

The role of teacher inquiry in improving pupils' engagement through eye gaze technology

An overview

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Introduction

The SEND Code of Practice (DfE/DoH, 2015) states that schools are responsible for removing pupils' barriers to learning and requires that pupils needs are met by 'well evidenced interventions' (p. 85). The focus of this inquiry is to provide evidence as to the effectiveness of eye gaze technology interventions in improving engagement for two pupils with Complex Learning Difficulties and Disabilities (CLDD).

This research takes into consideration the context of policy, children's changing needs, the rising use of technology within schools and the need for engagement in successful learning. It then discusses the research methods used and the role of the Engagement Profile and Scale (Carpenter et al., 2011a, 2015) in measuring pupils' progress over the 12 week intervention period. The results of both case studies are then discussed in a follow up article which also addresses how this information was disseminated to colleagues and the limitations of the study. This article concludes by summarising the research results and looking at the role that teacher inquiry had in supporting pupils' engagement during eye gaze intervention sessions.

Background to the study

Pupils changing needs

The setting for this inquiry was School X, Worcestershire. The school provides outstanding

provision for 120 pupils ranging from early years through to post 16. All pupils have physical disabilities often accompanied by other complex medical needs, sensory, communication or learning difficulties. The most recent Ofsted report (2012) documented that in recent years the nature of their learning difficulties has become increasingly more acute and complex.

The changing nature of pupils' needs is not unique to School X and the Department for Children, Schools and Families (2010) has noted a steady increase in the population of children with CLDD. This increase in number and complexity of pupils' needs has arisen through a variety of factors such as: the improvement in survival rates of preterm babies; prenatal maternal drug and alcohol abuse; and rare chromosomal disorders (Carpenter et al., 2011b). Whilst the population of pupils with CLDD has increased, there is as yet no established pedagogy to support these pupils. Teacher inquiry therefore provides an essential tool for identifying and overcoming the potential barriers to learning that these pupils face (ibid.).

Technology in schools

In the last five years UK schools have spent more than £1 billion on digital technology. From interactive whiteboards to tablets, there is more digital technology in schools than ever before. But so far there has been little evidence of substantial success in improving educational outcomes. (Nesta, 2012)

Technology is readily available and there is huge pressure for schools to invest. However, with limited funds available and the need to ensure that all pupils are reaching their

potential, it is important that schools invest wisely and can demonstrate that they have improved outcomes for their pupils. This is further reinforced by the SEND Code of Practice (2015, p. 85) which requires that pupils' needs are met by 'interventions targeted at their areas of difficulty and where necessary specialist equipment or software'.

Through fundraising, School X was able to purchase three eye gaze systems in October 2014 costing £7,000 each. This research project piloted the use of this technology and provided evidence relating to the use of eye gaze interventions within school.

Eye gaze technology

Babies begin to develop the ability to use eye tracking at one month of age, enabling them to follow people or moving objects and to begin to move their eyes independently from their head (Von Hofsten and Rosander 1996). This is a very early developmental skill and a natural and intuitive process. Eye gaze therefore has the potential to be used with pupils with a wide variety of conditions including physical disabilities, communication and intellectual difficulties (Inclusive Technology, 2015). It can also be used for a wide range of purposes including to access Windows on a PC, as an environmental control or as an Augmentative and Alternative Communication (AAC) device (ibid.). As a relatively new technology there is a rapidly increasing research base into its possible applications. To date this has largely focused on the analysis of eye tracking data for using the eye gaze with students with Rett syndrome (Baptista et al., 2006; Rose et al., 2013), autism (Brady et al., 2014; Gillespie-Smith and Fletcher-Watson, 2014), and as a method of determining appropriate AAC interventions (Light and McNaughton 2014; Wilkinson and Mitchell, 2014), but there is little evidence relating to its use within the classroom and the impact this can have on pupils' engagement and learning.

Learning and engagement

The notion of personalised learning...is inextricably linked to children's levels of engagement. Finding out what motivates and engages children is key to personalised learning. (Imray and Hinchliffe, 2014, p. 47)

For children with CLDD it is evident that a differentiated and personalised curriculum is needed (Dittrich and Tutt, 2008). Research has indicated that engagement is one of the best predictors for successful learning, particularly amongst children with disabilities (Carpenter et al., 2015).

