NCE-MSTL
National Centre for Excellence in Mathematics and Science Teaching and Learning

Resource & Research Guides Vol. 3#1 2012

Catering for Exceptionally Able Children in Mathematics in Primary School: Views from pupils, parents and teachers

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Introduction

Recent international studies reveal that able students in Ireland are not performing as well as we would hope. The 2006 Programme for International Student Assessment (PISA) found that higher achieving students in mathematics in Ireland '*could do better'* (Eivers, Shiel & Cunningham, 2007: 36). More specifically, 15 year-old students at the 90th percentile in Ireland obtained a score that was 14 points lower than the OECD average score at that benchmark in PISA (2006) (Shiel, Perkins, Close & Oldham, 2007: 46).

At a national level the 2004 National Assessment of Mathematics Achievement (NAMA) found that '*teachers' comments largely suggest that they experience some difficulty in attending to the needs of pupils with varying abilities*' (Surgenor, Shiel, Close & Millar, 2006: 23). Few school plans '*included statements relating to…provision of enrichment activities for more advanced pupils'* (Surgenor *et al*., 2006: 27). In the report, responding principals voiced a general level of satisfaction with the Primary School Mathematics Curriculum (PSMC) but stated that they were concerned the PSMC provided fewer challenges for average and above average pupils.

The National Council for Curriculum and Assessment (NCCA) (2005: 182) reported that in a survey of primary school teachers in 2003/2004 regarding the PSMC, 48% of respondents stated that catering for the range of children's mathematical abilities was one of the greatest challenges they experienced implementing the PSMC. These studies highlight that catering for exceptionally able children in Irish primary schools is a matter of concern.

On a more positive note, in 2007 the NCCA, in collaboration with the Council for Curriculum, Examination and Assessment (CCEA) in Northern Ireland, published for the first time draft guidelines on exceptionally able children. These guidelines contend that 5 – 10% of the school population may be exceptionally able (NCCA, 2007) and recognise that pupils can have high attainment levels in specific areas. The guidelines outline measures to identify exceptionally able children, as well as outlining enrichment and extension strategies for this cohort of pupils.

Purpose of this paper

The aim of this paper is to disseminate the views of mathematically able children, their parents and teachers about their experiences of mathematics in primary school. While broad generalisations cannot be made from this study, it does provide a 'voice' to mathematically able children.

Profiles of participants in this paper

The following four children are alluded to in this paper.

David	• In transition from primary to secondary school. • Psychological report noted he was mathematically highly able.
Trevor	• 6th Class pupil • In the 99th percentile in mathematics
Seán	• 5th class pupil • In 3rd Class NEPS psychologist discovered '*he was doing maths at the level of a 17 year old*'
Lucy	• Nine years old • When assessed at seven years of age, she was found to be linguistically and mathematically exceptionally able.

In addition, the reality of the educational landscape in relation to the provision for exceptionally able children in mathematics was gained through the interview of three key informants. The key informants included an Irish National Teachers' Organisation (INTO) spokesperson, a spokesperson from the NCCA and a primary school teacher educator.

Findings of the study

Views of Children

There was general consensus among the children that the level of mathematics they experienced in school was easy and provided little challenge. For example, Lucy enjoyed school but stated that '*I'd really love it if it was a bit more challenging*'. David believed that much of the time was spent on irrelevant material and '*messing around*'. This lack of challenge led to feelings of boredom among the children: '*it's a bit of a bore. We do the same thing everyday*' (Interview: Trevor). On questioning Seán as to whether he would like more challenging work he stated '*Ya I guess…but not too difficult or I would have to start concentrating*'.

All children reported doing the same material in mathematics as their fellow peers. They also recognised that they usually finished class work quicker than the majority of their classmates. The children noted that they did various activities such as extra mathematics of the same variety, reading books or finishing other school work when they finished their regular mathematics class work.

The children revealed that they would like to receive more interesting and challenging work in mathematics. David acknowledged that he would like to explore topics in more depth i.e. he would '*like if the maths questions could be replaced with harder ones*'. Similarly, Lucy reported that her favourite teacher was one who '*wouldn't take any nonsense from us….she wouldn't say that it's too hard for you*'.

Views of Parents

The majority of parents recognised that their children were not receiving extra provision in mathematics. Two of the parents reported that while psychological reports gave specific recommendations for their children, in their opinion these were not implemented in school. Trevor's mother believed that the teacher '*never really looked at the report….that was put away to the side. Trevor does not get anything extra than anyone else.*'

Lucy's mother believed that one of Lucy's teachers '*was very happy that everyone would do a little bit of the same*'. As a result, Lucy '*did what they call "dumb down"'*. She reported being afraid that Lucy would become demotivated, as she had always been working below her ability. Lucy's mother also revealed her daughter's feelings about receiving extra worksheets when finished with the mainstream work: '*why should I finish my sums quickly when all I get is extra sums?*' It would seem that this approach failed to challenge or motivate Lucy. The impact of such strategies on pupils' attitudes to mathematics was also apparent. For example, Seán's mother notes that at times he would make announcements such as '*when I finish school I will never ever do maths again*'. She feels that this is a shame seeing that he has such mathematical talent.

