Cox and Eames (1999) found that some individuals with autism have savant skills in artistic ability. However, some researches stated that to benefit from art therapy, being talented in art is not necessary but children with autism must be at least interested in the art making process.

Art allows children to show thoughts and feelings in a creative way, often through nonverbal communication (Spivey, 2008). Children with autism or other learning disabilities can express emotions through art that they may not otherwise be able to state (Spivey, 2008).Furniss (2006) proposed that introducing art to children with autism can help to exercise the vital parts of their developing brain as it is believed that all children can create art. Happe and Frith (1996) found that individuals with autism have a strong rote memory and visual-spatial or problem solving skills. Children with autism who have good visual-spatial skills and visual memory skills when making art can create detailed spontaneous drawings which are their favorite objects. When children with autism perform repetitive behavior such as making multiple or identical drawings, they should be given reinforcement as they feel happy and interested in the activity.

Through the use of symbolic imagery, art therapy can help children with autism in self-expressing and self-understanding. Evans (1998) has researched on a model of art therapy practices for interventions and she proposed it works effectively on children with autism.Gilroy (2006) stated in his book that description suggested the art therapy no matter whether in a group or individually, is effective because the attributes of an art helping cognitive and emotional development, enable relationship and result in decreasing destructive behaviors. Art therapy service provision for children with autism would be a useful base from which to explore different approaches appropriate to different settings and to examine their relative effectiveness (Gilroy, 2006). Also, Malchiodi (2003) stressed that art therapy has to be adapted to the strengths and needs of children with autism who have the weaknesses in paying attention, playing, communicating, imitatingand generalizing, thinking and coordinating motor skills to explore the world.

The ideal procedure is for one-on-one instruction which is a student and teacher aid with a head art teacher (Furniss, 2006). Furniss (2006) suggested that the ideal period for teaching art to children with autism is thirty minutes since they have a short attention spans. The new art process can be introduced by chaining, or step-by-step teaching by demonstrating or shaping (Furniss, 2006). Once the children have mastered the skills, teachers can continue with a more challenging task. The teacher can also prompt a verbal child to talk about his or her art process.

METHODOLOGY

Mixed method was used in this research. Qualitative data were collected from thequestionnaire forms to interview the teachers and survey form used for the parents in the selected school. Quantitative data were gathered using a checklistwitha five-point Likert scaleto evaluate the use of Computer Assisted Technology (CAT) skills inenhancing creative art development among three children with ASD. Wealsocollected anecdotal data fromschool documents.

Participants and Settings

Three children diagnosed with ASD by medical experts, three parents and a teacher teaching Information and Communications Technology (ICT)from selected schools were chosen as the respondents.The chronological age of the children chosen in this study is 6 – 9 years old. Two boys presented with moderate ASD while the girl had mild ASD.Weused randomsampling to select the samples as two weremild and one student was in the moderate category. At first, we chose four samples in which two were with mild autism and two were moderate autism. One of the mildautism children,however, was withdrawn in this study since he was reluctant to participate in the test. Eventually we proceeded with the testusingthree samples only.

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For the respondents, we had invited a teacher who teachescomputer basic skills which is Information and Communications Technology (ICT) in the selected school to carry out an interview session. Parents of the ASD children distributed the prepared survey forms in order to gain the psycho-demographic information of the children who had computers at home.

RESULTS

Interview with Teacher

Interest in doing creative art by using laptop

Children with ASDshow interest in doing creative art by using the laptop. However, the school culture does not allow computer or laptop in teaching creative art. Although they never teach creative art by using laptop, the teacher suggested thatCATwill stimulate the children'svisual and hearing abilities. The teacher believed that children with ASD can show better attention and concentration when learning with computers.

Children's Response to CAT learning

Children with ASDhave a longer attention span when using CAT learning but the condition of the ICT-enabled class is not much different from during the traditional teaching class. The teacher believed that the response of the children with ASD depended on each child's ability and the topic be taught. Those computers loverswill have problems such as being unwilling to stop using the computers.

Teacher's opinion towards of CAT teaching children with ASD

Computer Assisted Technologyis useful for children with ASD in their learning. Teachers can easily teach the children with autism on how to use the computer when teachers make it step-by-step. Teacher stated that teaching strategies play an important role when using any new type of teaching aid. The effectiveness of teaching aids will be seen when teachers are good in identifying the children's level of development.

CAT in teaching creative art can improve communication

Colors, shapes and anything related to the environment can help to promote the understanding of the children with ASD. With the aid of computer technology, children will concentrate more during the learning process. When a child can master computer skills, the teacher can combine Computer-Assisted Instruction and the child-centered learning model. For example, when children are allowed to draw on a computer or a laptop, they can express what they like and what they want to express easily.

