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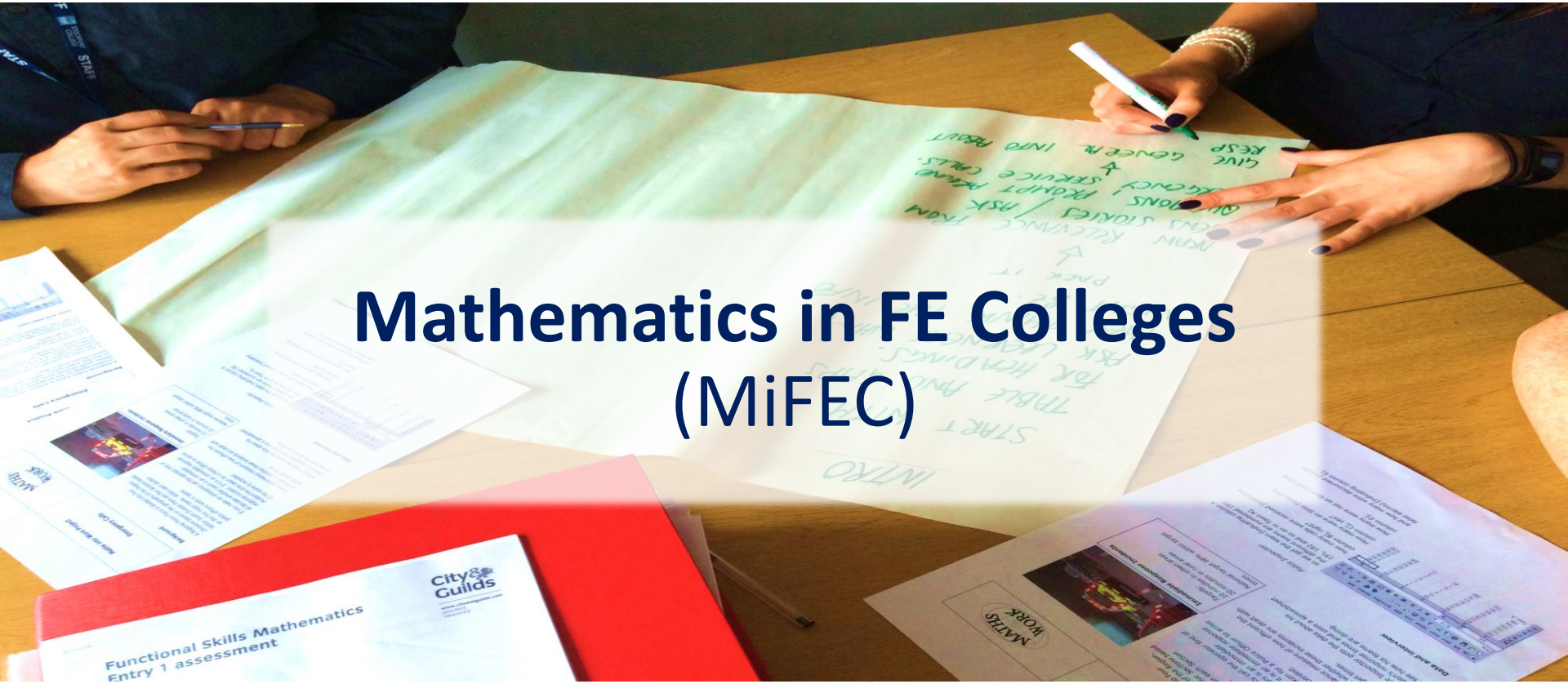

Mathematics in FE Colleges (MiFEC)

Andrew Noyes and Diane Dalby

NEU FE conference, London, 2018

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Mathematics in FE Colleges (MiFEC)

Sept 2016 – Nov 2019

Aims

The project, funded by the Nuffield Foundation, aims to produce evidence-based advice for policymakers, college managers, curriculum leaders and practitioners on how to improve mathematics education in England's Further Education colleges. The main focus is on provision for 16-18 year old students studying mathematics at Level 2 or below.

Approach

The project uses a mixed methods research design to explore the complex interplay between factors that directly or indirectly affect students' mathematical trajectories and outcomes.

A multi scale approach is used to investigate:

- the national policy landscape for mathematics in FE
- patterns of student engagement over time
- college level policy enactment and curriculum implementation
- teacher workforce skills and motivations
- learning mathematics in vocational contexts.

Four research strands

Work Package 1

A national policy trajectory analysis and literature review.

Work Package 2

Analyses of student progression over time (using the ILR and Next Steps survey).

Work Package 3

Six main case studies of colleges in 2017/18.

24 additional college case studies in 2018/19.