This is a particularly key area to investigate with regards to the introduction of eye gaze technology, as for pupils to use eye gaze effectively they must first be engaged and motivated to use the technology.

Project methods

Teacher Inquiry

A focus on inquiry-based practice needs to be sustained during initial teacher education programmes and throughout teachers' professional careers, so that disciplined innovation and collaborative inquiry are embedded within the lives of schools. (BERA, 2014, p. 8)

There are many research methods available within schools, 'including reviewing literature,

looking at existing data, observing, taking photographs, surveying and interviewing' (GTC, 2006, p. 8). This research focused on observation and used video to support this. The project followed the eight discrete stages of the Accessible Research Cycle (ARC) which is modelled on the cyclical nature of action research (Jones et al., 2012). Each stage addresses key questions, aiming to provide a framework for teachers, supporting them to develop thorough and meaningful research that can be incorporated into their own practice (ibid.). The tool used to assess pupil responses to the eye gaze intervention sessions was the Engagement Profile and Scale (EPS).

Engagement Profile and Scale

The Engagement Profile and Scale together form a systematic and deductive framework for incrementally developing, trialling and modifying personalised learning pathways for children with CLDD. (Carpenter et al., 2015, p. 26)

The EPS was the outcome of Department for Education funded research into developing personalised pathways for students with CLDD (Carpenter et al., 2011a). As a new tool the evidence base for its successful application is still being developed but to date emerging literature suggests it has a valuable role to play in teacher inquiry (Innovation Teaching School, 2014; Imray and Hinchliffe, 2014).

It is a classroom tool which allows teachers to focus on a child's engagement as a learner as they progress towards their attainment targets. It uses seven engagement indicators (awareness, curiosity, investigation, discovery, anticipation, persistence and initiation) which

recognise the different ways in which students engage in learning (Carpenter et al., 2011a).

The Engagement Profile is used to describe and record how a child responds and behaves in an activity which highly motivates and interests them and indicates how they demonstrate high engagement. This was carried out for both pupils in this study at the onset of research (See Figure 1).

