Intervention for specific learning difficulties dyslexia education essay

My chosen focus for the Inclusive Learning Assignment was dyslexia and associated intervention strategies within the context of Mathematics teaching. I chose this partly because the classes allocated to me made it an obvious choice, but also because this area of special educational needs is well supported when compared with for example more general learning difficulties GLD (Norwich, Ylonen & Gwernan-Jones, 2012) or Emotional, Behavioural and Social Difficulties. GLD and EBSD were two areas I also considered and researched, but ultimately did not have the opportunity to pursue.

There are various estimates for the prevalence of Dyslexia within the population, for example the National Working party report on Dyslexia (Singleton, C, 1999) gives an estimate of about 4%, and I have seen other estimates ranging from 2. 5% to almost 10%. Whatever the actual number, it seems clear that dyslexia is a condition all teachers will encounter regularly throughout their career.

It is over a hundred years since the publication of the first paper describing a dyslexic pupil (Pringle Morgan, 1896), so it was interesting to follow the development in the progress of our understanding of the condition and interventions which can successfully aid dyslexic learners.

What is Dyslexia

The Rose Report (2009) describes dyslexia as a learning difficulty which primarily impairs the skills involved in fluent and accurate word reading and writing, which can occur across a range of intellectual abilities. The report lists the main characteristic features as poor phonological awareness, poor

verbal memory and low speed of verbal processing. It also explains that Dyslexia should not be thought of as a discrete category, but ‘ as existing on a continuum from mild to severe’.

The description of dyslexia as primarily affecting the skills required for fluent and accurate word reading and writing may leave many to assume that the impact of dyslexia to the understanding and learning of Mathematics should be of a much lesser severity than in most other subjects, as the need for fluent and accurate word reading or writing is much reduced. However, there is a significant body of research and experiential based writing in books and journals for example, Dyslexia and Mathematics (Miles and Miles, 2004), Mathematics and dyslexia – an overlooked connection (Malmer, 2000) and Mathematics for Dyslexics: A Teaching Handbook (Chinn and Ashcroft, 1998), to suggest that such an assumption would be wrong and may lead to poor outcomes for dyslexic pupils in Mathematics.

How does Dyslexia affect the Learning of Children and Young People

Generally dyslexics tend to be slow at certain basic aspects of mathematics such as learning multiplication tables or adding up columns of figures (T. Miles, 2004). As already mentioned, the Rose Report (2009) describes the main characteristic features of dyslexics as poor phonological awareness, poor verbal memory and low speed of verbal processing.

Phonological awareness is the ability to hear and process the sound structures of language, and has a relationship to how well we can retrieve phonic information from long term memory. It is difficult to understand

directly why this should have an implication for mathematics, however, several research studies indicate that speech sounds play an important role in computational tasks (e. g. Jordan, Wylie and Mulhern, 2010), and that poor phonological awareness may have implications for working memory (Bull & Johnston, 1997).

Poor verbal memory causes problems for a significant proportion of dyslexic suffers. An example of how this may affect them would be their ability to recall effectively multiplication tables. Non-dyslexics usually have good verbal memory and can therefore easily recall, by verbal association, the answer to for example six times seven as forty-two. Most dyslexics by comparison have significant difficulty making the verbal association to recall the exact words making up an individual table line. A consequence for teachers of this failing is that traditional rote-learning methods will not be successful if used to teach table facts to dyslexic pupils (Kay and Yeo, 2003).

Poor verbal processing speed, the time taken to process familiar verbal information such as letters and digits further compounds issues relating to poor verbal memory, increasing difficulties with comprehension and mental arithmetic.

In addition to the three main characteristics discussed above, there is a significant amount of research suggesting a strong correlation between Dyslexia and poor working memory (Jeffries and Everatt, 2004; Jorm, 1983; Steeves, 1983; Kay and Yeo, 2003). When you consider this in the context of further research on poor working memory and mathematical performance (e. g. Bull and Johnston, 1997; Hitch, 1978; Hitch and Haliday, 1983; Hitch and

McAuley, 1991; Logie et al, 1994), it is possible to draw the conclusion that for many dyslexics this may also be a significant characteristic. Poor working memory can make mental arithmetic a challenge for many dyslexics as they struggle to hold values or the sequence of steps to be performed in their head. These related memory issues also produce sequencing difficulties and prevent accurate memorising of step-by-step procedures (Yeo, 2003). This produces problems in assessment, which in mathematics, like many other core subjects is based largely on the retention and recall of facts (Steeves, 1983); which would clearly be an issue for dyslexics who exhibit such memory impairments.

We should not ignore also that many of the problems faced by dyslexics in mathematics will be of a linguistic nature and therefore should not be unexpected (E. Miles, 2004). Dyslexia sufferers can often confuse the symbolic representations used in mathematics just as they might in other subjects for example misreading ‘ b’ and ‘ d’, ‘ E’ and ‘ 3’ or ÷ and + (Chinn, S and Ashcroft, R, 1998). Variations on the form of writing numbers can also elicit potential problems, for example the use of commas to separate large numbers in to blocks of1000s can present problems, as dyslexics can often confuse the comma for a decimal point and thereby misinterpret the value, confusing for example 3, 500 for 3. 500 (Henderson, 2004). These linguistic problems may in fact pose even greater problems in mathematics than for other subjects. Interchanging two letters in a word will probably result in a word that is still intelligible, but the same would not be true for mathematics.

