

## **Mathematics GCSE resit students: heterogeneous patterns of affect, participation and attainment**

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GCSE Resit students in England are a subset of those who have reached the age of 16 without achieving a ‘standard’ (Grade 4+) pass in GCSE Mathematics. In recent years, except during the pandemic, such students have comprised around 30% of each cohort. They are therefore re-sitting the assessment, often as a condition of funding in post-16 education. We highlight the diverse and gendered characteristics of these students in relation to mathematics, drawing on two sources of data: a mixed methods study of students studying GCSE Mathematics in each of two Further Education colleges, focused on accounts of their engagement with GCSE word problems as a ‘threshold skill’ in GCSE Mathematics; and recent years’ GCSE Mathematics post-16 participation and attainment data in England. Taken together, these illuminate gendered and experience-related patterns of affect, participation and attainment within students resitting GCSE Mathematics.

**Keywords: GCSE; resit students; gender; affect; participation; attainment**

### **Introduction**

Nearly all 16-year-olds in England (and Wales, as well as most in Northern Ireland) take GCSE Mathematics assessments, which function in a variety of ‘gatekeeper’ roles in later education and employment; outcomes are reported on a scale of 1-9 (or ungraded), with a grade 4+ regarded as a ‘standard pass’. Post-16 education takes place in a variety of school or college settings, with most vocational education in General Further Education colleges, the setting for the empirical work reported here.

In England, a ‘condition of funding’ policy established in 2014 requires that students who have not yet earned a good pass at age 16 continue with a mathematics course that would potentially demonstrate ‘progression’. For many such students, that involves ‘resitting’ GCSE Mathematics, aiming to show progress in their GCSE grade over less than an academic year. Two thirds of GCSE resit students do not improve their performance by age 19, while others may resit multiple times before achieving a grade 4+. This bears particularly on disadvantaged students and those with Special Educational Needs, who are both more likely to fall within the resit group and less likely to succeed (DfE, 2020). GCSE as a qualification is of recognisable status (Education and Skills Funding Agency, 2023) and so policy response to poor success rates has largely been to support participation and progression within GCSE Mathematics, rather than to develop alternative routes in which students are more likely to succeed – despite considerable work being undertaken to develop possible alternative approaches (e.g. Smith & Dalby, 2019; Davies et al., 2020). Corresponding GCSE resit attainment narratives are largely negative, usually referring to GCSE resit students as a group (e.g. Davis, 2023). This paper, in contrast, ‘unpacks’ GCSE Mathematics post-16 performance statistics. That work is complemented by data from an empirical study of relevant students’ experiences with word problems as a ‘threshold skill’ in GCSE Mathematics. Taken together, these two studies reveal complex patterns of attainment, and gendered, often positive

experience-related patterns of affect and participation. We argue our evidence should both encourage teachers of these students and remind teachers of students’ heterogeneous learning needs; it also offers further support for a re-think of government ‘resit’ policy.

### GCSE Mathematics participation and attainment: the current landscape

Not all post-16 students in England taking GCSE are resit students: recently-arrived students, for example, might be taking it for the first time, and in Northern Ireland only about 80% of any cohort take it at age 16, with a significant number of others taking it for the first time at a later stage. Time series need to consider jurisdictions other than England because until 2017, outcome statistics were conflated across England/Wales/Northern Ireland. We consider participation and attainment 2015-2023. 2015-2019 show decreasing rates of attainment of grade 4+ or equivalent, to <25%; that decrease is likely to be largely a result of the condition of funding analysed above. Alternative routes to assessment in the pandemic years of 2020, 2021, when assessments were made by centres/teachers, commonly, and very understandably, led to higher grade profiles at age 16 and subsequently, less well-prepared resit cohorts: 2023 statistics might still slightly reflect such distortions. Overall, though, for 2023 as in Table 1 below, post-16 GCSE entries were dominated by England, but success rates skewed by Northern Ireland (often first time) entries.

