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Students' Perspectives on Mathematics in Further Education Colleges

The Mathematics in Further Education Colleges Project:

Interim report 3 – Executive summary

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1. Executive summary

Improving the mathematical skills of adults in England is a national priority, as highlighted in the Industrial Strategy[1], Sainsbury Report[2] and Post-16 Skills Plan[3]. The benefits to individuals, in terms of future earnings, are well evidenced[4] and there is growing recognition of the wider value of mathematical skills for full and meaningful engagement in society[5].

The Further Education (FE) sector is critical in plans for improving national quantitative skills and, according to Smith's (2017)[6] report on post-16 mathematics education, there is a need for wider recognition of the importance of Further Education in the post-16 education landscape. Indeed, the majority of 16-18 year olds with low prior attainment in mathematics are studying in general FE colleges, mostly on vocational study programmes.

A new post-16 Condition of Funding[7] was introduced in 2014 to help tackle low prior attainment and increase the proportion of students achieving a GCSE Mathematics grade C/4. However, progress for 16-18 year olds in FE colleges remains slow with just over a third (36.5%) making positive progress[8] in 2019 and 18.2 % achieving a GCSE grade 4[9].

The Mathematics in Further Education Colleges Project (MiFEC) offers the latest and most extensive research analysis of the state of mathematics education in England's FE colleges. Comprising four interconnected work packages, the project has already reported major findings in a series of reports and articles.

The first Interim Report[10] focused on a national survey of the mathematics teacher workforce whilst the second Interim Report[11] provided a wide-ranging analysis of policy enactment and practice in a sample of 32 FE colleges in England. The project's Final Report (due autumn 2020) will synthesise the project findings and make recommendations for stakeholders including policymakers, college managers, curriculum leaders and Continuing Professional Development (CPD) providers.

This third Interim Report presents analysis of student-generated data from the case studies. It explores young people's perceptions of mathematics and experiences of

[1] BEIS (2017). Industrial Strategy: building a Britain fit for the future. London: HMSO.
[2] Report of the independent panel on technical education. 2016. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536046/Report_of_the_Independent_Panel_on_Technical_Education.pdf
[3] DfE (2016). Post-16 Skills Plan. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536043/Post-16_Skills_Plan.pdf
[4] Cerqua, A. & Urwin, P. (2016). Returns to Maths and English Learning (at level 2 and below) in Further Education. London: BEIS.
[5] Bredberg, J. (2020). The role of mathematics and thinking for democracy in the digital society. Policy Futures in Education, 18(4) 517–530
[6] Smith, A. (2017). "Report of Professor Sir Adrian Smith's review of post-16 mathematics." London: DfE.
[7] The Condition of Funding, commonly referred to as the GCSE re-sit or retake policy, made it compulsory for those who had not attained at least GCSE grade C/4 to continue their mathematics study post-16
[8] According to the government's maths progress measure. See here for the full guidance.
[9] DfE (2020). Revised A level and other 16-18 results 2018 to 2019. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/859515/2019_revised_A-Level_and_other_16_to_18_results_in_England.pdf
[10] Available at https://www.nottingham.ac.uk/research/groups/crme/documents/mifec/interim-report-1.pdf
[11] Available at https://www.nottingham.ac.uk/research/groups/crme/documents/mifec/interim-report-2.pdf

learning the subject in FE colleges. This report complements the teachers' perspectives on students' experiences that were reported in the second MiFEC Interim Report.

The analysis of students' perspectives addresses several of the MiFEC project's research questions:

- How do FE colleges *mediate*, *moderate* and *modulate* government policy on post-16 mathematics education?
- What different strategies have been employed?
- How has/is funding shaping college policy and classroom experience?
- What are the workforce strengths and limitations?
- How is curriculum and assessment changing?
- What are the possible unintended consequences of policy upon classrooms?