Work Package 4

A survey of the mathematics workforce in FE colleges.

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Work package 1: Policy and literature

How has FE mathematics policy and practice been shaped since c. 2000? What lessons can be learnt to improve the design of policy in the future?

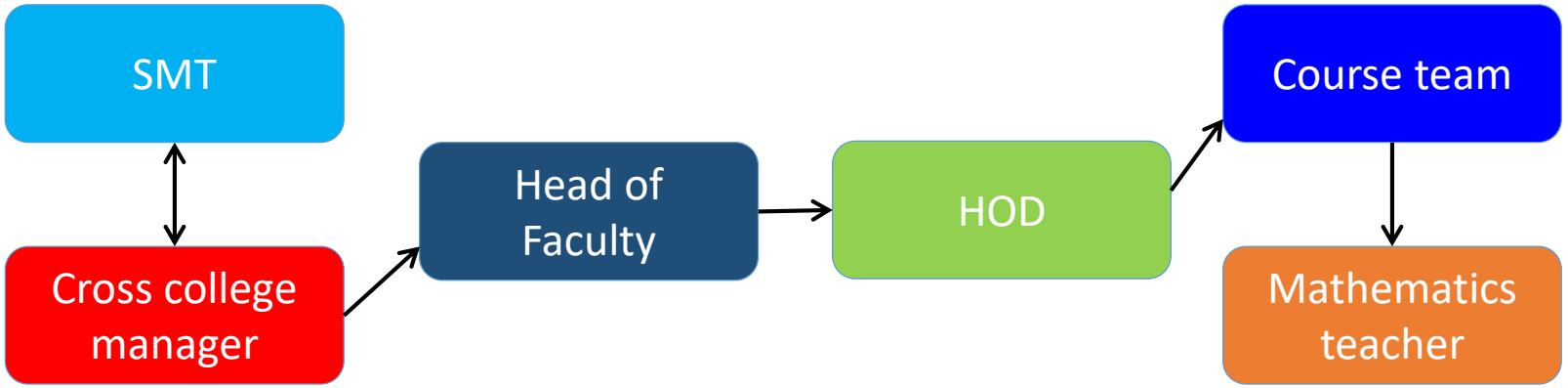
Emerging issues

- Reports that have influenced mathematics in FE include some about more general aspects of FE as well as those specifically about 16-18 mathematics or adult mathematics.
- Funding, governments and ministers are also factors for consideration.
- The origins of influential reports vary over time.
- The flow of ideas from ‘report’ to practice, research to policy, etc. is of particular interest.

