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**A critical reflection on how information communication technology can facilitate high quality teaching and learning for dyslexic children and their spelling**

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**Abstract**

This paper discusses how information communication technology (ICT) can facilitate high quality teaching and learning for dyslexic children and their spelling. Previous research has suggested that ICT can have a positive effect on dyslexic children's spelling ability and confidence (Lange et al, 2006, Tuner and Pughe, 2003). The use of an iPad therefore was utilised in small group spelling sessions to assess the effect ICT, specifically iPads, can have on pupils who have a diagnosis of dyslexia or significant literacy difficulties as recognised by the school. It was concluded that the children had improved spelling confidence and ability when various methods were introduced to the children on the iPad such as spell check and a speak tool software to hear the word. The results were consistent with previous research and theories, showing ICT positively effecting high quality teaching and learning for dyslexic children and their spelling.

**Introduction and Literature**

There is an unequivocal standpoint around high quality teaching and learning and the importance of outstanding teaching and positive learning outcomes for all pupils. This is practised throughout our education system and is underpinned through the teacher standards (Department for Education (DfE), 2011a). Society is changing at a fast rate (Desailly 2012), it is therefore important that everyone involved in the changing education system do their utmost to provide high quality teaching and learning for all. As we are an ever-growing technological society, it appears the integration of technology for all children is appropriate to support learning alongside other teaching strategies (Condie and Livingston, 2007). Therefore, this paper will discuss how information communication technology (ICT) can facilitate high quality teaching and learning and if this is potentially transferable to support children with specific learning difficulties. Dyslexia is prevalent in schools all over the United Kingdom which leads to a growing need for teachers to support these children in innovative and appropriate ways. This paper will consider how ICT can possibly facilitate high quality teaching and learning for pupils with dyslexia and as a significant issue for dyslexic individuals is spelling (Peer and Reid, 2003) this will be the focus of the practitioner research.

High quality teaching and learning is an area that Ofsted (2015) look for when assessing schools. It is clear this is an important part of the education system with learning being a focus ensuring all pupils achieve well (Ofsted, 2015). High quality teaching therefore is the topic of much discussion to facilitate this high-quality learning. To define good quality teaching however is somewhat problematic. As professionals, it can be very difficult to pinpoint a consensus definition of what establishes an effective teacher although various theorists and researchers have attempted this. Coe et al (2014) synthesised literature and list 6 main components to great teaching, including content knowledge, quality of instruction, classroom climate, classroom management, teacher beliefs and professional behaviours. Coe et al (2014) however do not mention assessment which has been suggested to be a significant aspect of effective teaching, especially formative assessment (Black and William, 1998). MacGregor (2007) however, does list assessment as a key component and mentions it explicitly in relation to student learning. On the other hand, Danielson (2007) presents 22 components to effective teaching

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listed in 4 domains, however it has been suggested that this presents difficulties when observing and providing effective feedback to teachers (Coe et al, 2014). Danielson's (2007) framework however can possibly be a supportive tool for teachers to improve and reflect on their teaching practice to potentially benefit learning.

There appears to be an emphasis on effective teaching (Coe et al, 2014, Danielson, 2007) but this should be underpinned by student learning (Black and William, 1998). Teachers tend to be judged on statistics and formal observations (Hayes, 2009) but whether this is an accurate measurement of the quality of teaching (Strong, Gargani and Hacifazlioglu, 2011) and more importantly the quality of learning, is up for discussion. Hayes (2012) suggests a lesser emphasis on teaching but rather how the learner demonstrates they are effectively learning. It is therefore arguable whether too much emphasis is placed onto the effectiveness of teaching, which should be to provide resources, guidance and knowledge to facilitate the pupil's learning process (Hayes, 2012). Danielson (2007) presented similar discussions, stating it is important to recognise how pupils understand the content which is being delivered. The quality of learning and a deeper learning in the classroom therefore should be a significant focus with a lesser emphasis on a teacher focused approach which has been suggested to not promote this deeper learning (Trigwell, Prosser and Waterhouse, 1999). Frameworks such as Danielson (2007) offer an effective guide for teachers to strive for quality teaching but this should be reinforced by the quality of the learning in the classroom.