The project's case studies of 32 General FE colleges (GFECs), which were either single providers or part of a college group, comprised around one sixth of 187 similar providers at the time of sampling (Sept 2017). This sample was stratified across the nine regions of England and based on the selection criteria set out in the second MiFEC Interim Report.

Student focus groups took place during visits to the colleges. They included an individual, card sorting activity that exploring teaching and learning experiences and preferences. The field work involved 44 site visits and 62 student focus groups in which a total of 388 students participated from a range of vocational areas. 93% of the sample were aged 16-19 and the large majority were studying GCSE (80%) with others following Functional Skills (15%) and Core Maths (5%) programmes. This report presents findings from a cross-case analysis of the data concerning students' perceptions of their experiences of mathematics in FE.

The main findings are as follows:

Student motivation to retake mathematics centred on the 'exchange-value' of the qualification rather than the 'use-value' of the skills. Students needing a GCSE mathematics qualification for progression to further study or their chosen career identified this as a source of motivation. The majority of students stated that a mathematics qualification, especially GCSE, was an advantage in the employment market but some questioned how essential the actual mathematics was for certain jobs.

Students were unconvinced about the relevance of the mathematics they were learning to their lives, careers and vocational studies. The most useful mathematics for life and work was described as 'basic numeracy'. Students sometimes identified specific mathematics topics that were relevant to their vocational areas but connections were weak and hidden in work routines. Much of GCSE mathematics was considered only useful for passing the examination.

Failure to pass the GCSE examination, or understand mathematics in class, reinforced negative attitudes and emotions. A lack of interest, low confidence and anxiety were common responses amongst students to mathematics. Prior experiences in school contributed but negative reactions were reinforced by evidence of continuing failure, from examination performance or classroom learning.

Students valued individualised, student-focused approaches to teaching and learning from understanding and approachable teachers. Students were generally more positive about their learning experiences in college than those in school but felt they would benefit from

more use of student-focused approaches to teaching and learning, according to the categorisation used in a previous study[12]. They valued clear explanations and alternative methods but most important was having a teacher that they could 'connect' to and feel comfortable approaching for help.

Students rarely understood college systems for the organisation of mathematics classes and were critical of inconvenient timetabling, disruption to classes and ineffective action concerning poor attendance. Most students were unaware of why they were in a particular class but sometimes found the timetabling of mathematics inconvenient or unconducive to learning. Students stated a strong preference for continuity regarding both teacher and class members. The reorganisation of classes for some students was too frequent and unhelpful. Action to deal with poor attendance or disruptive class behaviour sometimes appeared ineffective from a student perspective.

Few students were in favour of the GCSE re-sit policy and proposed a more differentiated approach to improving their mathematics skills and qualifications. Views of current policy from students reflected their perceptions of having differing needs. They questioned the relevance of qualifications and some of the mathematics included in them. Students proposed that the focus should be on developing mathematics for specific vocational areas and GCSE becoming an option rather than mandatory.

In summary, these findings are in broad agreement with those of teachers and managers in the MiFEC case studies, although there are some important points of difference that signal areas for improvement:

- Students' reliance on the 'exchange-value' of the GCSE qualification as their primary source of motivation and their low rating of the usefulness of mathematics suggest that greater emphasis on the relevance of mathematics would lead to increased motivation.
- Managers and teachers gave the impression that the linking of mathematics to vocational or real life applications, especially through the practice of embedding into vocational learning, was common practice. Students themselves saw few connections, which suggests these practices need further exploration.
- The importance of addressing students' attitudes and emotional responses to mathematics was well evidenced by students and staff. There was general agreement about the approaches to teaching and learning that were most helpful, including the importance of the teacher-student relationship but students' preferences for greater use of student-centred approaches should be noted.
- Students found it difficult to understand some of the organisational systems that affected their learning experiences. Better understanding of these, such as the reasons why they are placed in certain groups, the purpose of initial assessment and the attendance monitoring processes would be empowering.

[12] Swan, M. (2006). Collaborative learning in mathematics: a challenge to our beliefs. Leicester: NIACE