

AUTISM AND TECHNOLOGY

COSMO as a strategy for supporting young children with Autism Spectrum Disorder

Introduction

The role of technology as a strategy to support children with autism in inclusive early years practice will be critically evaluated with reference to COSMO technology-mediated music-making app to promote engagement and social communication. COSMO training system won the Bett Ward 2017 for the most inspiring innovation in technology for supporting children with special needs with a clear focus of what works in the classroom (Papadakis, 2018).

Barriers children with autism face

According to Schreiber et al. (2015) developmental theorists such as Piaget, Bruner and Vygotsky recognise that social interaction, communication and imitation are necessary foundations for child development and learning. According to Baron-Cohen (2013), James et al. (2015) and Kossyvaki and Curran (2018) the most common traits associated with autism are difficulties, often extreme, in these areas. Autism is a spectrum disorder and therefore not all children exhibit the same behaviours, but most often children with autism avoid eye contact, turn-taking, and engaging in person to person interaction, regardless of their intellectual ability (Wimporary et al., 2007).

Baron-Cohen (2013) and Cowley et al. (2013) suggest that people with autism have a better understanding of ‘things’ which they call systemizing as opposed to understanding ‘people’ which they call empathizing. Systemizing is defined by Baron-Cohen as ‘the drive to analyse or construct a system’ (2012: 114). Technology is therefore an area, usually of strength, for people with autism.

Technology as an intervention strategy for children with autism

Boucenna et al. (2014) cites Konstantinidis et al. (2009) study suggesting that children with autism preferred interacting with computers than playing with other toys and Allen et al (2014) claims that apps can be adapted to support learning through scaffolding linking to Vygotsky’s theory, in a way that has advantages over child-adult instructor interactions because programs can have multimodal prompts and supports to extend learners current level appropriately. Also, technology can provide a smooth transition from school to home to promote continuous and greater learning. McIntyre (2010) state that it is a socially approved strategy, a child with autism using technology is considered ‘cool’ and therefore more likely to feel included which builds self-esteem.

However, according to Sharkins et al (2015) and Way et al (2010) there is debate as to the impact of technology on young children and as yet there are no longitudinal studies showing long-term outcomes. Kullack-Ublick et al (2015) and Palmer (2015) are among those who believe that children should have no exposure to technology at all in the early years because it represents an artificial, abstract, virtual world at an age when children need to make connections through first hand experiences of real life.

COSMO – research case study

An independent research study was undertaken in collaboration with Kossyvaki and Curran (2018) researchers at the Autism Centre for Education and Research, University of Birmingham, to measure the effectiveness of the Cosmo music-making app as an intervention strategy to improve engagement and social communication skills necessary for development and learning.

Geretsegger et al (2015) suggest that like technology, music is something children with autism often have an affinity for because it offers a structure and predictability that they prefer. Wimporary et al (2007) and Wan et al (2010) studies revealed that music facilitated joint attention and emotional attunement. However Simpson et al (2013) found considerable variability in their studies with children with autism and music, in their levels of engagement.

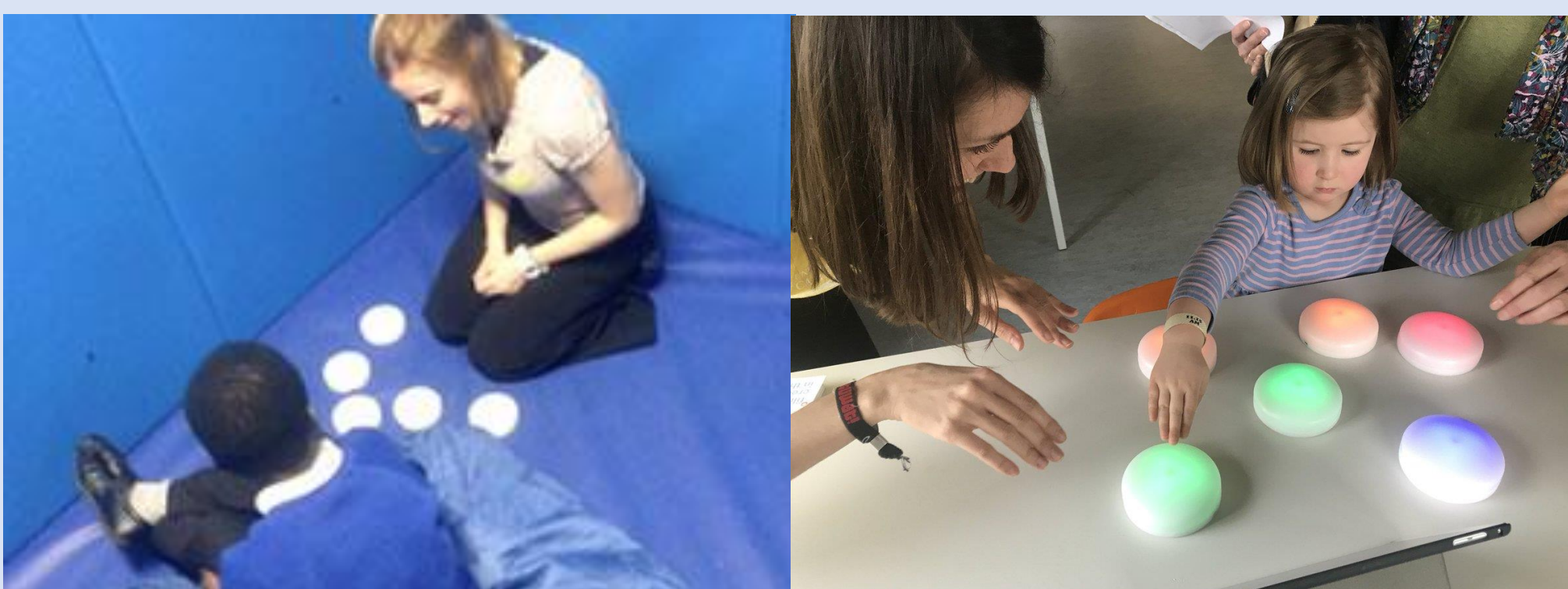
The COSMO research was undertaken in the real life context of a school setting with 5 participants in Years 1 and 2, aged between 5-7 years old (four with extreme autism and one with moderate autism).