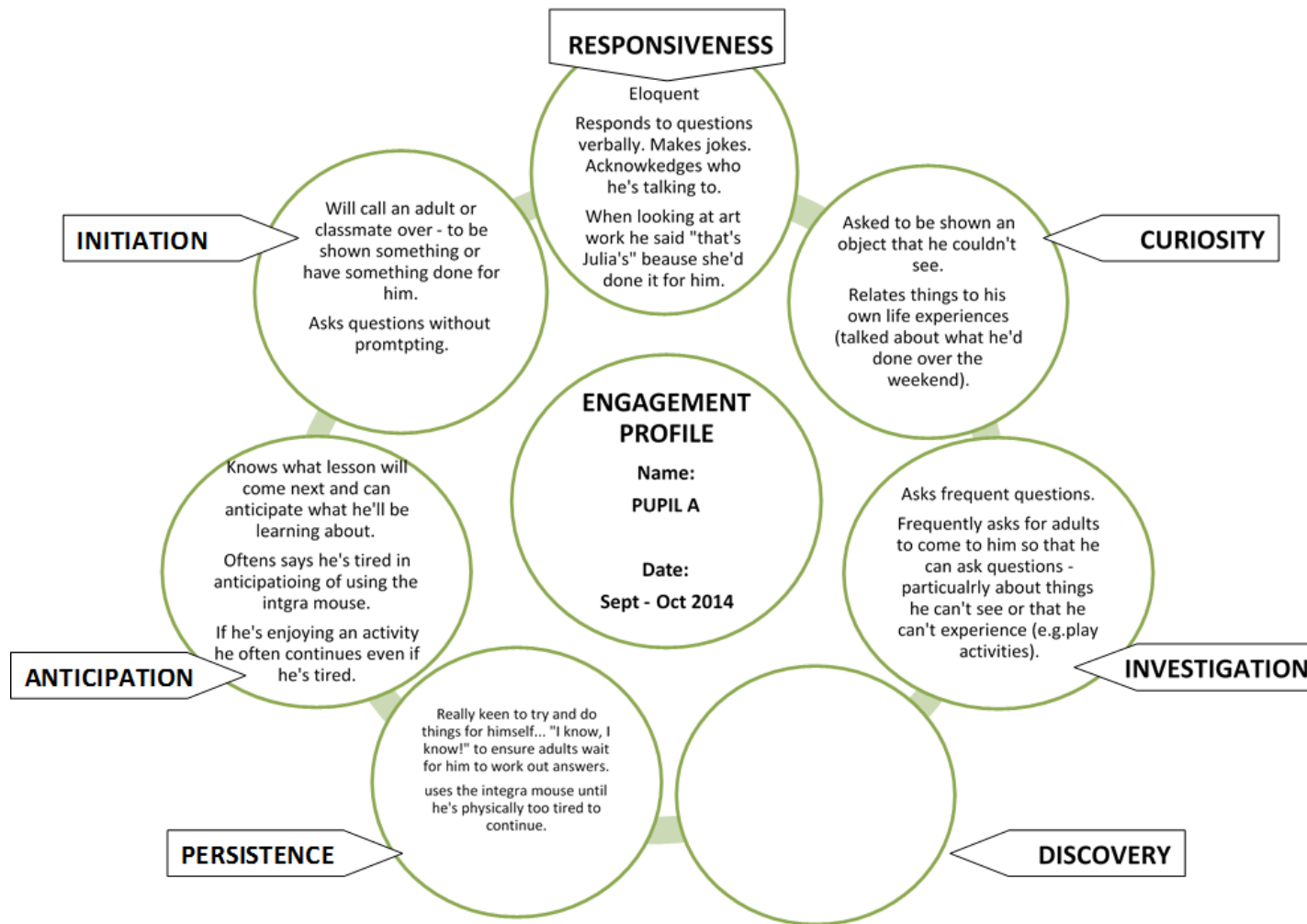


Figure 1: Example of a completed Engagement Profile – Pupil A

Pupils were then introduced to the eye gaze in 1:1 sessions, where possible twice weekly. An Engagement Scale was completed for each session, recording how pupils demonstrated the seven areas of engagement, scoring each of these out of four to reflect whether this was fleeting engagement or fully sustained or somewhere in between. The totals for each area of engagement were added together to give an overall score out of a possible 28. The Scales were completed after each session through analysing video alongside other members of the staff team whenever possible. From this analysis 'next actions' were identified and one was selected to be implemented during the subsequent session.

Pupils involved in the inquiry

With the introduction of the eye gaze into school, nine pupils were selected to use the technology and two pupils (with contrasting needs) were selected as case studies (Table 1). These case studies acted as a pilot for the school to determine how the eye gaze might be used to the best effect for the widest range of pupils.

Table 1. Summary table providing case study comparisons

	Pupil A	Pupil B
Age	10 years	4 years
Diagnosis	Morquio Disease	CLDD – Cerebral Palsy and Learning Disability.
Communication	Verbal	Non-verbal (facial expression, shaking his head, vocalisations and eye gaze)
Levels	P8 (writing) – 2A (number)	Working at: birth – 11 months.
Target for eye gaze intervention	To develop skills to enable him to access the curriculum using the eye gaze.	To explore and experience cause and effect activities.

Summary of results

Through using the EPS it was possible to quantify both pupils' engagement and to use this to monitor progress towards their individual eye gaze target. Both pupils increased their engagement scores significantly, moving from 'low / minimal engagement' to 'Fully sustained' in at least five of the seven engagement indicators. Through analysis of video recording of each session it was possible to identify numerous 'next actions', one of which was implemented in the subsequent session. This process provided the opportunity to reflect, and the space to 'see' how pupils demonstrated engagement and how this could be further supported by making adjustments to the interventions.

This individual progress from each case study is explored in greater detail in a subsequent article.

Reflection

Taking an inquiry approach centres the child and their learning need... [and] encourages clear prioritisation, a team focus, a workable timeframe and consistency. (Carpenter et al., 2015, p. 129)

Introducing the eye gaze in targeted intervention sessions enabled pupils to become the priority due to the space and time provided by the process of teacher inquiry. This enabled staff to respond directly to each individual pupils' abilities, needs and progress in relation to the use of the eye gaze. As the subsequent article will explore, this led to a personalised pedagogy for each pupil and improvement in their engagement, learning and emotional wellbeing. Whilst these benefits may have been possible through eye gaze interventions

alone, the framework of using teacher inquiry (and both the ARC and EPS) enabled this progress to be evidenced. This is essential if schools are to be able to justify the cost of new technology, document interventions as required by the SEND code of practice (DfE/DoH, 2015) whilst providing the very best support to their pupils.

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