

Inclusive Digital Technology (xxxx)

Name: xxxxxxxx

ID: xxxxxxxx

CALL Scotland & University of Edinburgh

Course: Inclusive Digital Technology

Task:

Critical review of inclusive digital technologies in practice.

Case Study:

The effect of Text-to-speech software on promoting inclusion and improving reading comprehension and vocabulary.

According to the Scottish government's National Improvement Framework Plan (2018), "focusing on a single measure is neither helpful or meaningful" when addressing the issue of inclusion within Scottish education. In essence, this statement is true, as there is no single answer when it comes to inclusion within schools, especially as there are still those within education that are preoccupied with the fallacy of fixed ability. Whilst aspects of a Universal Design for Learning would certainly help alter philosophies and support individuals with additional support needs, the role of technology must be addressed to help offer a sense of autonomous learning, where all aspects of the curriculum can be accessed without content modification. Yet, there are obvious limitations: cost of technology; its reliability; up skilling practitioners in its use; variety of needs to be addressed by technology and policy that offers equity within local government to implement everything previously mentioned. What is clear, is to truly deliver inclusion, in a modern sense, technology should not just augment learning and teaching, but should be at the centre of current practice.

The impetus for the paradigm shift in policy towards inclusion and a more "child centred approach" (Policy Scotland, 2018) came from ENABLE Scotland's 2016 report, *IncludED in the Main*. The report challenged the Scottish School's Act (2000), by highlighting the discrepancies between policy and practice when it came to 'presumption to mainstream'. The root of the problem, and the issue that policy still fails to address, is when surveyed teaching staff (82% of the workforce) felt that issue with inclusion was there weren't enough classroom or pupil support assistants employed to address the needs of ASN pupils. As Julie Allan, University of Stirling, makes clear: "there is a conceptual confusion surrounding what inclusion is, what it is supposed to do and for whom" (Inclusion for All? 2007) From my own experience, Allan's statement can to be said to be true: teachers do not have an understanding of what true inclusion looks like and this has led to practice and policy becoming incongruous or at least misinterpreted. Again, from experience, current practice still suggests, as Florian and Spratt highlight, "inclusion should not interfere with the efficient education of others." (Florian and Spratt 2013).

Such a reductive approach to inclusion continues to exacerbate issues surrounding inclusion in a mainstream setting and becomes counterproductive as it aids the belief that pupils requiring support are in some way different to other students. As stated in *IncludED in the Main*, "60% of young people with learning disabilities claim to be lonely and 62.5% claim peers don't understand them." This sense of isolationism is a deep rooted fear of pupils with additional support needs; in fact, a bi-product of my interviews highlighted that my student with Meares-Irlen syndrome worried about how she is perceived when wearing her coloured lenses; stating that it is the main factor that she is hesitant to wear them. Evidence suggests that current practice simply creates a stigma around learning support and negates the principle of inclusion.

At the heart of these approaches lies a paradox. In seeking to provide education for all by differentiating for some of the basis of perceptions

about 'ability' or 'need', schools often adopt a dual track model of additional or special education. (Grenier 2010)

Now, whilst differentiation should not be fully dismissed within practice and the need for support assistants in class is still a requirement, schools need to avoid overt support in classroom environments, this "dual track"; as Allan states (Inclusion for All, 2007) it results in pupils seeing inclusion and exclusion as "much more unstable processes", where individuals, both mainstream and those with specific learning needs, feel in a state of flux when it comes to the ethos of supporting learning in schools.

What is required is a progressive movement from the stigmatisation and marginalisation of target support and differentiation. Studies, both neurological and pedagogical, have shown that a shift towards Universal Design for Learning may be the approach needed to foster and nurture an environment of inclusion. Kershner describes this as a non-passive inclusion where all children are "involved in the life and learning of the school." (Kershner, 2009) What this is advocating could be argued is already promoted within schools, albeit, perhaps not under the banner of UDL. Many teachers, myself included, adhere to and incorporate a great deal of cooperative learning strategies and multimodal forms of assessment within their current practice and many of these processes promote "collective learning" process that Kershner describes. However, it is now clear that such methods are limited by the fact that they cannot fully account for the autonomous element that all learning stems from; the ability for the individual to continue to learn effectively without others. It is here where assistive technology and digital resources may prove fruitful in closing the gaps that peer support and shared learning fail to accommodate.