The COSMO system is used very simply without any verbal instruction which according to Kossyvaki and Curran (2018) is an advantage for young children with autism. Based on intensive interaction therapy methods (Nind and Hewitt, 2001) and responsive imitation training (Ingersoll, 2010) the researcher models the rules of the game for the child to imitate such as knowing when and how to press a switch to alter the volume of sound or build up layers of sound, depending on amount of pressure applied. The buttons are visible and accessible to the child and the non verbal interaction based more on attunement with the adult encourages joint-attention and turn-taking in a more appropriate way for a child with autism and aids development of a personal relationship with the child through the shared experience of music making.



Children playing with Cosmo units

(Source: Filisia, 2018)



(Source: Filisia 2018)

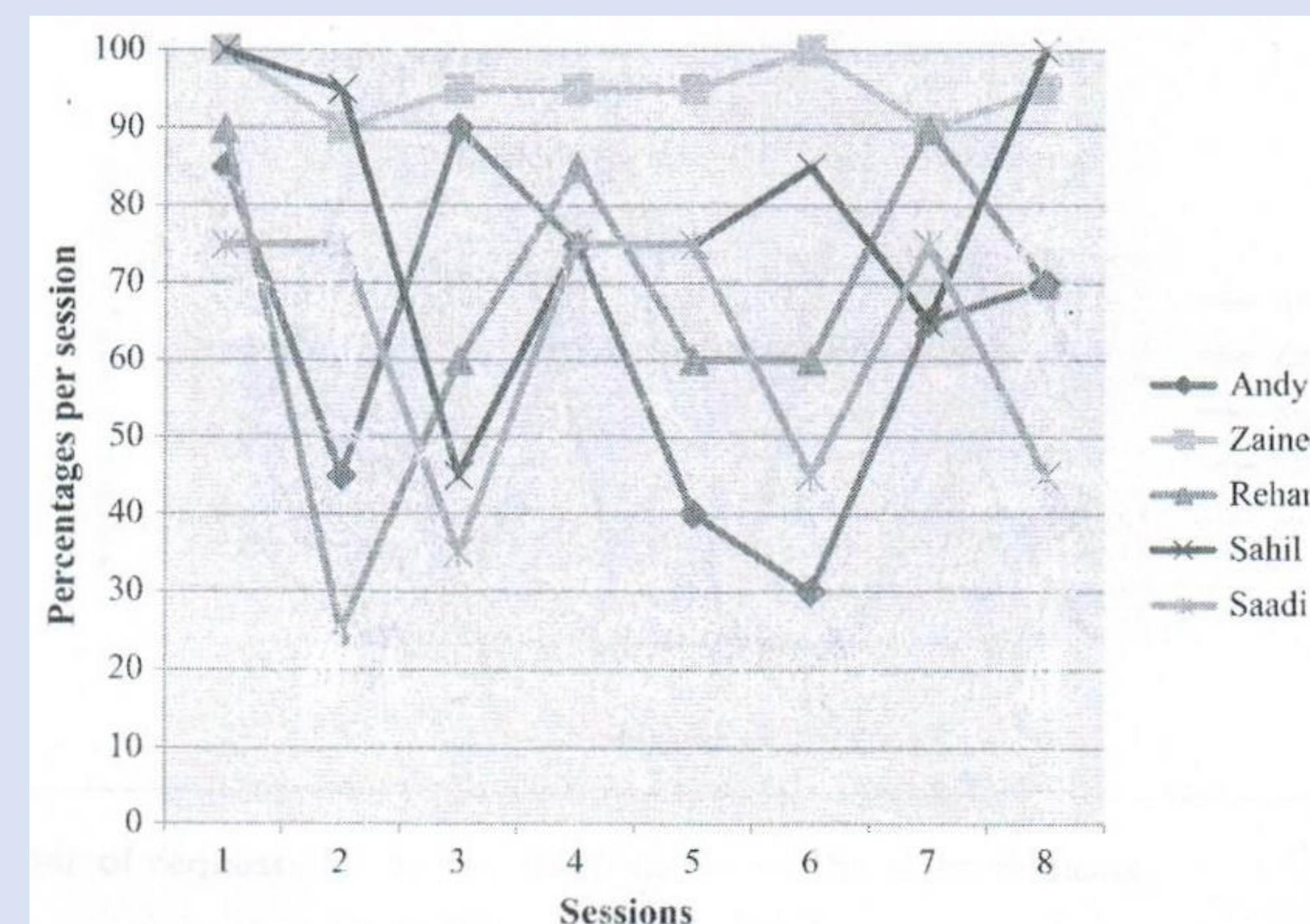
(Source: Filisia, 2018)

