Early entry in GCSE Mathematics

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The change in school accountability measures at KS4 to include GCSEs in mathematics and English at grade C or above has led to increasing use of early entry to ensure that performance targets are met. We discuss the evidence around school entry practices from two surveys completed as part of the independent evaluation of the mathematics pathways project and discuss the need for a quantitative research study into the impact of early entry on participation and attainment.

Assessment; accountability; GCSE; measures of performance; early entry

Introduction

Since 2006 school accountability measures for KS4 (age 16) have included five GCSEs at grade C and above including English and mathematics (DCSF 2005). Performance in this measure (see Table 1) has increased and the data suggests a simple and positive trend, during a time of significant change for GCSE mathematics.

	2006	2007	2008	2009	2010
5+A*-C including English and mathematics (DfE)	45.6%	46.3%	47.6%	49.8%	53.4%
A*-C mathematics (JCQ)	54.3%	55.3%	56.4%	57.3%	58.5%
Average point score for mathematics	4.5	4.531	4.575	4.639	4.686

Table 1 GCSE performance in England 2006-2010

As the data in Table 2 shows, in 2008 when the first awards were made on two tier GCSE there was a drop in the proportion of grade Bs by 1.5% (9000 candidates) and an increase in grade Cs by 2% (12000 candidates) and in 2009 the first awards on GCSE without coursework saw boys' achievement overtake that of girls (by 1.5% from 2008 to 2009).

(Overall/female/male%)	A*	A	B	C
2006 3 tier with coursework	4.1/4/4.2	9/9/9.1	17.6/18.2/17	23.6/23.7/23.3
2007 3 tier with coursework	4/4/4	9.7/9.7/9.6	17.7/18.3/17.1	23.9/23.9/24
2008 2 tier with coursework	4.5/4.7/4.3	9.8/10/9.6	16.2/16.3/16.1	25.9/25.8/25.9
2009 2 tier w/out c'work	4.6/4.5/4.7	10.7/10.6/10.8	15.7/15.6/15.7	26.3/26.3/26.4
2010 2 tier w/out c'work	5/4.8/5.1	11.2/11.2/11.3	16/15.8/16.1	26.3/26.6/26.1

Table 2 GCSE mathematics results in England 2006-2010 (JCQ)

Anecdotal evidence suggested that as a direct consequence of the change in school accountability measure, schools were adopting a range of practices to secure grades C in GCSE mathematics, that were not necessarily enhancing learners'

experience of mathematics. In particular early entry to GCSE was being used with a wider range of students, particularly by schools identified as 'challenge schools' where early and multiple entries to both GCSE English and mathematics were being encouraged as a means of ensuring that government 'floor targets' were met. Early entry had been the preserve of high attainers and this had increased as local authorities used it as an indicator for schools meeting the needs of 'gifted and talented' students.

In 2009 Ofsted reported the prevalence of 'teaching to the test' in school mathematics and QCA developed a factsheet distributed to all schools and local authorities in England through the National Strategies and Awarding Bodies about the forthcoming changes to GCSE from 2010 (following changes to the National Curriculum implemented from 2008) which stated

> Candidates who take GCSE early and achieve a lower grade than A* are less likely to continue their study of mathematics post-16 than students who achieve their full potential in mathematics at age 16. In other words, for candidates who may achieve lower grades through early entry, it would be better to delay entry and give them a richer experience of mathematics and the opportunity to achieve a higher grade.

During this time (2007-2010) QCA was managing phase 2 of the Mathematics Pathways Project which included the trialling and piloting of two GCSEs in mathematics, one of which incorporated functional mathematics and the other which had a greater emphasis on mathematical thinking and problem solving. This pilot involved approximately two hundred centres and was subject to an independent evaluation led by academics from Nottingham, Manchester and Sussex Universities (the Evaluating Mathematics Pathways project (EMP)). During summer 2009, the EMP team conducted a survey of these centres to explore emerging entry practices. With responses from just under 100 centres, the report concluded that

> The inclusion of mathematics in the 5 A* - C GCSE count in the headline performance measure for schools is resulting in a substantial proportion (about one-quarter) of schools entering students early for GCSE mathematics. There are indications that schools in which post-16 education is not possible are adopting this strategy more vigorously than those with post-16 provision. Such strategies are used alongside targeted interventions for students identified as being at risk (ie on the C/D borderline). For students who achieve their goal at GCSE before the end of year 11 their continuing study of mathematics is handled very differently from school to school.