One possible way to enhance the quality of teaching and learning in the classroom is the use of Information communication technology (ICT). ICT, more explicitly computing, is discussed within the national curriculum (DfE, 2014). This is an integral aspect of the curriculum which should potentially lead to creativity and support thinking and problem solving (DfE, 2014). Literature (Garcia-Valcarcel, 2010) and the government (DfE, 2014) state that ICT should be present not only in designated lessons but also throughout curriculum subjects, however it is arguable whether this is the case throughout schools in England. A research project commissioned by the government (DfE, 2011b) found ICT was present in a cross curricular way in most schools researched, however this was not the case in all schools and possibly only being used in core national curriculum subjects (Cox et al, 2003). This therefore questions whether ICT is fully integrated throughout school.

It has been put forward that ICT has the potential to support student learning and improve the quality of teaching (Sutherland et al, 2004). There would appear to be an interest from teachers, pupils and society regarding ICT (Leask and Meadows, 2000), however this should be implemented in the classroom effectively (Sutherland et al, 2004). ICT can be used to support teachers in planning, classroom teaching as well as assessment (Garcia-Valcarcel, 2010). It can also have a positive effect on student learning as a literature review conducted by Cox et al (2003) suggested. Giving children the opportunity to engage with ICT in the classroom can equip pupils for a world outside of education, helping them to gain transferable life skills (Duffty, 2006) and be part of a society which is constantly using technology. There are however, differing arguments about how ICT should be implemented in regards to teaching and learning. Literature suggests that children should be given clear objectives whilst using technology (Higgins and Moseley, 2001, Cox et al, 2003). This therefore reduces any opportunity for pupils to become distracted and off topic when using ICT (Duffty, 2006) ensuring positive learning gains. A clear structure to ICT has been noted to be more effective especially when pupils receive instant feedback from the work (Florian and Hegarty, 2004). This links in closely with Skinner's (1954) behaviourist learning theory, suggesting a positive reinforcement (the instant feedback) leads to pupils being more likely to learn. There is argument however that this is placing pupils in a passive role (Ewens, 2014) and therefore not giving children the opportunity and choice for exploration in ICT which can be positive to student learning (Wheeler, Waite and Bromfield, 2002). In contrast to the behaviourist learning theory however, ICT could be used to promote active participation and co-operative learning in the classroom (Obradovic, Bjekic and Zlatic, 2015) linking in

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with Vygotsky's (1978) social constructivist learning theory. It is important however that teachers use ICT effectively in the classroom to promote peers working together as this has been suggested to not always be the case (Sutherland, Robertson, and John 2009).

ICT has been greatly researched to potentially support quality teaching and student learning (Sutherland et al, 2004) and this can be transferable for children who have special educational needs. ICT can be used to create equal opportunities to learn and allow equal access to the national curriculum (Florian and Hegarty, 2004) although this may have to be personalised to suit individual needs. More specifically, ICT can be a useful tool to support the dyslexic student in their educational life.

There is a breadth of definitions which all discuss the characteristics of dyslexia. In 2009 the Department for Children, Schools and Families (DCSF) commissioned a review on Dyslexia (Rose 2009). Although the DCSF has now changed to the DfE under the new government this report offered a definition of dyslexia which is supported by the British Dyslexia Association (Peer, 2006). Rose (2009) defined dyslexia as 'a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling'. Rose (2009) includes a thorough insight into specific characteristics around dyslexia which are supported by others who have attempted to define dyslexia and discuss the characteristics. These include difficulties around reading, phonological awareness, spelling, writing, memory and motor skills (Peer and Reid 2003). These are general characteristics that individuals may demonstrate, however this is not conclusive to all and each person should be supported to meet individual needs (Pollock, Waller and Politt 2004).

Often individuals who have dyslexia can demonstrate poor literacy skills, however this does not necessarily determine a lower level of intelligence (Hiscox, Leonavičiūtė and Humby, 2014). One of the issues facing dyslexic individuals is spelling (Peer and Reid, 2003) not only whilst moving through the education system but also in their adult life (Turner and Pughe, 2003). One study appears to suggest that English speaking pupils with dyslexia made more phonological errors when spelling and reading in comparison to pupils who were not native English speakers (Giannouli and Pavlidis, 2014). This supports the idea that phonological difficulties are prevalent in individuals with dyslexia (Thomson, 2009). It is therefore important to recognise the personal difficulties children may face around the teaching and learning of spelling and what best way to support them.