As Rose states "AT and UDL, while different, are completely complementary- much like two sides of the same coin" (Rose et al, 2005). On the surface, technology from a UDL perspective certain seems to fit the Meyer and Roses' model in terms of the principles of UDL, as it offers a "multimedia curriculum that provides digital, universally designed media that offer diverse options for viewing and manipulating content and expressing knowledge." (Rose et al, 2005). However, in terms of good practice, it would seem that Hitchcock and Stahl (2003) argument is far more pragmatic in structuring future practice: "in reality, both kinds of solution are needed" when it comes to AT and UDL- as UDL helps offer a flexible curriculum that can be accessed by many, whilst AT provides specific individual support through adaptive technology.

Indeed, a combination of both approaches certainly meets the need of policy, where the Scottish government is striving to "reduce inequalities... as a result of socio-economic disadvantage and... those inequalities other than a result of socio-economic disadvantage" (Education Act, 2016). Yet, one of the most contested barriers is the financial cost involved to allow unprecedented access to modern technology. The £750 million Attainment Scotland Fund (PEF) has been allocated to address this burden. It is here that philosophical issues arise, as the

conditions of this money are that it be used to support ASN individuals and the political context of this money is based on the socio-economic factors impacting learning. As the money must be made accountable, spending in schools varies and if the money is spent on digital support, individuals that meet the criteria. Overall, this does not meet the principles of UDL and means that the stigma surrounding pupils with ASN needs is perpetuated. What Mcghie-Richmond and Sung argue is that “Limiting the strategy to students with special needs, modifications create a dichotomy within the inclusive classroom to accommodate for students with special needs, but not others (Mcghie-Richmond and Sung, 2013).” It should be argued that, whilst specific needs of individuals should be supported, when it comes to digital technology and devices that could support learning for all that all pupils should have unrestricted access.

Method

It is from this premise that I constructed the grounds for my case study. With my background as a subject specialist my aim was to look at Text-to-speech software to study the effect on reading comprehension with both ASN pupils and those without reading difficulties. Studies have shown that the most common cause of reading disability is the ability to decode written text (Wood et al, 2018). Research has also shown that “retrieving correct word meanings whilst decoding strengthens word identification and vocabulary” (Park et al, 2017) and that misinterpretation of words when reading results in future errors when retrieving words from memory, which in turn impacts context skills when an individual attends to use inference to decode new words. (Park et al, 2017) Following on from the reading, my case study would focus on reading comprehension in an attempt to explore if there was evidence that Text-to-speech can strength the understanding of those without reading difficulties, which would help promote a UDL approach to literacy that removes barriers for all, whilst helping to eliminate the stigma of struggling readers.

Participants

Five students were selected from a mixed ability Broad General Education S2 class. All students were base level tested with the *Schonell* reading test and results were compared with their reading scores from their *Accelerated Reader* assessments to gain an assessment of their reading age compared to their physical age.

- Student A is 13 years old with a reading age of 9.08. She has a diagnosis of “moderate dyslexia”, as well as a diagnosis of Meares-Irlen syndrome.
- Student B is also 13 years old and has a reading age of 9.06. His diagnosis of dyslexia is more severe.
- Student C is 13 years old and has a reading age of 9.09. This student displays a low reading level, but has not, at this stage, been diagnosed with dyslexia, despite showing dyslexic tendencies when reading.
- Student D is 13 years old and has a reading age of 13.4; however, from previous class assessments, this student’s reading comprehension is stronger than her reading level suggests.
- Student E is 13 years old and has a reading age 16.06; he is by far the strongest reader and has no history of reading difficulties.

Materials and Procedure

The test material for the study were SRA cards at reading level 2C. This was selected for its ability to offer a range of reading material at levels that were appropriate for the students and its ability to test reading comprehension and vocabulary. After base reading levels were established, students were assigned a reading card at their level and asked to read the card and complete the subsequent questions. Once complete, students' work was marked by myself and assigned a percentage score. Students were then given a tutorial in how to use the Text-to-speech software, which for this study was *Read&Write Gold .10*. At this point, students were asked to attempt a second card at the same level and employ the software to read all written passages, questions or instructions. Students were also informed to digitally record their answers and then use the software voice to read their answers back to them once they finished.