CAT in teaching creative art can promote emotional development

Teacher stressed that doing creative art is a kind of therapy. Children with ASD can be more relaxed and there is no stress in learning. Following in the steps of today's world, children with ASD learning creative art with a hightechnology device is desirable. Children can express their mood unconsciously or consciously. Thus, the ICT teacher believed that CAT in teaching creative art can promote emotional development of children with ASD.

Questionnaires with Parents

In this research, all the parents involved encouraged the children with ASD to use the computer in learning. Most of the parents have at least one CATdevicesuch as an iPad, computer or laptop at home. Parents found that their children show interest and had fun in using computer laptops. Hence, they would allow their children to use the computer at home every day.At home, the parents play the role of guide when the childrenare using the computer in learning. With parental guidance, children with autism can be trained. To prevent the children with ASDfrom misusing the computer or losing interest in learning with a computer, parents must be careful in monitoring continuously. Therefore, parents should always accompany their children.Family socio-economic status is one of thefactors affecting access toa computer in the home. Economic status and educational background are connected. Lower educational background might be one of the reasons that causes lower socio-economic status. Low socio-economic status of a family will reduce the chance of a child with autism being able to learn by using a costly computer.

Sample A:

Sample A is called Asyraf who is a boy aged 7 years and 8 months. He has moderate autism. He is Malay. He is the youngest child among five siblings. In school, he studies in the *Jujur* Class which is the same class for sample C. According to the school documents Asyraf was diagnosed by a doctor as having poor social interaction, poor speech and hyperactivity.

Interest in doing creative art by using laptop

Asyraf's performance using laptop in the test is weaker than candidates B and C. He faces more difficulties in using a laptopbecause he could not monitor the mouse properly on the first test, but showed interest in monitoring the laptop and mouse. In the first test, Asyraf did not scribble properly within the blank page by using pencil but moved the key around the whole screen **(refer to Figure 4.1)**.When we changed the medium from pencil to air brush, Asyraf started to scribble properly in the blank page in the second test**.** After using airbrush, Asyraf started to be more focused on scribbling **(refer to Figure 4.2).** He showed improvement in moving the mouse during the second test. Overall, Asyraf needs more physical prompts on monitoring the laptop, mouse and the software.

Creativity development in doing creative art by using CAT

Asyraf has challenging behavior on doing creative art. He did not draw but only scribbled most of the time.We guided sample A how to scribble by using the mouse properly. Off task in showing his creativity development.

Communication development in doing creative art by using CAT

Sample A can understand simple instructions, such as, wash your hands but not complex instructions, for example, change the color and choose the air brush. He likes to mumble during the test. He always responded with a smile when we asked him some questions, such as "Do you want to draw a house?", "Do you want to change the color into blue?" and others. He did not reply but only showed his smile together with his eye contact. He did not ask questions nor ask for help during the test. Overall, he did not speak much but only mumbled during the test.

Emotional development in doing creative art by using CAT

Asyraf did not draw any picture by himself during the test. We held his hands when hedrew a happy face and sad face on the *Paint* **(refer to Figure 4.3 and Figure 4. 4)**. After the drawing, we asked "Is this happy face?", and he answered "happy face". When asked "Is this sad face?", he answered "sad face". Therefore, we could not identify whether he can differentiate happy and sad. On the second test, when we changed the medium into air brush, he showed a surprised expression and shouted happily.

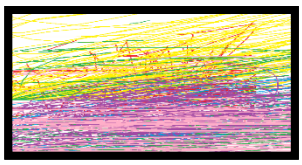

Figure 4.1

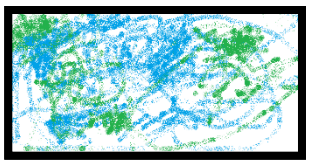

Figure 4.2

Figure 4.1: Scribble drawing with pencil from sample A in the first test
Figure 4.2: Scribble drawing with air brush from sample A in the second test

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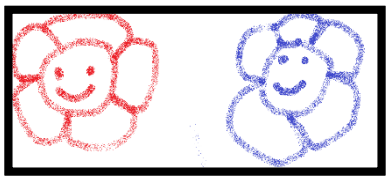

Figure 4.3

Figure 4.4

Figure 4.3: Happy face with air brush from sample A in the third test (Red: researcher; blue: sample A drew with the help of researcher)

Figure 4.4: Sad face with air brush from sample A in the third test (Red: researcher; blue: sample A drew with the help of researcher)

DISCUSSION

Use of CAT to Enhance Creative Art in Children with Autism

The purpose of study is to examine the use of CAT to enhance creative art in children with autism. Based on Wing and Gould (1979), the triad of impairments has shown the three main areas of difficulty faced by children with autism are impairment of social communication, impairment of social interaction and impairment of social imagination. The results have shown that doing creative art by using laptops helps in creativity development, communication development and emotional development. Art activities such as drawing require different levels of complex thinking and problem solving skills. Indeed, art permits children to show their thinking and feelings in a creative way which is usually through nonverbal communication. Children with autism or other learning disabilities can express emotion through art that they may not otherwise be able to state (Spivey, 2008). Hence, when teaching art to children with autism, the focus should be onunderstanding that all children have the potential to create art and that art exercises critical regions of the developing brain (Furniss, 2006).