In summer 2010 the EMP team completed a national survey of schools to investigate entry practices more widely. When exam results were published in August 2010, it was reported that 10% of mathematics GCSE results were for candidates aged 15 or under (BBC 2010). Andrew Hall, CEO of the awarding organisation AQA, raised concerns around increasing levels of early entry (more than 150% over two years, from 33000 in 2008 to 83000 in 2010) in his speech to the ACME conference in March 2011. In this paper we discuss the outcomes of the summer 2010 survey and a possible research study into the impact of early entry on participation and attainment.

EMP 2010 survey

The national online survey was widely publicised by subject associations, the National Strategies, mathematics advisers and consultants and awarding bodies. There were 368 responses which represents more than 10% of all secondary schools in England. Approximately 66% of respondents were from 'through 16' schools. The

GCSE achievement from respondents was higher than the national average. Nearly all schools used one awarding body and most (62%) entered candidates at the end of KS4, this was particularly the case for independent and selective schools.

20% of respondents entered high attainers before the end of year 10, and a third of respondents had entered a wide range of students before the end of year 11. This was an increase over the findings in 2009. In preparation for entry about two-thirds of centres reported targeting particular teachers at C/D borderline students and providing additional support at lunchtimes or after school. In line with the 2009 survey these strategies are used more in 'up to 16' schools, than in 'through 16' schools, and by schools with lower GCSE performance. Some schools had introduced additional time for teaching mathematics to all students, most of these also use the other two strategies as well.

Many early entrants are re-entered if they fail to get a grade C or the grade expected (through, for example, Fischer Family Trust data). Respondents were asked what mathematics provision was available to early entrants. Figure 1 shows that a quarter of those achieving a grade C and 11% of those achieving grades A and B stop studying mathematics and only a substantial proportion of those who achieved a grade A had access to more mathematics at a higher level.

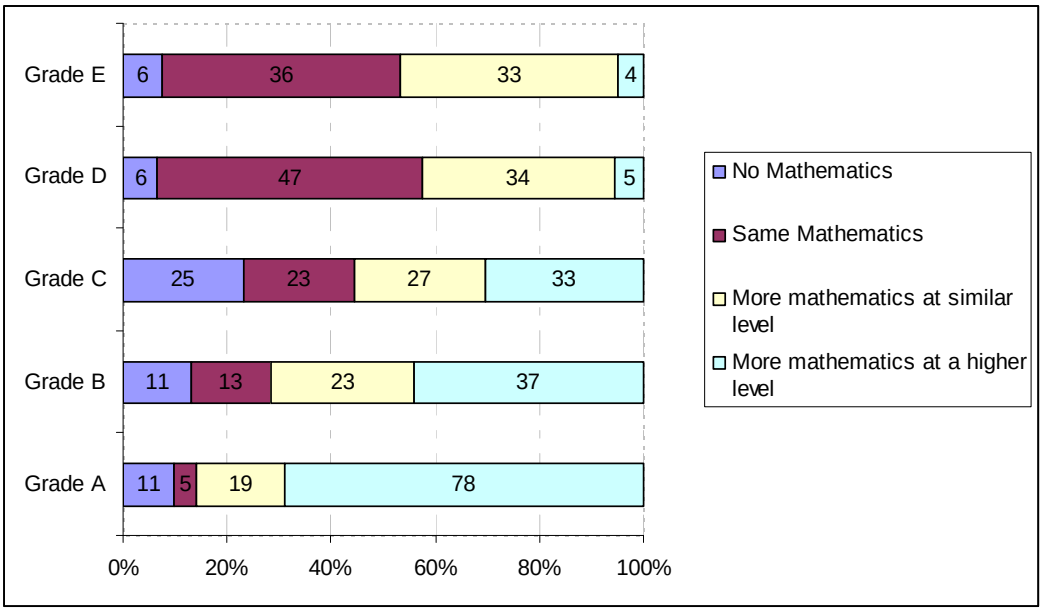

Figure 1: Mathematical provision for students who take GCSE early by achieved grade

