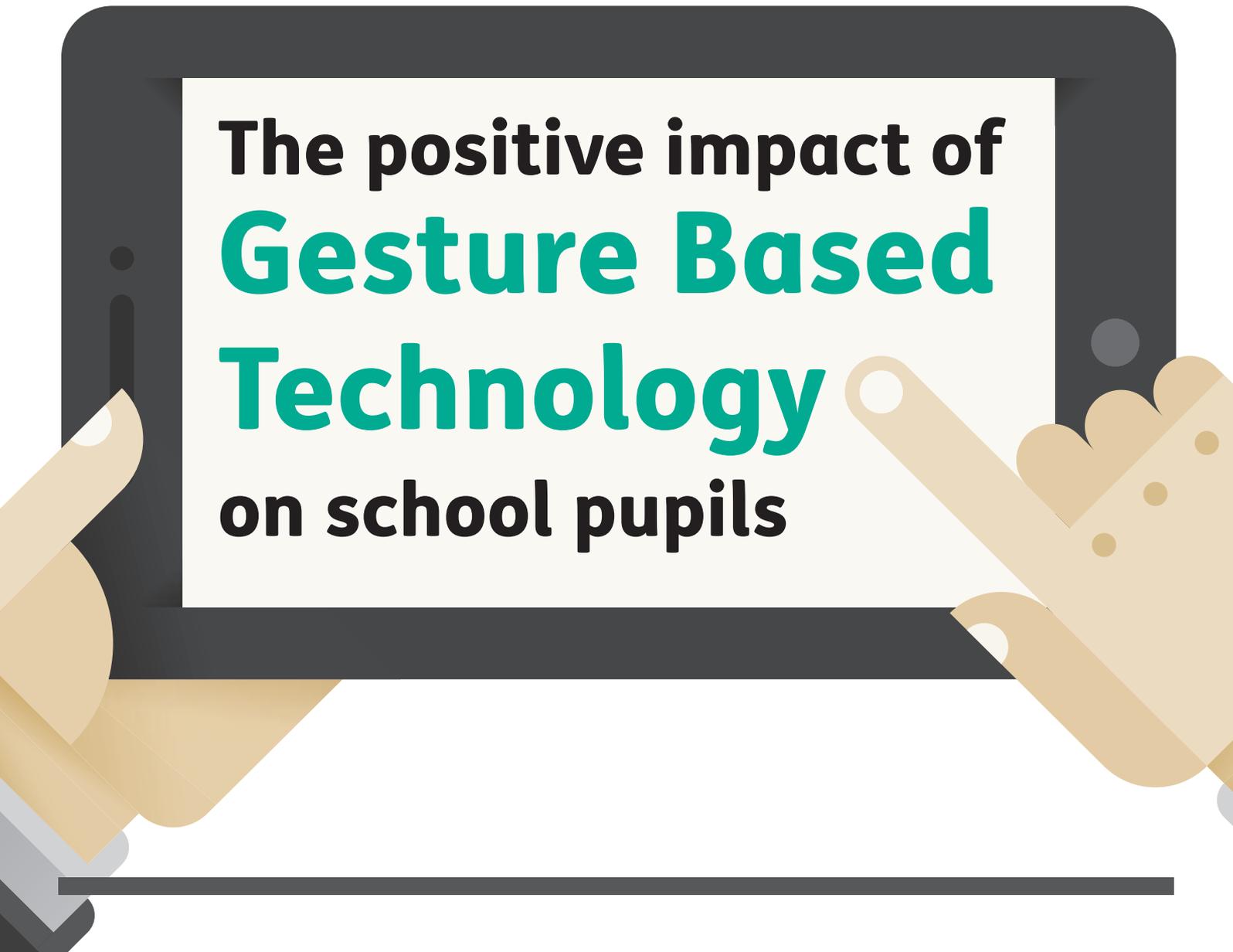




Anthony Rhys is the ICT Co-ordinator for Trinity Fields School and Resource Centre. The school has been focusing on increasing independent access to the curriculum for their more severe PMLD and SLD pupils since 2011. One important element of this work has been utilising gesture based technology. Anthony describes the positive impact this has had on pupils.



The positive impact of **Gesture Based Technology** on school pupils

We are well aware that all of the pupils we teach are different; they have their own individual physical capabilities, their own interests and their own cognitive abilities. Therefore, through using a wide variety of gesture based technologies, we can harness these capabilities to give each pupil what we all want them to have- independence and as much control over their environment and their lives as possible.