Table 1: Age 17+ GCSE Mathematics and attainment by gender across the UK, 2023. *Source:* <https://www.jcq.org.uk/examination-results/?post-year=2016&post-location=>

Gender	England			Wales			Northern Ireland		
	Entry n=	% grade 7+	% grade 4+	Entry n=	% grade 7+	% grade 4+	Entry n=	% grade 7+	% grade 4+
M	74023	1.4	16.3	2097	2.2	27.3	2210	19.2	68.7
F	80000	1.4	16.4	2485	1.4	25.6	2418	18.6	61.5
M/F	154023	1.4	16.4	4582	1.8	26.4	4628	18.9	65

For England 2023 post-16 GCSE entries, Table 1 shows the overall ‘success’ (grade 4+) rate was a very modest 16.4%. England entries continue fairly evenly split by gender; Figure 1 shows participation and success decreasing significantly by age, until age 20+, when mature students were relatively successful, and that is now a well-established pattern (e.g. Golding, 2022). In England in 2023, resit students aged 18 and 19 enjoyed a ‘success’ rate of only ~10%, with male students slightly more successful than female. Among resit students aged 20+, though, females enjoyed ‘success’ rates of ~40% and males 34%: these older students’ participation and attainment merit further research. If we exclude those mature (aged 20+) learners, the overall ‘success’ rate for 17-19 year olds (Years 12-14) in England in 2023 was 15.2% (16.3% for young men and 14.2% for young women).

Given these rather sobering statistics, it should be noted that students in the complementary empirical study were aged 16-19 (years 12-14), in two General FE Colleges in central and western London, respectively, studying for, and usually

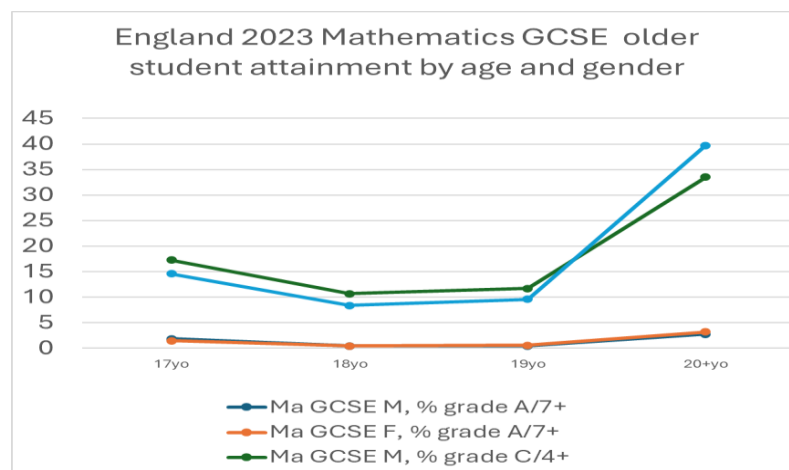


Figure 1: England older student performance hides variation by age and gender. Source: <https://www.jcq.org.uk/examination-results/?post-year=2016&post-location=>

resitting, GCSE Mathematics. We now turn to data from that study, which privileged student voice (e.g. Cook-Sather, 2006). These resit students often face unique challenges and may have distinct learning needs compared with their younger peers (Noyes & Dalby, 2020). The related methodology is described in Boli (2020, 2023). The focus was resit students' approaches to, and experiences with, GCSE Mathematics and in particular, word problems, as a key 'threshold skill' in mathematics at this level (e.g. Pearson, 2019).

### Further Education College mathematics resit students' experiences and affect in relation to GCSE word problems

Verschaffel et al. (2020) offer an overview of the wider evidence base in relation to word problems at different stages of education. There is negligible literature focused on related issues for students who are resitting GCSE Mathematics or similar, but of course, in previous years such students will have been (regarded as a not particularly 'successful') part of the mainstream student body. Boli (2023) describes her workshop approach to initial explorations around GCSE resit students' experiences with, approaches to and affect in relation to word problems, within one Further Education College in London.

Data from that workshop informed the development of an online survey for such students, carried out across two such colleges, the first in central and the second in western London. The survey probed learners' affect around mathematics, their experiences with and approaches to word problems, and their related learning experiences within their college; it used a mix of Likert scales and open responses, so as to balance coverage and richness of data. Non open-response questions were taken from TIMMS (2019) and the wording adjusted accordingly, with 5 point Likert scale: strongly disagree – strongly agree. Analysis was reflexive thematic (Braun & Clarke 2022), and included analysis by assessment experience, with students who were resitting for at least the second time defined for these purposes as 'persistent low attainers' (though they might not perform poorly outside examinations). Key characteristics of the sample were as in Table 2.