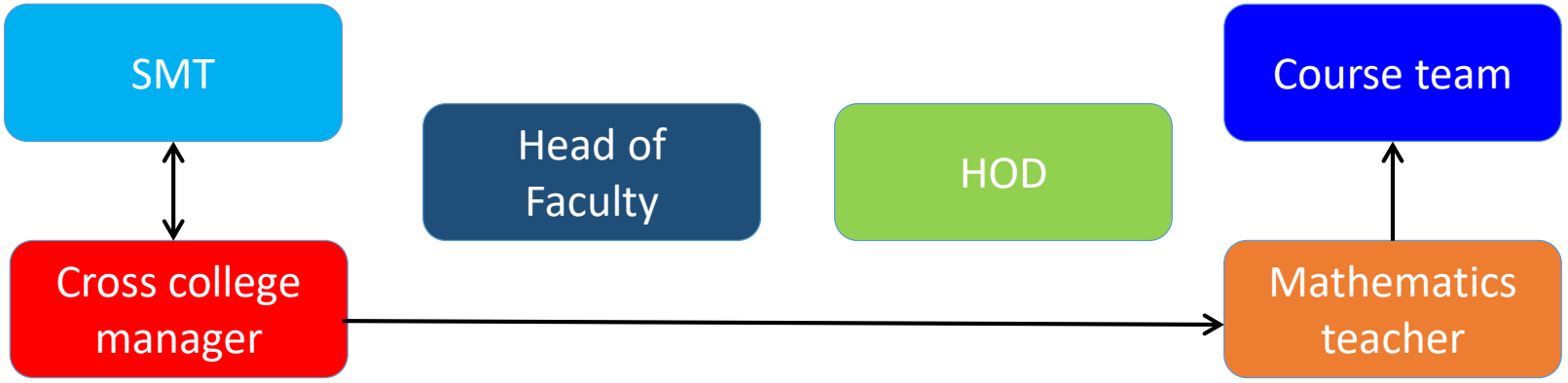
2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Labour: Tony Blair; Gordon Brown (July 2007)	Labour: Gordon Brown	Labour: Gordon Brown	Labour: Gordon Brown; Coalition: David Cameron (May 2010)	Coalition: David Cameron	Coalition: David Cameron	Coalition: David Cameron	Coalition: David Cameron	Coalition: David Cameron: Conservative: David Cameron (May 2015)
Alan Johnson/Ed Balls (July 2007)	Ed Balls	Ed Balls	Ed Balls/Michael Gove (May 2010)	Michael Gove	Michael Gove	Michael Gove	Michael Gove/Nicky Morgan (July 2014)	Nicky Morgan
2007 Further Education and Training Act	2008 Education and Skills Act		2010 Children, Schools and Families Act	2011 Education Act			2014 Children and Famiies Act	
2007 Green paper, Raising expectations: staying in education and training post-16.								
2007 July Leitch World Class Skills		2009 November BIS Skills for growth: the national skills strategy		2011 March Wolf Review of vocational education	2012 October Lingfield Professionalism in Further Education	2013 DfES Payne Choice at the end of post compulsory education	2013 October BIS International survey of adult skills	2014 September BIS Report on Numeracy
2007 November Queen's speech Intention to raise school leaving age to 18				2011 BIS. Skills for Life Survey.	2011 December Employer ownership of skills pilot: our vision. UKCES	2013 March Employer ownership of skills: Building momentum. UKCES	2013 April CESC From GCSEs to EBCs: the Government's proposals for reform	2015 July CESC Apprenticeships and traineeships for 16 to 19 years olds.
				2011 DfE Government response to Wolf report	2012 April CESC Great teachers - attracting, training and retaining the best		2013 September Ofsted Inspection framework (new)	March 2015 AoC Inspection and FE colleges
				2011 CESC Participation by 16-19 year olds in education and training				
				2011 August Vorderman A world-class mathematics education for all our young people				
				2011 July CESC The English Baccalaureate				
2006 November NRDC Embedding literacy, language and numeracy	2008 July NCETM The organisation of mathematics in colleges	2009 June Nuffield Review of 14-19 Education and training	2010 Nuffield Values and variables	2010 October BIS FE and Skills STEM data report (RAE)	2011 November NIACE+ A dynamic nucleus, colleges at the heart oftheir communities	2013 March CAYT (Crawford & Cribb) Reading and maths skills at age 10 and earnings in later life	2014 March ETF Strategic consultation: Maths and English report	2014 November UKCES Employer perspectives survey
	2008 Education for All: final report of Nuffield Review of 14-19 education and training		2010 OECD The high cost of low educational performance	2011 April Ofsted A good numeracy teacher.	2012 April Ofqual Review of functional skills standards in mathematics	2013 Sutton Trust (Hodgen & Marks) The employment equation	2014 March ETF Strategic consultation: Maths and English report	2014 December ETF Effective practices in post-16 vocational maths

Policy enactment in FE colleges

Example 1



Example 2



Discussion 1: Change over time

Think about the changes related to mathematics provision that you have experienced in FE over the last 5 years, at three levels:

1. Personal (e.g. job, role)
2. College (e.g. strategies, structures)
3. Policy (e.g. government directives, funding, accountability and performance measures).

Construct a timeline to show where key changes have occurred and add comments on the impact.

Example

	2012/13	2013/14	2014/15	2015/16	2016/17
PERSONAL	Teaching Performing Arts. Took part in embedding maths project.	Started teaching one session a week of functional maths.	Increased this to 4 sessions.	Did additional training to start teaching GCSE.	Full timetable of maths, mainly GCSE. Change of college team and site.
COLLEGE		College restructuring. Poor Ofsted inspection. A lot of maths staff left.	College changed maths exam board to try and improve results.	College merger announced. Threat of redundancy.	Restructuring. Moved to newly created Faculty maths team.
POLICY		Students without grade C had to continue studying maths.			GCSE re-sit compulsory for grade D students

Influenced decision to train for GCSE maths

College short of maths teachers

More students taking maths in college

Big increase in GCSE numbers

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Work package 2: Student progression

Who attains what mathematics qualifications in FE and how has this changed over time? What are the relationships between prior attainment, FE mathematics outcomes and life experiences at age 25?

Emerging issues

- Good data is available from NPD, ILR and Next Steps but there are some challenges, e.g. changes in variables within the ILR over time.
- A cohort approach helps understand changes over time.

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Examples of student pathways

Example 1: (2012-14) Student on Public Services course (Level 3)

Year in FE	1	2	3
Mathematics studied	Level 1 functional mathematics	Level 2 functional mathematics	GCSE mathematics

Example 2: (2016-18) Student on Animal Care course (Level 1)

Year in FE	1	2	3
Mathematics studied	Entry level functional mathematics	Level 1 functional mathematics	(GCSE mathematics)

- Varying government and college policies have significant effects on students' post-16 mathematics pathways.
- Students may also learn specific vocationally-specific mathematics within their main study programmes, although they often do not see this as mathematics.