Results

With Students B and C there was a marked result in their scores, with both students improving by 10% on average between their two cards; however, there was marginal progress with Student A who improved by 4% and the same can be said for Students D and E, who matched their score (D) or improved by 1% (E). The results from Students B and C tie in with current research on comprehension improvement through Text-to-speech; specifically studies by Lundberg and Olofsson (1993) as cited in (Meyer and Bouck, 2014), and whilst speed wasn't specifically measured, both boys improved in terms of timing, which also ties in with the Lundberg and Olofssons' (1993) study where students "who typically struggled with decoding, were able to finish reading tasks faster." Despite a marginal improvement in terms of overall comprehension score, all five students produced a stronger performance in the vocabulary section of the reading assessment, where they were given the meaning of the word and tasked with sourcing the correct word from the passage. This, at the time, was promising, as all five students had struggled with the word "colonel" during the *Schonell* test, but all claimed to understand the word once it had been read to them, which could suggest that TTS had enhanced their decoding abilities when undertaking their digital assessment.

When interviewed, students were largely very positive about the benefits of TTS on their reading. Students B and C felt that TTS would be something they would use regularly if made available for all reading material, whilst Students A, D and E felt that TTS could help when decoding an unknown word, but all three were clear that they preferred physically reading the card, as the TTS voice still felt too artificial-when asked if a different voice would help, students were unsure. These findings match a similar study by Meyer and Bouck where their own research subjects found the voice off putting, but felt TTS would help with decoding language more confidently (Meyer and Bouck, 2014). However, what I was able to gauge with my study was the social factors surrounding support from TTS software, as only one student (E), was not concerned about how their peers

would view them if they were to use digital technology in classroom in their learning; all other students stated they would feel uncomfortable using TTS if the rest of the class did not have a similar digital device or at least the option to access the software if they wished.

Discussion

Whilst the results are promising in suggesting the positive effect that TTS can have towards decoding language there are few factors to consider. It should be noted that when the *Schonell* reading test was re-administered, there was no improvement in decoding ability recorded, suggesting TTS had no impact of comprehension outside of software use. The length of time involved in the study could also have impacted results, as Stodden's study reported there were improved scores in terms of vocabulary for his participants, but here TTS software was used for 40 minutes per week over a number of weeks (Stodden et al, 2012); whilst Meyer and Bouck found no improvement in "oral fluency, comprehension or task completion time" (Meyer and Bouck, 2014) in a study within a similar time frame to my own. It is possible I would potentially see an improvement across my students if the study had been over a longer time period. However, Meyer and Boucks' findings seem to suggest that the confidence that came from TTS was simply psychosomatic, as their data suggested no real improvement (Meyer and Bouck, 2014) and whilst my ASN pupils improved, it could be suggested that the confidence instilled in the non ASN pupils was simply a "placebo" effect based on the artificial nature of the case study. There were other factors that suggest that digitising reading for all pupils would be inefficient, as the digitisation of the reading cards was cumbersome, time consuming and took four attempts to format into a version that could be easily read by TTS software. Equally, once students had accessed the cards they found the standard voice too robotic and the software did not allow the reader to be changed to the Scottish voice that was built into the program, again, and ICT issue that was unanticipated and further disadvantaged pupils.

Conclusions

Whilst there are still a good deal of limiting factors involved, it can still be argued that the best way to promote an inclusive agenda and truly demonstrate the principles of UDL is through the mass implementation of digital technology within schools. If we truly wish to remove the stigma surrounding differentiation and the alienation of ASN pupils, the playing field must be leveled. Whilst there should be a balance between individualised support through AT, technology, in general should be made as ubiquitous as possible. In terms of my own study, there is evidence to suggest that software such as TTS is a benefit to all pupils, as Buzick and Stone state:

[digital] accommodation may be appropriate even if students without disabilities would benefit from it, as long as students with disabilities who need the accommodation would receive a significantly greater score increase, on average.

Inclusive Digital Technology (xxxx)

Yet, the most hindering factor affecting such a shift in practice lies with the financial burden that comes with such an implication. With the example of TTS, publishing rights become an issue, as well as the individual cost to retain such access and practitioners may have to retain levels of resourcefulness in curriculum and lesson planning. The second issue is the cost of upgrading technology and ensuring updates do not add lag to the already dissipating time young people spend in the classroom. Lastly, policy needs to take account of upskilling staff-providing specific training, initial teacher training and career long opportunities to ensure that teaching moves, as close as possible, with the pace of technology.

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