Intervention Strategies for children and young people in Mathematics

A multisensory teaching Strategy was by for the most prevalent recommended strategy I came across during my literature review for the teaching of Mathematics to Dyslexic pupils (e. g. Henderson, 1989; Johnson, 2001; Mattuvarkuzhali, 2012; Steeves, 1979). In brief I would describe the strategy as one which tries to engage a learner in multiple learning styles for a single topic, the intent being that this will leave the greatest impact on memory for long term learning.

Discussion on the Three Learning Episodes and Evaluation of Intervention Strategies Used

The three lessons for my ILA assignment were taught as part of a series of lessons covering Shape, Space and Measures 2 (DfES, 2001). This was rather convenient as this subject does lend itself to a variety of approaches, particularly hands on Kinesthetic activities, which are often recommended as one component of a Multisensory approach (Mattuvarkuzhali, 2012). It is also relatively easy to develop animations to support audio visual learning styles, and to relate the subject matter to real world examples.

The first lesson of the three lessons I planned was to be on the calculation of the area of a parallelogram. We had already spent a lesson reviewing the area of a rectangle and compound rectangles, in preparation. I decided that I would have both a hands-on (Kinesthetic) aspect and some animations to provide a visual aspect to support my multisensory intervention strategy. I would also incorporate group work into the lesson to foster some pupil to pupil interaction. I provided the pupils with some 1cm dotted paper. In

groups they were to use this to investigate different strategies for working out the area of a parallelogram (see lesson plan in Appendix A for details) with a view to explaining them to the rest of the class.

Engagement with this activity was generally very good. Bob engaged with it very well and seemed to enjoy the investigatory aspect and discussing strategies with his group. Most of the groups came up with a solution based on simply counting squares. Bob’s group however did come up with something close to the solution I was looking for by dividing the parallelogram up into 2 triangles and a rectangle. One group did come up with the idea of cutting off one triangle and moving it to create a rectangle, but then for some reason still counted squares rather than think to multiply the base and height. When we moved on to the modelling and then the worksheet, these were very well accepted and most of the class, including Bob handled the exercise very well.

The second lesson in my series of ILA lessons was the calculation of the area of a trapezium. This followed on nicely from the previous lesson as the skills learned for calculating the area of a parallelogram are used in the calculation of area for a trapezium. Because of the success of the previous lesson I kept the format of the lesson the same, with an initial investigation, followed by modelling of examples and then a worksheet, (see Appendix B for detailed lesson plan).

Again engagement was very good with the group investigation work, and as we were all familiar with this from last lesson, we were quick to get going. Bob’s group was actually the only group to come up with the idea that they

could put the two trapeziums together to make a parallelogram, but where unsure how this would help them. They failed to realise the are of the trapezium had to be half that of the Parallelogram, so there were still clearly some issues with the concept that area is conserved.

When we moved on to the modelling and reviewing the animation things appeared to be fine, however within minutes of giving out the worksheet it was clear that a good portion of the class was struggling. It was the use of the formula ½(a + b) x h (not written this way in lesson, see slides in Appendix B) which caused the problems. It was clear that many were not comfortable with using a formula and seemed to become very confused with the idea of substituting numbers from the questions for the letters in the formula. Bob was among those that were confused, but was able to understand and access the work once I went through it with him individually. See copy of Bobs work in Appendix D.

For the third lesson the focus was on calculation of the volume of a cuboid. With the difficulties of the last lesson with the use of a formula, I wanted to try something a little different and expand my multisensory approach. I therefore decided to create a narrated animation that would demonstrate clearly the relationships of area and volume and the construction of a multi unit cuboid from many single unit cuboids. It also had quite a strong element of humour. The animation I created was played at the start of the lesson with no introduction. I had purposely narrated it in a caricature movie trailer voice over style to make it humorous and enjoyable and to get everyone engaged. The class were silent throughout the little animation and they seemed to really love it. I think they also liked the fact that I was prepared to make a bit

of a fool of myself. Following the video I modelled a few example questions from the booklet I had prepared for them using a further animation I created and the white board. I used analogy in my modelling, likening the cuboid shapes to tower blocks, with rooms and floors, trying to give the work some connection with the real world and something familiar. This seemed to work very well for everyone, including Bob, they flew through the workbook and no-one seemed to require my help or assistance, with the exception of one pupil who regularly struggles due to a very patch primary education and whom I usually spend some individual time with at the start of an exercise. (see Appendix C for detailed lesson plane).

Conclusion

It is clear to me from my experience and the background reading I have done that there is very likely a strong link between dyslexia and a difficulty in some areas of mathematics. Particular difficulties are likely to be in those areas which rely on verbal memory e. g. multiplication tables and working memory e. g. mental arithmetic and of course problems with symbols and digit ordering.

Multisensory interventions can definitely help, however they are not a simple generic formula for the teaching of mathematics to those with Dyslexia. Teachers still need to asses children whose dyslexia may be causing them issues in maths on an individual basis to try to discover where their particular difficulties lie.

In my opinion it is very difficult to look at multisensory techniques and see them as anything other than in most respects simply good practice for the

teaching of mathematics. Having said that I can remember the way mathematics was typically taught several years ago with the emphasis much more on working through a prescribed textbook with a prior brief description written in chalk on the blackboard. If such an approach was historically the norm, then it is clear to see how dyslexia sufferers were poorly supported historically, and how such an approach would have presented significant barriers to the majority of them.

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