Work package 3: College case studies

- How do FE colleges mediate post-16 mathematics policy?
- 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 unintended consequences of policy upon classrooms?

Emerging issues

- Inconsistencies in the national data available to select a sample of colleges.

Main case studies

Visits to all six main case study providers have been completed for 2017/18, involving 14 days of visits across the country. A further 24 providers have agreed to be additional case studies and will be visited during 2018/19.

No of colleges visited	No of sites visited	Number of interviews				
		College principals or CEOs	Senior managers	Other managers overseeing maths	Staff teaching maths	Vocational staff
8	13	6	4	17	39	14

To date, 73 interviews have been conducted and 23 student focus groups, involving a total of 130 students. Colleges have completed a staff audit, data summary and provided other documents relevant to the study.

Emerging theme 1

A trend away from Functional Mathematics towards GCSE.

The main driver for this is the growing importance of the mathematics progress measure, as opposed to a singular focus on percentages crossing the Grade 4 threshold.

This is compounded by the increased difficulty of Level 2 Functional Mathematics and its unsuitability as a stepping stone to GCSE. There is concern, however, about students experiencing multiple failures with more colleges moving to enter those having attained Grade 1 and 2 for GCSE mathematics rather than taking functional mathematics.

Emerging theme 2

(In)stability in the college mathematics teacher workforce

Many colleges have difficulty recruiting mathematics teachers but those with effective strategies to achieve workforce stability see multiple benefits:

- Stable workforces can develop collective approaches to planning;
- CPD has clearer, sustained effects on quality;
- Students respond negatively to changes in staffing and value continuity.

Current strategies to achieve stability include financial incentives and 'grow your own' schemes, in which staff from other college areas (e.g. vocational, student support) are re-trained to teach mathematics.

Emerging theme 3

A whole college approach

Mathematics provision seems to be more effective when:

- senior managers are actively involved, investing time and financial support to overcome problems;
- where vocational areas share responsibility for mathematics provision, e.g. by encouraging embedded approaches and taking an active role in monitoring attendance.

Emerging theme 4

Use of meaningful and relevant data to inform decision-making.

Many colleges take a ‘try it and see’ approach towards:

- strategic decision-making for mathematics provision;
- choices concerning teaching and learning.

Those who collect meaningful data and use it to inform their decisions have more confidence that their approach is meeting student needs. Whether this leads to more effective strategies and outcomes will be explored through further analysis of available data.

Emerging theme 5

Tensions between teacher-centred and student-centred approaches.

Mathematics teachers consistently identify students' needs as both cognitive and affective, highlighting:

- The need to engage and motivate students.
- The need to help students develop more positive attitudes to mathematics, overcome anxiety and build confidence.
- The need to develop sound conceptual understanding and fluency with basic mathematical operations.
- The need to develop good examination techniques.

Discrepancies between these identified needs and student perceptions of classroom teaching are evident. Students' views suggest much teaching is teacher-centred and has changed little over time.

This mismatch may be attributed to multiple contextual factors that affect teachers' decisions and the transience of the teacher workforce.

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Work package 4: Mathematics teacher workforce

Who is teaching post-16 maths in FE now? (to include roles, responsibilities, knowledge and skills). What FE mathematics training and development needs exist now and will be needed in the short to medium term?

Emerging issues

- There is little reliable national data on the FE mathematics teacher workforce.
- Pathways into teaching mathematics in FE colleges are very varied.
- The reasons why people are teaching mathematics in FE colleges and how long they intend to stay are unclear.

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Survey of mathematics teachers in FE

General background: some general background data will be requested including gender, age group and mode of employment.

Teaching experience: pathways into teaching mathematics in FE colleges; professional experience; general teaching experience; specific mathematics teaching experience; previous employment and reasons for becoming a mathematics teacher in FE.

Teachers' roles and responsibilities: teaching hours; additional responsibilities and the key elements of daily work.

Changes over time: changes in employment; expected changes in workload and employment; teacher satisfaction.

Training and PD: teachers' mathematics qualifications, teaching qualifications; professional development; possible skills needs.

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Discussion 2: Professional development

We are interested in the impact of professional development (including teacher training courses) on mathematics teachers and students.

Try completing the survey questions provided and discuss:

1. What professional development has had the most impact on you and your teaching?
2. Why has this been effective?

Final question

Bearing in mind the changes you have experienced over the last 5 years and the professional development you have received:

- What needs to change now?

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Further information about the project is available at http://www.nottingham.ac.uk/research/groups/crme/projects/mifec/index.aspx

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