Findings

Benefits of COSMO music-making app:

- a **recreational tool** to facilitate expression and socialisation
- a **cognitive tool** to support reaction to stimuli, connection to cause and effect, training of attention and memory
- a **physical training tool** to train fine motor skills and hand eye coordination
- an **evaluation tool** as it collects data through sensor technology, which is revolutionary, allowing teachers and therapists to track each child's individual progress over time in an accurate and objective way. (Filisia, 2018)

It can also be a time and cost effective intervention which is an important consideration due to limited school budgets for additional learning needs provision.



(Source: Kossyvaki and Curran, 2018)

Figure 1. Percentage of engagement for all five children during the eight sessions.

Engagement was coded according to ‘The Engagement and Social Communication Checklist’ based on how often a child showed curiosity, awareness, anticipation and initiation recorded in 30 second intervals for 12 minutes.

The graph shows that one child was highly engaged during most of the sessions whereas for the others there is more variability, in fact it seems quite up and down for most of the children. Overall there is evidence of engagement which when you consider these are children with severe autism and intellectual disabilities it is a relatively positive result. However, measuring engagement is hard, it is quantifiable according to qualitative factors and not quantitative. In fact there was also another graph measuring ‘disengagement’ in which one child scored 100% disengagement in 2 sessions which is not reflected in the graph of engagement as each is measured according to different criteria.

A similar research by Allen et al. (2014) with fifty four six-year old children with autism, found that the children were highly engaged with the technology, although the study concluded that there were no significant differences between children's pre and post intervention scores in joint attention and engagement ability after playing on the game-app.

Discussion

According to Frederickson and Cline (2015) research studies always have limitations. One can ask the question whether the children were more engaged because of the music or the technology, or as Kossyvaki and Curran (2018) point out themselves, were the changes in children's behaviour due to the development of relationship between researcher and child irrespective of music or technology? The study is also based on a very small sample size with no control group.

Five classroom staff were interviewed and reported that the children became more engaged over time with familiarity with the activity and the researcher, and that for some this transferred into other contexts. However, they noted some challenges such as it taking some time for the children to understand how the buttons and game worked and even then the buttons were being used as play objects for stacking rather than their intended purpose. Also computer glitches were raised as an issue as they caused some children to lose all interest and one child to become so frustrated he started throwing the units around the room.

King et al. (2017) state that researchers have indicated that technology based interventions in classroom settings require practitioners and parents to have a high level of technical support and training to be able to support learning with children with autism. The Welsh Government Digital Competence Framework (2016) requires digital competency skills to be embedded as a cross-curricular activity and this may offer advantages for children with autism.

Conclusion

To conclude, research suggests that children with autism have a natural affinity to technology due to its systematic structure and it can therefore be used as a tool for intervention strategies to support children in inclusive early years settings. Research on the Cosmo technology-mediated music-making app indicated that it can be effective in improving engagement and social communication, although findings did show variability. Furthermore, there are no longitudinal studies showing the impact of technology on young children's developing brain, in the long term, and research studies are also subject to many external factors that may play a greater role in the outcomes such as the relationship between the child and the adult.

Further Reading

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