Trinity Fields School and Resource Centre is located in Ystrad Mynach. We have 126 pupils on roll aged 3-19 and we serve the County Borough of Caerphilly. Our pupils mainly have severe learning disabilities (SLD) and permanent and multiple learning disabilities (PMLD). During our inspection in November 2012 Trinity Fields School was given Sector Leading Practice by Esytyn for our use of gesture based technology in school to support the learning of pupils with SLD and PMLD.

What is 'Gesture Based Technology?'

Gesture based technology is increasingly becoming part of our everyday lives at home through the use of smart phones, tablets and gaming devices such as the Wii and Kinect. The basic principle is that gesture based technology uses gesture as the main input method, rather than a mouse, switch or a keyboard. This gesture can be touch (swiping, pinching, pressing a screen), physical gesture (moving hands, arms, fingers, head or even the eyes) or speech and sound. The emphasis is on a direct interaction between the self and the device, with little or nothing in-between.

The attraction of this should be obvious to those working with special needs pupils as they just need to move, touch or make a sound to have a direct effect on their environment. Through using a variety of equipment this gestural input can be anything from the wiggle of a finger to a shout or kick of the legs. We are well aware that all of the pupils we teach are different; they have their own individual physical capabilities, their own interests and their own cognitive abilities. Therefore, through using a wide variety of gesture based technologies, we can harness these capabilities to give each pupil what we all want them to have- independence and as much control over their environment and their lives as possible.

Tablets

Tablets are great for most pupils. They are portable and have touch responsive screens but they also have photo and video cameras and can use the spoken word and sounds for interaction.

Case Study

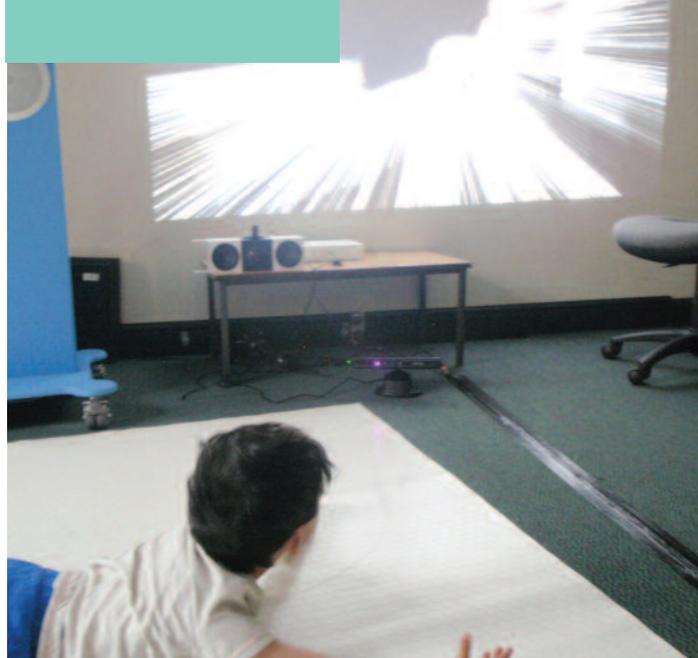
J is a pupil with cerebral palsy who has limited movement of his elbows and head. He is a very accomplished switch user and uses switches to access music tracks, computer programs and sound clips. He loves high pitched sounds and harp noises so for his free time in school now he accesses a tablet either by stroking it with his cheek to create the sounds he likes or by using apps that use the camera to detect his motion and convert that into sound. This has the advantage of enabling him to create sounds in a more fluid way than with a single switch press, he can move fast or slow with large or small movements to create a variety of sounds for himself.



The positive impact of Gesture Based Technology on school pupils

Interactive Floor Projector

This technology was introduced for two specific purposes. It allows our pupils with very poor physical mobility to interact meaningfully and independently with their immediate environment and it also gives our 'slower movers' motivation to be more active. The main users of this are those with severe physical disabilities such as cerebral palsy. The system uses infra-red motion cameras and a projector to create an interactive area on the floor.



Case Study

One of our most responsive floor projector users is a 7 year old pupil working at a P3i level with severe cerebral palsy. He has limited movement of his arms and legs and cannot stand or sit unaided but when out of his chair he can roll around on the floor. He absolutely loves the floor projector and it really motivates him to move his arms, legs and head as when he does stars, lights and flowers emerge from every movement. In this way he can also pop balloons, squish insects, splat ice creams and move graphics. When he is on the floor projector his activity levels increase dramatically as he has a compelling reason to move - because when he does, wonderful things happen around him. The most important thing as well is that he is doing it himself with very minimal staff intervention or help.



It is becoming a window into the minds of a lot of our pupils and as the only physical movement it requires is the eyes.