In contrast to the 2009 survey there was a slightly more positive disposition towards two tier GCSE, although those who were opposed to two tier were more vociferous, and the proportion of students being entered for higher tier was greater. The increase in higher tier entries may be a consequence of the nature of the respondents. Many centres that are adopting early entry tend to enter most students at foundation tier initially and then re-enter those they think might be able to get a higher grade at higher tier.

What is the impact of early entry?

There is no doubt that not doing any mathematics from the age of 15 will ensure you are ill-prepared to take up the study of mathematics post-16. Like playing music or sport, skills will atrophy without practice. Given the focus on 'grade C' many students think that a grade B will do. They do not realise that when they apply for a

popular undergraduate course at a prestigious university their GCSE results will count and a grade B a year early will not be good enough (Daily Telegraph 2008). Many centres believe that once students have achieved a GCSE in mathematics their statutory entitlement of a broad and balanced curriculum that includes mathematics up to the age of 16 no longer exists.

For some students, who may 'opt out' during Y11 or be eligible to leave before the end of Y11, taking GCSE early may help to ensure they have a grade which they might otherwise not have achieved. This is clearly advantageous to both the student and the school. However, there is considerable anecdotal evidence that in schools where early entry is adopted for the entire cohort and 'students are offered a chance to improve their grade', many centres find motivation a significant issue. Anecdotally, this was often the case when 'top sets' were entered at the end of Y10 and began studying A level in Y11. Students were often more concerned about their other GCSEs than the A level course and the experience could make them less inclined to continue studying mathematics post-16.

The need for a quantitative study

Given the serious impact upon students' experiences of learning mathematics and the probable longer term effects of early entry on participation, further research is needed in this area. A quantitative study would enable answers to the following questions:

- What is the extent and nature of the increase in early entry to GCSE?
- Is there any evidence that early entry results in underperformance?
- What is the impact of early entry on participation and achievement in AS and A level mathematics and does this differ depending on the type of institution?

It would provide a baseline for examining future changes and would also help ensure that any policy in respect of early entry practice is appropriate and well informed. It is worth noting that in Scotland 'early presentation' is strongly discouraged by the Scottish Executive (2005).

Through using matched candidate data for a large age-group cohort, the real impact of early entry on subsequent participation and achievement can be investigated. Identifying all students who achieved GCSE in advance of the summer in which they completed KS4 and tracking their subsequent mathematical achievements, allowing for school type, prior attainment, gender etc. and comparing that with the progression of those who completed their GCSE at the end of KS4 will enable a thorough investigation of the questions identified above.

One of the challenges of this approach is the longitudinal nature of the data. Data is now becoming available for students completing A levels in the summer of 2010. This is the cohort that might have been entered early for GCSE, as year 10 students, in the summer of 2007. Although this analysis would provide a baseline the research would need to be repeated with subsequent cohorts in order to get a sense of the evolving impact of the performance measures and early entry practices.

Conclusion

There is a general consensus in the UK mathematics community that enrichment through breadth and depth of study is generally better than acceleration in meeting the needs of 'able' learners (UK mathematics foundation 2000). The performativity culture in England has seen acceleration being more widely adopted for a wider range

of learners. Indeed, the government decision in 2008 to abandon National Curriculum tests at the end of Key Stage 3 has led many schools to start KS4 early and enter students for GCSE units in Y9. This could lead to an even greater proportion of centres entering students early.

Evidence from the EMP surveys (2009 and 2010) suggest that early entry is on the increase and that the mathematics provision pre- and post-entry is not necessarily what might be hoped for in terms of a broad and balanced curriculum with opportunities to learn for understanding and develop confidence as a learner and user of mathematics.

Does early entry result in underperformance? Does it undermine participation in post-16 study? A quantitative study has been proposed that will enable answers to these questions to be found.

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