Montgomery (2000) claims that government initiatives such as the National Literacy strategy attempted to support reading but were unsuccessful in improving spelling and although closely linked, a good reader does not constitute a good speller (Westwood 2008). Reading entails the skill of decoding, where the reader uses clues and strategies to support them and spelling entails the skill of encoding where the speller uses strategies to recall words accurately from memory (Turner and Pughe 2003) It is not only questionable whether dyslexic pupils use these types of strategies and skills to support their spelling, but also if the education system provides a supportive environment. A continual method to help with spelling in the mainstream classroom is spelling tests (Ewens, 2014), however this can be an ineffective method for the dyslexic student due to issues around memory (Peer and Reid, 2003) so giving them a test which can rely on memory recall can potentially lead to difficulties. Therefore, other methods could be put in place for high quality teaching and learning to support with spelling across the curriculum and ICT could potentially do this for the dyslexic pupil.

As an additional curriculum approach, ICT has the potential to be significantly positive for learning for children who have specific learning difficulties. Anestis (2015) found that dyslexic students received better examination results when a computer based method was used. In terms of supporting spelling Lange et al, (2006) found students with literacy difficulties using tools such as spell check to correct spelling mistakes in their work. Supportive literature also comes from Barker, Franklin and Meadows

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(2000) who suggested that using a multimedia ICT package can be beneficial to the learner as it allows the pupil to not only see the spelling but gives the learner the opportunity to hear the word. This can encourage phoneme awareness as well as phoneme to grapheme correspondence which is an important skill to apply whilst spelling, especially if you are dyslexic (Turner and Pughe, 2003). Using ICT therefore could potentially give pupils more opportunity to work independently, thus moving away from the teacher dictating the spelling to the pupil (Turner and Pughe, 2003). Not only can ICT be a supportive tool for dyslexic students but for all students as Kast et al (2011) found with computer based programmes to support with spellings. Furthermore, demonstrating the positive aspect of integrating ICT into the curriculum for dyslexic pupils but also to potentially benefit whole class learning.

The use of technology can provide dyslexic pupils a supportive tool to allow them to take risks whilst building their confidence around areas in which they struggle (British Dyslexic Association, 2013). Spelling is a clear difficulty for the dyslexia pupil, therefore any spelling strategies taught should be multi-sensory and, where possible, utilise all the senses (Turner and Pughe, 2003). ICT therefore, could be utilised as a teaching and learning method to support dyslexic individuals with their spelling. This will therefore be the focus for the practitioner research.

### **Methodology**

When undergoing a research project there are two paradigms which are typically used; positivist and interpretivist (Denscombe, 2014). A positivist approach looks at the data produced in a scientific way therefore the researchers can produce consistent results and remain objective (Burton and Bartlett, 2005). The interpretivist approach however challenges this idea, suggesting that research should be driven by what people think and how they interact (Burton and Bartlett, 2005). The interpretivist method however, can create bias perspectives as it may be shaped by the researcher's practice and experience (Denscombe, 2014). It is therefore important that the research design should be appropriate to the research you intend (Menter et al, 2011). Furthermore, as this is practitioner research which sets out to further improve and understand personal practice (Lunt and Fouche, 2010) it was appropriate to apply an interpretivist approach.

When analysing the results a combination of methods were used including joint observations, evidence of children's work and interviews with the children. Collection methods such as joint observations and interviews with the children were recorded immediately after each session on one document. This seemed appropriate as it allowed judgments and findings to be discussed collaboratively. This triangulation approach to gathering evidence can enhance and produce more in depth analysis of the evidence gathered (Denscombe, 2014), as well as potentially producing more reliable data and judgements (Menter et al, 2011, Jick, 1979). Triangulation however must be used in an effective way and be purposeful to the study at hand (Thurmond, 2001). Researchers therefore must have a clear aim or goal to collecting evidence. This led this research to specifically look at spelling so a clear focus was evident when observing and as working in a small group can be an effective way to learn (Desailly, 2012) it is appropriate that the research focused on a group of 4 children. All the children who were chosen had a diagnosis of dyslexia or had literacy difficulties recognised by the school and a significant issue noted for all children was spelling.

A reflective model (Schon, 1983) was applied daily when planning and linked in with known spelling strategies. Hall (2009) states two main strategies for spelling including auditory strategies, which include the use of phonics and visual strategies. Whilst planning the session these strategies were considered. The use of Apps on the I-Pad such as Keezy and ClaroPDF allowed children to record the word as well as hear the word back, linking in with auditory strategies. Technology such as the Interactive whiteboard was also used to link in with the visual strategy giving children the opportunity to manipulate the letters as well as a look, say, cover, say, write, check activity (Turner and Pughe,

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2003) using the I-Pad. Where possible both strategies were integrated into the sessions. The spellings provided to the children included common spelling errors that were noticed when checking previous work as well as high frequency words at a request from the class teacher.