Kinect (or Depth Sensing Cameras)

Depth sensing cameras normally use both a normal camera and an infrared camera to track a large three dimensional area. They can recognise people and movement in this area and feed this information back to the computer. A typical set up uses a PC, a projector and a depth sensing camera to enable pupils to interact with programs by moving part or all of their bodies. Cause and effect is instantaneous with this technology as any movement will cause a reaction on screen and these reactions then invite further exploration. All the programs we use are fail safe and non-task directed and this is important as we are not teaching specific skills but encouraging play, creativity and interaction, deficits which lie at the core of autism. They work well with all pupils who have movement and good vision.

Case Study

A 14 year old pupil with severe autistic spectrum disorder working at around a P5 level was studied using the Kinect for a post-graduate action research project. He had limited interests and his behaviour was deteriorating and he was becoming more withdrawn and hard to engage with very limited interests. Through four weeks of sessions the pupil made significant improvements in his levels of movement, interaction and engagement. Usually he was 'rooted to the spot' or used short, specific movements but after a few sessions he began to walk around, wave his arms and displayed much more fluidity of movement.

The pupil, who has immediate and delayed echolalia, also independently named the colours on the projected screen twice as he changed them during the study. Such independent expressive language has not previously been observed in the pupil in the last five years since he entered our school setting. More importantly he had found something that he really enjoyed doing which increased his well being and involvement.

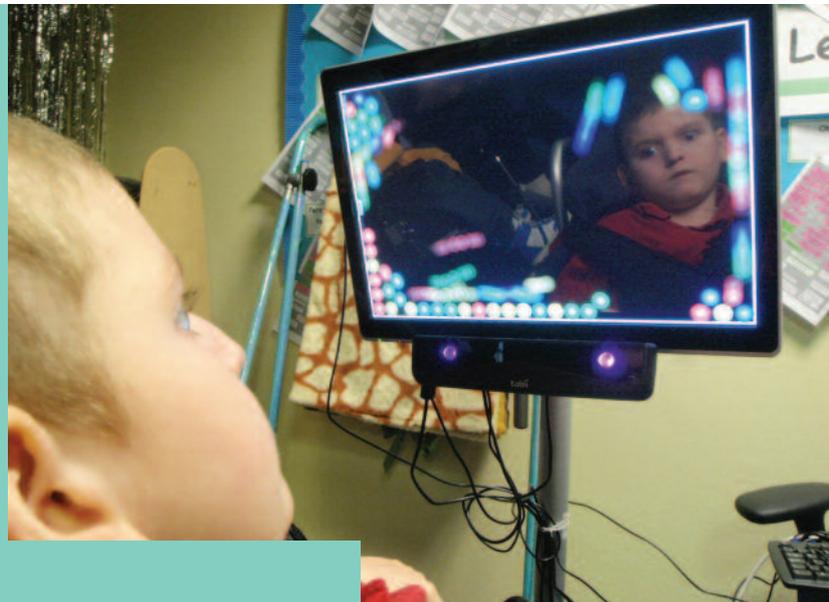
Eyegaze

This technology, which has been used traditionally as an AAC device, is being used in our setting as an open ended engagement tool. The eyegaze device which fits under the PC screen tracks the eyes and enables the user to control the mouse cursor. By using it pupils can create lovely sensory effects, or choose from options just by looking at a screen. It is becoming a window into the minds of a lot of our pupils and as the only physical movement it requires is the eyes we are currently trialling it with a large cohort of our PMLD pupils.



Case Study- Eyegaze

One of our eyegaze users is a 7 year old pupil working at a P2 level with Lissencephaly who is tube fed and only has controlled movement of one thumb. When using the eyegaze he totally fixates on the screen and really enjoys the sensory interaction programs that create sounds and graphics as he looks around the screen. He will track specific targets across the screen very well and he can also use the 'dwell' function, which is where the user looks at a single place for a short amount of time to emulate a mouse click. He accessing interactive content such as switch based programs and animal scenes and the next step with him is to introduce early choice making activities using icons. It is evidence enough that until we try technology such as this we do not always fully appreciate the cognitive abilities of our pupils with severe physical disabilities.



Conclusion

Our use of gesture based technology is constantly developing. The more we use it the more we learn about how the pupils interact with it and how they can use it. In many ways there is no real precedent to gestural based technology, there is no textbook for its use so it is a case of giving it a go, seeing what happens and building on the positives. The common theme with all of this technology is that it enables some pupils to do things they never would have been able to do without it. The most crucial aspect of this is that they are doing these things themselves.

The equipment needed can be expensive but doesn't always have to be. To share all of our collective experience our Gesture Based Technology group runs information sites on the different equipment which can be found here:

<http://gesturesen.wikispaces.com>

The Somantics program, which uses the Kinect sensor can be downloaded for free at www.somantics.org

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