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ECHOES: a computer game that helps children to communicate with others

ECHOES is a game that supports young children on the autism spectrum in exploring and learning social communication skills. Our research demonstrates the potential of computer games as complimentary educational tools in autism intervention.

Key words: autism spectrum disorders; virtual agents; serious games; technology-enhanced learning

Key findings

Findings are of interest to parents, teachers and autism practitioners as they relate to the **efficacy of the ECHOES' computer game in supporting social communication skills** in children with autism spectrum disorders.

- The analysis of children's behaviours before, during and after using the ECHOES game revealed a significant reduction in children missing opportunities to communicate with a human social partner, as well as a significant increase in children's social behaviours e.g. using gaze to seek information from others, to share joy/interest, to secure attention, to greet a partner or to facilitate the continuation of turn-taking, as well as speaking to a social partner, both human and the virtual agent.
- Although the study was too short in duration to reveal any real-world transfer, the improvements observed highlight the potential of technology in facilitating skills that are critical to social interaction.
- Some children manifested behaviours that they never showed in the classroom and for a number of them a positive trend was observed in their ability to self-regulate emotionally. Observing such behaviours allowed teachers to appreciate children's individual hidden potential and to tailor support accordingly, thus changing specific day-to-day interventions and practice to suit them.
- Teachers reported that the main achievement of ECHOES is seeing children behave more spontaneously and communicatively within ECHOES compared to their usual classroom behaviours. This was the main reason for teachers' continuing enthusiasm to be further involved in the research.

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What we did

ECHOES lasted three and a half years (2008-2012). It was funded jointly by the Economic and Social Research Council (ESRC) and the Engineering and Physical Sciences Research Council (EPSRC).

The motivation for the project was to build a technology-enhanced learning environment that could serve: 1) to help young children aged 5-7 years old, both typically developing and those with autism diagnosis, in practicing social interaction skills; and 2) to provide a research tool for scientists and practitioners for enhancing our understanding of the social communication difficulties that young children with autism diagnosis experience. The project involved eight universities: Institute of Education, University of London (lead), Heriot-Watt, Sussex, Edinburgh, Dundee, Strathclyde, Birmingham and Cardiff, as well as 5 primary schools across the UK. 42 children took part in the final evaluation of the technology with over 100 children and 36 practitioners taking part overall at different stages in the project.

How we did it

Teachers and children in different schools participated in the design of the look-and-feel of the ECHOES game. Practitioners were crucially involved in the design of the intelligent agent, named Andy, including its appearance and behaviours.

The designs were evaluated at different stages, while the final evaluation was conducted in the last 3 months of the project. The final evaluation involved pre and post activities providing the baseline against which children's progress within the use of ECHOES was measured. 42 children participated in up to 8 ECHOES sessions over a six-week period (15-20 minutes each) at their schools. The sessions were video recorded and annotated using a coding scheme specially developed by the team, based on the SCERTS intervention framework (Prizant et al. (2006) The SCERTS Model: A Comprehensive Educational Approach for Children with Autism Spectrum Disorders. Brookes). The main behaviours of interest were the child's ability to initiate and to respond to bids for interaction, both of which were marked by positive trends across the participating children.

Further information

While the ECHOES project is now completed, two further projects continue its work: the ESRC funded Shape project which investigates how different technologies can be embedded in everyday classrooms successfully, and the EPSRC funded SHARE-IT project, which aims to improve the ECHOES technology by extending it to different devices and to different contexts of use, including to children's homes. The main results of the ECHOES' final evaluation are now being prepared for publication by the team and will be available to the public in 2014.

Contact

Principal Investigator: Dr Kaśka Porayska-Pomsta, Department of Culture, Communications and Media, Institute of Education, University of London
Email: K.Porayska-Pomsta@ioe.ac.uk
Phone: +44 (0)20 7763 2167

Other team members:

	Co-investigators	Researchers
Institute of Education, University of London		Dr Katerina Avramides & Dr Sara Bernardini
Sussex University	Dr Judith Good	Dr Christopher Frauenberger
Birmingham University	Dr Karen Guldberg	Dr Lila Kossivaki
University of Wales Institute	Dr Wendy Keay-Bright	
Heriot-Watt University, Edinburgh	Prof. Oliver Lemon	Dr Mary-Ellen Foster
Edinburgh University	Dr Helen Pain	Ms Alyssa Alcorn & Dr Jinying Chen
Strathclyde University	Dr Ganathusharan Rajendran	
Birkbeck, University of London	Dr Tim Smith	
Dundee University	Prof Annalu Waller	Dr Rachel Menzies

IOE researchers are based at the London Knowledge Lab (LKL) – a collaboration between the Institute of Education and Birkbeck