### **Ethics**

Ethical considerations should be extended throughout the process of practitioner research with the welfare of the participants being paramount (Cohen, Manion and Morrison, 2011). Descombe (2014) lists four ethical components which should be considered before conducting research including protection of participants, consent, deception and law. Although these components are useful to researchers, Mockler (2014) on the other hand offers 5 ethical dilemmas which may present themselves, including informed consent, avoiding harm, importance of student voice, power dynamics in the classroom and professional judgment. Mockler (2014) links these dilemmas closely with classroom practice therefore these were considered during this practitioner research. This research was approved by the University of Cumbria course leader and written consent was gained from the Assistant Head Teacher. It was made explicit that the research would include anonymity, participant protection and the right to withdraw at any point.

### **Results**

During the first session, all the children made mistakes when applying the 'w' phoneme to their spellings, often confusing the phonemes 'w' and 'wh'. Through observations all children were confident using the Apps, especially the speak tool. Child D stated "I like hearing myself say the words back". This was agreed by Child A and Child C who showed an interest in the Keezy App - to hear them say the word and speak tool to hear the word being read.

In the second session, the 'oa' phoneme was introduced, as requested by Child D and Child C the previous session. During this session spell check was introduced so the pupils could notice mistakes in their work. Through joint observations it was observed the children were confusing the 'oa' and 'ow' phonemes when spelling. The evidence of the children's work demonstrates correct spellings, however this was due to the all children using the strategies which they had learnt. Child A consistently used the Keezy speak App to record the word and then hear it back. Child D and Child C appeared to enjoy using both spell check and the speak tool to check and correct spellings, adopting a trial and error approach. Overall it was observed all children gaining confidence and independence with spelling as the session progressed.

Session 3 included the use of I-Pads and the Interactive Whiteboard (IWB). The words were differentiated to meet ability level and personal struggles with certain spellings. Through observations the children were confident using the IWB and appeared to like being able to move the letters around to try different combinations of spellings to find the correct answer. All the children made at least one mistake when using the IWB but supported each other to find the correct spelling. This was an independent, differentiated activity, however the other children confidently used their I-Pads to check the spellings using the strategies taught this week.

During session 4 the IWB was used again alongside the I-Pad. A look, say, cover, say, write and check strategy was utilised in this session which the children all appeared to implement. It was observed that Child B spent a considerable amount longer looking at the word than their peers. Child B and child D made mistakes during this activity but attempted to utilise all the ICT strategies they have used during the week to find the correct answer. All the children exhibited trial and error strategies using the I-Pad, with Child A using their peer for extra support. Overall this session was noticeably the most successful session regarding spelling success with all children either using spell check, Keezy recording tool or the ClaroPDF speak tool software to hear back the word. Independence and confidence was observed to be significantly higher than in previous sessions.

## Discussion

Throughout the practitioner research it was observed the children had a preferred way to learn their spellings, either auditory through the speak tool or visually using spell check (Hall, 2009), which was evident through observations and discussions with the pupils. This led me to utilise the children's preferred strategies as well as spellings the children identified as an issue. Therefore, through using Schon's (1983) reflective model, I reflected on action using the previous session to inform the next. On the other hand, this was a small-scale research project which made the observations of learning styles quite easy to reflect upon using the model and support in the coming sessions. As a class teacher, this may prove more difficult to detect and implement. As ICT can be best utilised in a structured way with clear learning objectives (Higgins and Moseley, 2001, Cox et al, 2003) this could be a limitation to using ICT in the classroom where appropriate monitoring appears to be needed to avoid distractions (Duffty, 2006). It must be stated however, ICT can greatly influence pupils' independence (Stevens, 2004) therefore if clear objectives and expectations are set for children the use of ICT could be extremely positive to support spelling in the classroom.

