

MATHS AND DYSLEXIA

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This purpose of this study was to observe dyslexic children and how they approach mathematical problems. The focus was on three 10-12 year old children and the findings were centred on classroom management and teaching style issues. This involved the pupil's ability to perform in a modern British classroom with the current suggested styles of lesson presentation.

The findings centred on the notion of a need for quiet in the classroom and a dyslexic child's inability to cope with noise and offers of help from other adults or pupils.

INTRODUCTION

This study took place in a medium sized rural school in northern England with just over three hundred children. It is an independent school with children aged 2 ½ to 16 but I chose to focus on children who were in Years Six and Seven. The school, although it is independent, does not have an entrance exam and has over 30% of children on the school's Special Educational Needs (SEN) register, including many children who have been diagnosed as dyslexic.

The aim of the study was to identify preferred methods of study for dyslexic children in mathematics lessons. The focus was not on assistance for individual problems such as how to learn times tables etc. which would be duplicating some of the excellent work by researchers such as Chinn and Miles and Miles, amongst others. The purpose was to look at the children's role in the classroom and how they coped on a day to day basis in a typical mathematics lesson, regardless of the specific topic.

I particularly wanted to study children who had a good overall performance in mathematics so I could gain understanding of how these children coped in a mathematics classroom and the successful strategies they adopted for learning. I have relied on the school's setting system to demonstrate the children's ability in mathematics and the pupils selected were all in the upper of two sets. Two of the three children were also included on the school's Gifted and Talented (G&T) register for mathematics and attended a G&T mathematical group.

The part of the selection process that involved identifying children that were dyslexic was fulfilled by approaching the special needs department at the school. They work with many children and particularly focus on children who are dyslexic. I requested names of children who were already diagnosed as dyslexic by the department (by a combination of educational psychologists reports and internal assessment by Hornsea trained dyslexia teachers) and compared these with the schools subject set lists to identify children who were included in both the top set for mathematics and had been diagnosed as dyslexic.

Through this selection process I identified three children who fitted both categories and were close in age so they could be given tasks of similar mathematical difficulty so they could be compared and contrasted. The fact that the children could work on similar tasks was important to me because I wanted the children to have the opportunity to discuss tasks if they wished and also to comment on each others strategies. I felt that the children needed to be within two academic school years of each other in order for this to be possible. The children were all boys and in Year Six (two children) and Year Seven (1 child). I had taught all the children in the past but I was no longer their maths teacher.

METHOD

The data was collected through several meetings with the three children. The pupils initially came together as a group and were observed attempting to solve some problems from past Year 6 Standard Assessment Tests (SATs) papers. The children, as they attend an independent school, do not have to sit SATs papers as part of their education so I was sure they would not have seen the questions prior to the observation.

The SATs questions were chosen for three reasons.

1. I could be confident that the questions were at an appropriate level for the children.
2. The questions are reviewed and written after considerable thought and consultation by professionals in their field, which provided me with confidence that the questions would test the children's mathematical skills in an appropriate manner for a Y6/Y7 child.
3. The questions were well set out – vital for dyslexic children.

I chose questions that were of an open nature and had several ways of approaching them in order to give the pupils a range of ways on which to tackle them. For example a problem asking about the number of chairs needed for differing amounts of joining tables, which could be approached (amongst other ways) graphically or numerically, using number sequences or multiplication.

The children were provided with equipment (apart from calculators) if they required it and were left to approach problems in whichever order they desired.

The observation was videoed by another member of staff from the school though this was fairly unobtrusive as the video camera was left on a tripod in the corner of the room.

After the observation the children were interviewed individually to reflect on the tasks they were set. The children were all asked the same questions which were structured in an open manner. The interviews lasted around thirty minutes each.

After the interviews I used the data that had be gained so far to create a diary of a dyslexic child of a similar age to those involved in the study. This was a fictional

passage describing a child's experience in a maths class as a dyslexic student created using a technique similar to 'restorying'.

The technique I used differed slightly from 'restorying' as this can be defined as follows:

A story in narrative research is a first-person oral telling or retelling of events related to the personal or social experiences of an individual. Often these stories have a beginning, middle and an end. (Ollerenshaw and Creswell, 2002, pp. 330).

My account did not have the beginning, middle and end and was instead converting their stories into a diary, so was not 'restorying' more 'diarising'.

I chose to use this technique for the following reasons:

1. It would place the data in an accessible form for the children to reread.
2. It would be a way of combining the data gathered from the observation and the interviews without claiming to generalize on individual's views.
3. It gave the data presentation the chance to represent the pupils that were studied as real people with real experiences.

After this fictional diary was drafted it was given back to the children to record their comments and thoughts on. It was presented with a large margin down the right hand side and the children were invited to add comments or marks to indicate whether they felt that the child in the diary was like them. The pupils took the diary home to do this and their parents helped them to look through it. I thought that this was necessary as to analyse teachers work would be a difficult and daunting task for the children and so they would need help. I felt that this would create issues around the role of the parent in the children's decision making process but the task was too complex for the boys to attempt individually and I did not want to involve myself in the process as this may create greater issues as it was my own work. In addition I felt that it may benefit the parents to see some of the issues that the children had raised so they could gain greater understanding of their children's life at school.

The papers were returned to me via the children with varying amounts of comments.

RESULTS/DISCUSSIONS

The most remarkable part of the observation was the silence that fell immediately when the children were asked to begin and which remained throughout the time the pupils were approaching the tasks, despite assurances that they were able to talk to each other if they wished. The transcript of the videoed observation is less than four pages long including my instructions to the children even though the observation was for over half an hour.

