

TECHNOLOGY ENHANCED LEARNING [tel.ac.uk](http://tel.ac.uk)

# Echoes the virtual garden that helps autistic children communicate

TEL stories

EVIDENCE from  
the TEL research  
programme





Echoes has a massive impact on children with autism. It enables them to communicate and succeed without any barriers or feeling constrained by everyday teaching. They are free to explore, learn and develop by themselves, which is absolutely fascinating to see.

Ian Lowe, Headteacher, Topcliffe Primary School

---

## Echoes... the challenge

Making friends when you're five years old can be tricky. Keeping them can sometimes be traumatic. The process of learning to get on with other people can be trying for all children, but particularly for youngsters with autistic spectrum conditions.

'There can be a lot of grief in the playground,' says Dr Kaska Porayska-Pomsta, director of the Echoes project. 'Young children have such a lot to learn. They need to know how to take turns, how to share, how to listen, how to walk away.' In other words, they have to acquire those subtle social skills that smooth and soothe human interactions and that help them learn in general.

Such skills are difficult for autistic children. They often miss out on social cues, not realising, for example, when someone is trying to show them something by pointing or looking at it. Called joint attention, this is a skill fundamental to communication.

Dr Porayska-Pomsta realised that technology had the potential to help all children, but especially those on the autistic spectrum, acquire such vital social skills. In 2008 with a £1.2 million grant from the ESRC and the EPSRC research councils, she and colleagues set up the Echoes project.



...the challenge

# Echoes... **Helps teachers, parents and researchers to understand a pupil's strengths and difficulties** — and how **technology** might address them.

## Echoes... the technology

Getting on with people, like all other skills, benefits from practice. But if you are unsure of yourself, wouldn't it be great to be able to practise on something that isn't human and isn't going to take offence?

That's where Andy comes in. Created by the Echoes team, Andy is what's known as a virtual autonomous agent. To the children who meet him he's a cheerful boy who lives in a magic garden displayed on a huge interactive plasma touchscreen. He's good at playing games and helping them learn. He's happy to share and take turns. He also often points things out to them, sometimes with his finger, sometimes just by looking in a certain direction.



Andy has some surprising qualities. His personality has been built using cognitive architecture, a well-known artificial intelligence (AI) technique. The Echoes researchers selected the traits that determine how he reacts to the information he receives when a child plays with him. Plus, he's equipped with cameras so he might know where the child is looking.

Each child Andy encounters is at a different stage of development with different interests, fears, likes and dislikes. 'Ideally, Andy will react differently to different children. He will pick up on their needs, their interests and then adapt his actions accordingly,' says Dr Porayska-Pomsta.

**'At a very basic level, if a child touches an object frequently we might infer that the child likes that object and then Andy would concentrate on activities using that object.'**

'The role of AI in the system is to drive the interaction, allowing us to develop technologies that adapt to the individual child on a moment by moment basis. AI has a big role to play in the design of educational technology for young children.'

Of course, it's not just Andy who gets to know a child better. Echoes helps teachers, parents and researchers to understand a pupil's strengths and difficulties – and how technology might address them. It's also a platform for exploring questions relating to learning and development, user modelling, and multi-modal interaction.



...the technology

# Echoes...

The system has won an enthusiastic response from teachers and children, many of whom were involved in its development.



## Echoes... in action

Technology can be very motivating for autistic children, says Dr Karen Guldberg, director of the University of Birmingham's Autism Centre for Education and Research. 'Perhaps because it is predictable, the children can get to know the rules in a way they find hard with people.'

'The key is to use technology in the right way. We don't want them to get locked into a technological world, but to use their enthusiasm to help them engage better with the real world.'

Echoes has been trialled at four schools in the UK. The system has won an enthusiastic response from teachers and children, many of whom were involved in its development. Staff say that some children change their behaviour when using Echoes, giving them clues as to possible new ways of teaching them.

'Andy can be a stepping stone for a child,' says Dr Porayska-Pomsta. 'Those who played and interacted with Andy showed that they did care for him. Teachers were impressed by this because they rarely see these pupils interacting with "real" children.'

'Echoes is a computer system so it's endlessly patient, you can repeat everything over and over again,' she says. 'Children can experiment and they can fail, but without real-world consequences. And eventually we hope they'll be able to transfer what they've learnt into the real world.'

Ian Lowe, headteacher of Topcliffe Primary School, Birmingham – where Echoes was trialled – commented on the 'massive impact' Andy had had on children with autism, liberating them to explore and learn. Subsequently Topcliffe employed a psychologist to analyse how the children interacted with Echoes. The aim, he says, is to support not only their everyday teaching but, ultimately, to improve their life chances.

## Echoes... find out more

More information about Echoes is available at [www.tel.ac.uk](http://www.tel.ac.uk). The project is part of the Technology Enhanced Learning (TEL) research programme. This is...

- a £12m programme funded by the UK ESRC and EPSRC from 2007-2012;
- designing and evaluating systems to advance our understanding of learning and teaching in a technological context;
- supporting eight large interdisciplinary projects;
- working to achieve impact for emerging research results;
- mapping progress on key themes.



tel.ac.uk

Technology Enhanced Learning Research Programme  
London Knowledge Lab, Institute of Education,  
University of London, 23-29 Emerald Street,  
London, WC1N 3QS

youtube: [youtube.com/tlrptel](https://www.youtube.com/tlrptel)

twitter: @TLRPTEL

email: [tlrptel@gmail.com](mailto:tlrptel@gmail.com)

phone: +44 (0)20 7911 5577



**EPSRC**

Pioneering research  
and skills