Table 2: Composition of sample by key characteristics

	College A (n=112)	College B (n=36)
Resitting at least 2 <sup>nd</sup> time	37 (33%)	13 (35%)
English first language	74 (66%)	14 (38%)
Studied in UK >11 years	83 (74%)	14 (38%)
Studied in UK <5 years	17 (15%)	13 (35%)
Studied in UK >5, <11 years	12 (11%)	10 (27%)
Female	60 (53%), 23 PLAs	16 (43%), 5 PLAs
Male	50 (45%), 13 PLAs	20 (54%), 7 PLAs
Prefer not to say	2 (2%), 1 PLA	1 (3%), 1 PLA

### ***Findings:***

Even though the majority of the participants would have preferred not to have to resit maths and a small majority consider maths one of their least favourite subjects, almost all at least agreed that their college maths teachers have supported them to do well by giving them clear explanations, using a variety of methods, linking new topics to previous and persisting with a topic when students do not understand it well. More than a third agreed or strongly agreed that they were doing well in maths class and less than a quarter disagreed or strongly disagreed.

In general, male students reported a fairly positive historical relationship with mathematics (for example, *“not easy, but once I get it it’s OK”*), and an overwhelmingly positive current self-image of themselves as mathematics students (*“intelligent and a fast learner”*, *“determined”*, *“a hard worker”*); well over half of participating female students reported a negative historical experiences with mathematics (*“I’ve always struggled with maths, never enjoyed it”*, *“I hated it”*, *“It was horrible”*, *“I used to be an emotional wreck”*) but over half reported a positive current mathematics student self-image (*“making good progress”*, *“hard worker”*); there was less male/female contrast in College B. The range of students widely reported experiences of mathematical growth, value and sense-making in mathematics during their college years.

In relation to solving word problems, male participants largely reported positive, confident feelings (though workshops suggested those might not always be well-founded) whereas female students were much less likely to report general confidence in solving word problems (*“confused”*, *“annoyed”*, *“pressured”*, *“anxious”*). However, in relation to specific word problems, there was much less, sometimes very little, difference in confidence. Male and female students both reported a range of approaches to being ‘stuck’ in solving a word problem when they were at home or in class, though faced with a word problem in an examination situation, female students more likely to report ‘skipping’ it.

Male persistent low-attaining students, in our definition, were more likely than their first-time resit male peers to report a positive mathematics self-image, or confidence in solving word problems – although again, they were more confident in

relation to specific word problems than to word problems in general. The range of persistently low-attaining students were also somewhat less likely to report current positive mathematics experiences.

## Discussion and Conclusion

Taken together, these two studies demonstrate very clearly that Mathematics GCSE resit students are not a homogeneous group. Headline figures about their post-16 progression hide variation that include sobering ‘success’ rates of ~10% for previously low attaining students – those 17-19-year-olds who have already resat GCSE at least once without having achieved a grade 4+. Prevailing narratives of poor attitudes and failure are nevertheless challenged by the sample resit students’ dominant perceptions of growth, value and sense-making in their Further Education College mathematical journeys, though the persistently low attaining students in the sample understandably reported somewhat less positive experiences.

Overall, participating female FE GCSE resit students (and persistently low attaining students) reported less positive general mathematics self-image and mathematics confidence than their male counterparts resitting for the first time, though in relation to specific mathematical tasks, those differences largely disappeared. Such male-female differences are commonly also reflected in the questionnaires associated with large-scale international studies such as PISA and TIMSS (e.g. Golding, 2022), although those sample students aged 15 for PISA and aged 9-10 or 13-14 for TIMSS.

The empirical study on which we draw sampled GCSE Mathematics resit students from just two Further Education colleges in England, so is not easily generalised – findings might be indicative of those elsewhere but add sometimes unexpected perspectives to the statistical analysis presented. It should also be noted that the students sampled were all significantly affected by the global COVID-19 pandemic, and that might have skewed responses: at least seven reported strong negative connotations similar to one workshop participant who said “*Covid-19 ruined everything, put stress on students..... Didn’t feel as authentic as real life*” and another who reported “*When lockdown came the student in me died*”.

In conclusion, then, we argue against conceptualising GCSE resit students as a homogeneous group, not least in contemplating the consequences of ‘success’ rates of ~10% for teenage persistent low attainers. Teachers of resit students should be aware of the gendered and experience-related differences reported here, and their possible pedagogical implications, which may well be indicative of similar differences on a wider scale. Further, we should be aware of valuable outcomes of these students’ post-16 engagements with mathematics, beyond their GCSE grades: the widely reported mathematical growth, valuing and sense-making gained in their post-16 learning are important benefits that will support mathematical engagement in adult life – provided other experiences, such as persistent lack of GCSE ‘success’ at grade 4+, do not undermine that.

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