During interview the children all said that they did not like to sit next to others who chatted and needed quiet in order to work. One child said he liked sitting next to another pupil in particular as "he doesn't interrupt me at all".

The students liked to be able to tackle problems themselves in a holistic manner rather than being given a set of instructions. Because of this they found additional help and support given by the teacher to be counter productive as they needed time to process information in their own way before being able to talk about it. This can be compared to Chinn's 'grasshoppers' who he describes working in his books about dyslexia in the following ways

..tends to overview; holistic; puts together...answer orientated...rarely documents the method; performs calculation mentally...flexible focusing; methods change. (Chinn and Ashcroft, 2007, p. 41).

This was emphasised by the use of a still from a clip of a sample teaching lesson which showed a SEN child in a fast pace mental mathematics session receiving a high level of input from the teacher with further input from a teaching assistant. This level of help may assist some children but the dyslexic pupils in the study repeatedly said they prefer to attempt problems themselves first and then ask for help after contemplating the calculation if they had difficulty with it.

Following from this notion of quiet was a discussion centred around the pupils perception of others who preferred to work in pairs or small groups. The children in interview perceived others who talked as lazy and just asking for answers rather than working out problems themselves. Only one of the three dyslexic students said that they would like to work with others and that was only in circumstances when the work was too difficult for him to do alone "say if you're doing like a...say... $5000+2000 \times 11$ then divide by 6 then I'd work in a group but..."

The children had difficulty in accepting help from others and saw it as a sign of others finding the work too complicated to do alone.

All three pupils recorded very little working. They said in interview that they preferred to perform calculations in their head and I would like to investigate further whether this need to do calculations in their head, as well as poor short term working memory as a consequence of their dyslexia may be why these children need to work in quiet environments as they are attempting to hold large amounts of data in their head at any one time.

This need for quiet appears to contradict the current emphasis in England on interactive teaching with a highly paced lesson delivered using, at least in the first part of the session, a large amount of conversation and delivery from the teacher.

The NNS advocated a particular format for each 'numeracy lesson', in three parts: mental/oral work as a whole class; a main teaching session in groups or individually; a plenary with the whole class again. This structure, which emphasized whole class interaction, contrasted significantly with traditional classrooms. (Pratt, 2006, p. 221).

Mental maths being taught in whole class sessions and the emphasis on whole class interaction were the particular parts of the maths lessons that the children said that they had difficulty with. They were being asked to perform mental mathematics tasks

very quickly as part of a group and needed time to assess the problems they were being set. The pupils did not like being taught in this manner and I feel that these children would have been a lot happier being taught in a more old fashioned style as the key features the children described as being in a good lesson (a problem being written on the board and then being invited to solve this themselves while sitting in silence) are more consistent with this approach.

I feel the National Numeracy Strategy (NNS) has suited many children that may not have succeeded before it was implemented. However the sort of pupils that were succeeding under the more old fashioned way may have been forgotten and their need for a quiet, individual working environment has been sacrificed in order to give others a more interactive lesson.

The greater use of teaching assistants supporting these children may not benefit them as it is additional noise that they have to contend with when they actually need more time and space to develop their own understanding of the topics and particular calculations they are working on.

The children that I observed were still achieving success in mathematics lessons and exams but mostly as they had developed the ability to shut themselves off from the noise around them and work individually even when they were supposed to be working in small groups and by finding other pupils to sit next to who liked to work in a similar way.

During the discussion issues surrounding the pupil's proficiency at speaking during interview was raised. This was a difficulty in the research as one child in particular dominated the conversations and one said very little. When the diary was written and subsequently returned to the children it emerged that as this child had raised more points their view point seemed to feature more heavily in the final fictional account of the dyslexic child in a mathematics lesson. One of the other children disagreed with some small parts of the final diary but unfortunately time did not permit me to return to the children and interview them in more depth about what may have helped to resolve this issue.

I also had difficulty in encouraging the children to describe the methods that they used to solve problems as they tended to focus on the particular rather than the more general practices that they adopted. For example one child described solving a problem as follows:

Pupil 3: I did 9×4 which is 36 and then I did...what is it... 4×0 which is 0 and 500×4 which is 2000 and then (pause) and then I did 2×9 which is 18 and 2×500 which is 1000 and then 2×100 which equals 0. Then I added the 2000 and 36 which equals 2036 and I added 1000 and 18 which equals 1018 and added them two together.

I found it very difficult to get the pupils to break from this and discuss the way that they imagined the figures in their head or how they decided on a particular strategy to approach a calculation.

POSSIBLE FURTHER RESEARCH

I would like to conduct further research in the area and would focus on the idea of some children in mathematics lessons needing times which are quiet in order to perform calculations whilst others need to be able to talk to others in order to proceed. Within this there are many more issues including those below:

The role of SEN support teachers and how their skills are used in mathematics lessons, and whether this helps or hinders the children they are working with, depending on their particular special need.

The way in which children who do not like to be interrupted during their work view the more chatty children and vice versa.

The ways in which dyslexic pupils who find mathematics difficult may be able to benefit from the ideas that the children in the study put forward.

Whether the pupils who would have achieved high standards in old fashioned, quiet classrooms with a greater emphasis on individual working are still succeeding in the modern more interactive classrooms. If they are achieving high standards is this because of the interaction and whole class teaching or despite it.

REFERENCES

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