When children with autism are using CAT in doing creative art, it seems like an isolated activity. However, the teacher can improvise more active learning. Simonson and Thomson (1997) maintained that CATwill make teaching and learning more effective but in reality, teachers actually plan a more teacher centered lesson for children. The best way to introduce art to children with autism is for the teacherto plan for a more child-centered art lesson. This is because children with autism can reveal their visual preoccupations and favorite art medium through their experience while doing creative art. Based on Gestalt art therapy, clients must “do the work”, not only of creating the representations, but also of recognizing their own self-configurations (Rubin, 2001).

Children with autism show strong interestin using laptops and some of them have talent or strong interest in doing creative art. Goldsmith and LeBlanc (2004) stated that electronic visual strategies can increase attention and motivation, and decrease challenging behaviors in children with autism. Furthermore, Gardner (1982) as well asCox and Eames (1999) discovered the savant skills of some individuals with autism in artistic ability. Art lessons should accommodate the individual needs and abilities of each child with autism (Furniss, 2006). Thus, using laptops to teach art must be based on the children’s needs and interests so that the children with autism can gain the best benefit.
Laptops can actually help the children reduce the sense of touch. Furniss (2006) has emphasized that many of the children with autism are hypersensitive to sense information such as sound, sight or touch. Some children with autism will over select specific medium such as clay, plasticine or tempera which will stimulate their sense of touch. Moore et al. (2000), Panyan (1984), Silver and Oakes (2001) stated that computer-based interventions benefit individuals with autism programs created may provide clear routines and expectations, reduce distractions, and control the stimulus overselectivity which is one of the characteristics of ASD. Therefore, children with autism can concentrate more on doing the creative art by using laptops.

Perceptions of Teacher towards Use of CAT to Enhance Creative Art in Children with Autism

Our research concluded that the teachers show positive thinking on usingCAT to enhance creative art in children with autism. Todays, teachers can plan more activities involving assistive technology devices in order to make the lesson more interesting. Teaching art by using CAT can help the teachers in planning lessons in which children with autism can learn more effectively and actively. Norhafizan (2013) has found the support from Jamila et al. (2002) who stated the use of CAT can be an alternative for teachers.
Furniss (2006) suggested teachers use one-on-one instruction. The new art process can be introduced by chaining, or step-by-step teaching by demonstrating or shaping (Furniss, 2006). Furniss (2006) also stated art lessons should be planned according to the individual needs and abilities of each child with autism. Also, teachers need to do self-improvement before they start teaching and do related researches on the use of CAT and the benefits of teaching art to children with autism. It is important for them to understand the input aswell as the output. Jamaluddin Budasah and Abdul Razak Habib (2003)stressed that preparation andteacher attitude is important. Other than serving as teaching aids, teachers can also motivate the children with autism by rewarding them using the laptop to do creative art.

Role of Parents in the Use of CAT to Enhance Creative Art of Children with ASD

Parental involvement in helping the children with autism to learn at home is very important. According to Norhafizan (2013), parents must raise the spirit of children with autism in order to make them interested in using the CAT and prepare the devices at home according to their financial situation. Barron,Harmes, and Kemker(2006) commented that computers are common in schools and children's homes in recent years. However, in this research, one of the three subjects does not own a computer or laptop at homebecause of low economic family status. Without parental support at home, the child will have less chance to practice in using the CAT to do creative art. Bolger, Patterson, Thompson, and Kupersmidt (1995) found that children from low-income homes tend to face difficulty in interacting with peers and tended to show more behavioral problems than their peers.

CONCLUSION

Throughout the research it was found that besides developinglanguage proficiency of children with autism CAI also improved their emotional development and communication skills. As children with autism showed interest in doing isolated activity such as drawing, teachers and parents can also be involved in the activity together with them to interact with them.Children with autism can also improve their creativity development and express their feeling in a creative way such as by making creative drawingsusing laptops. However, a great deal of workstill needs to be done inthis area.Teachers,parents and volunteers or therapists are able to enhance communication, language, psychosocial and other development among ASD children through different types of intervention such as Neuro-Bio art.

RECOMENDATIONS

Further research should be conducted with a focus on young adults with ASD aged 10 to 18 yearsold to see how far the Computer Assisted Technology (CAT) approach improves communication, psychomotor and socio-emotional skills among young adults with diagnosed ASD in primary and secondaryschools. Results should be more informative with a larger sample using an experimental study (quasi-experiment with control and experimental groups) of Malaysian children with ASD. Finally, further research could also involve the use of sensoryintegration such as tactile processing and therapeutic approaches in using laptopsor iPadsin drawing creativeartto develop talents in creative art for commercial value and career prospects of ASD adults.

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