The parents of mathematically able children viewed the provision of extra resources, more challenging and differentiated work and more group project work as ideal provision for this population of pupils. For example, while Trevor's mother saw the need to '*stretch them more, make things a little harder for them*' as an important need, Lucy's mother reported her desire for her child to receive '*… a lot more differentiation'*. Parents also envisaged that a resource class could be used effectively with their exceptionally able children in providing individual extension work. Lucy's mother believed that her child would '*think she'd died and gone to heaven*' if she got resource time for extension work.

Views of Teachers

Many of the teachers were sceptical about the PSMC ability to cater for the very able mathematician. Trevor's teacher believes that the PSMC has been '*diluted*'. Seán's teacher likes the PSMC but highlighted the difficulty of doing practical activities with large classes.

Teachers of the mathematically able children in questions noted that the main provision provided by them was extra work in the form of extra sheets or work from books such as *Figure it Out*.

David's teacher reported that she used an old mathematics book '*that would have the half penny in it, nearly the farthing in it [and] he loved that because it really challenged him*'.

When questioned about differentiating the curriculum in order to provide for the needs of children in mathematics, teachers' answers were varied. While one teacher believed that '*teachers do that automatically, children naturally fall into groups*', another teacher was less positive stating '*this word differentiation, particularly when it appears on a psychological report, just makes my hair stand on end. Because how do you do it?*'

Teachers gave a variety of replies on what constitutes good practice with mathematically able children. One teacher acknowledged that '*what the thing we overdo is, we give a lot of stuff that is boring for them so therefore they won't do it well*'. As a result he commented on the need to provide variety in mathematics in order to provide a more stimulating environment. This reflects the findings of Koshy (2001) who reports that mainstream mathematics lessons in school can be overly repetitive for able mathematicians. Instead such pupils require time and opportunity to analyse ideas, look for patterns and relationships, reason and consider alternative solutions. Another teacher in the study believed that appropriate computer programmes would be more stimulating and relevant to mathematically able children rather than '*getting out old stuff*'.

Teachers identified large class size as a significant obstacle in providing for the mathematically able. Seán's teacher concluded that '*to ask teachers to really stimulate every child in a class of thirty is really asking too much*'. Teachers also noted that the reality of a wide spectrum of abilities in a normal mainstream mathematics class makes it difficult to cater for the needs of all pupils. These findings reflect those of the NCCA (2005:182) where one teacher commented that '*there are so many levels and abilities in maths that it is difficult to keep the children appropriately challenged.'*

Another significant obstacle in the provision for exceptionally able children, as reported by the teachers, was their perceptions of who was most deserving of extra resources. Two teachers stressed that the child with a learning difficulty needed resources more. One teacher, in a multi-class situation, found that time was another constraint in teaching children '*at their own level*'. He found that he had limited time to help all students and at the same time cover all the subjects of the curriculum. He also noted that while multi-grade classes are good for exceptionally able children when they are young, it can become frustrating for them when they reach 6th class because they have all the work covered.

Views of Key Informants

Differentiation of the PSMC to cater for the needs of all pupils was viewed by all key informants as being of vital importance i.e. providing intellectually challenging material that is both age and stage appropriate. One key informant highlighted '*you might give a child a Leaving Certificate question and they might be able to do it, but it might not be age appropriate for them. It should be something that is relevant to their lives, something that has meaning for them*'.

The need to emphasise problem solving in all strands of the PSMC was also highlighted. A key informant emphasised that '*very often children that are very bright are numerically*

able and are fed a diet of that'. Problem solving activities are required in all strands of the PSMC to challenge these pupils and provide them with a holistic mathematics education.

The key informants in this study noted that there are a number of obstacles facing exceptionally able children in realising their ideal provision in the mainstream mathematics class including large class size, wide ranges of abilities and access to appropriate resources. A key informant stated that there can also be a perception '*that the good child will get on anyway.*'

Conclusion

Mathematically able children in this study received very little extra provision (except more of the same) in the mainstream mathematics classes they experienced, and as a result considered mathematics to be unchallenging.

Parents were concerned that their children might be 'dumbed down' as a result of such experiences.

Teachers' perceptions of the needs of mathematically able pupils were found to have an impact on how these children were catered for. Often children who experienced difficulties in mathematics were deemed to need more help than the mathematically able. Large class size in Irish primary schools was viewed as a major obstacle to mathematically able children receiving suitable specialised instruction. While the publication of the NCCA's draft guidelines for exceptionally able students is a welcome development, further work in this area is necessary. Shiel *et al*., (2007: 48) recommend, from the findings of PISA, that higher achieving students in mathematics require more challenge, especially challenge that requires them '*to extract mathematical information from real-world problems*'.

Implications for the classroom

Differentiation is a crucial aspect of good provision for the able mathematician in the regular classroom (Eyre, 1997). Teachers should be supported over an extended period in their attempts to implement a differentiated mathematics curriculum for exceptionally able pupils. This could take the form of working in collaboration with colleagues, team teaching, continuous professional development, development of relevant challenging resources that align with the PSMC and work with outside agencies such as the Centre for Talented Youth in Ireland. In addition, problem solving needs to become an integral part of the mathematics lesson. This will help to develop critical and higher-order thinking skills among mathematically able pupils.

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