Independence and confidence were noted as a clear, positive result throughout this practitioner research. Through teacher observations the children had some level of competence when using the Apps to begin with but as the sessions progressed the children led their own learning through the ICT rather than relying on teacher input (Turner and Pughe, 2003). The children utilised the strategies for noticing and correcting spellings, such as spell check and speak software. This in turn allowed a deeper independence when it came to applying their spellings. Lange et al's (2006) research suggested spell check is a useful tool for children with literacy difficulties. This research appears to support this literature as it was observed all the children in sessions 2-4 used spell check with increasing confidence and independence. This was particularly evident with Child B who started off quite low on confidence and quite reliant on phonic knowledge. By the end of the sessions Child B's confidence was observed as significantly increased and less reliant on phonics whilst utilising all the ICT software available, especially spell check. The use of the Interactive White Board also produced positive results for all children, allowing them to take risks with their spelling as the letters could be easily manipulated. Therefore, this supports the notion that the IWB can be a useful tool for learning (Beauchamp, 2004). Through reflection however, it is questionable whether this can be applied specifically for spelling. The I-Pad however is a much more accessible and movable tool which could be potentially utilised alongside a normal lesson.

The use of technology to support spelling is not without its limitations. It was noted the children consistently using the speak tool software to hear if the spelling was correct. This was a popular method most children used and was beneficial in some way. Where this proved problematic was when the children spelt a word phonetically plausible, the App would speak the word correctly however this was not the correct spelling, therefore proving quite misleading for the children. This was particularly evident when the 'wh' phoneme was introduced. Hearing the word back has been suggested to be a beneficial tool to support spelling (Barker, Franklin and Meadows, 2000) which was noted within this research but it was not consistently correct. After using the reflective model (Schon, 1983), children were introduced to spell check to use as an additional tool to overcome this barrier. This offered children the opportunity to visually notice they had the spelling wrong. When this was coupled with the speak tool it appeared the children became more competent in recognising mistakes made within the word and effectively correcting them. This is a significant observation as it is important that children utilise ICT skills to support their learning (Florian and Hegarty, 2004). Through joint observations however it was noted Child A relying on the spell check software to find the correct spelling rather than reflecting on how to correct themselves. The use of ICT can be an effective tool for the dyslexic pupil however a reliance on spell check can potentially be problematic to learning, with pupils not using their own initiative to correct spellings. It is therefore important that a reflective

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model such as Schon (1983) is used for future research to overcome any issues ICT may present to ensure children do not become reliant on ICT (Danielson, 2007).

All children were given the option of typing or writing the spelling using the Apps. All the children who took part however opted to type the word. This is an interesting result as it could possibly relate to Skinners' (1954) behaviourist learning theory. When discussing spell check, one child stated, 'It doesn't tell you it's wrong when you write it'. This suggests that the pupil liked the instant feedback from the spell check software (Florian and Hegarty, 2004) which prompted them to think about the spelling. A behaviourist learning approach however was not the only learning theory that was observed. In session 4, two of the children worked collaboratively to attempt to find the correct spelling (Vygotsky, 1978). This potentially demonstrates the impact ICT can have on various learning processes the children may utilise. The instant feedback appeared to be something that could be implemented effectively in class potentially leading to increased independence whereas ICT could also be used as a social tool, allowing the children to take risks with their spelling while working collaboratively.

It must be stated that this was a small-scale research project with Child B and Child C being off at different points during the week. This could have possibly impacted the reliability of the research however the research appeared to produce positive results. It was evident the children had preferred strategies when applying the spellings (Hall, 2009). It is important therefore that individual differences of all students (Pollock, Waller and Politt 2004) are considered to ensure that any form of ICT which is used is utilised appropriately and with a clear learning aim and effective teaching to facilitate this.

### Conclusion

While there is a consensus that ICT has a positive impact on student learning, ICT is not sufficient alone to produce good learning outcomes for all children (Sutherland, Robertson, and John 2009). ICT, however, is an integral part of the education system, and can support students who have learning difficulties, such as dyslexia. This research has supported the assumption that ICT can be a positive tool when it comes to dyslexic children and their spelling. All the children used the technology available and were extremely competent when applying this to their teaching and learning of spellings, especially the iPad. Throughout the practitioner research one major observation which was apparent was the confidence and independence of all the children. Although mistakes were still evident in their work, children could utilise the ICT available to support their spellings through methods such as the speak tool app and spell check and this was done with less reliance from the teacher. This allowed children to think about their spellings, take risks and try different combinations to find the correct answer. All children stated this is something which they would like to have in the classroom, especially the I-Pad, and this seems extremely plausible for future research and teaching practice to implement in a mainstream classroom alongside traditional teaching approaches (Condie and Livingston, 2007). The use of ICT therefore has great potential to facilitate the teaching and learning of spellings for the dyslexic student.

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