

A photograph of a meeting table with several people. A large white sheet of paper is spread across the table, with handwritten notes in green and blue ink. The notes include 'INTRO', 'START', 'TABLE AND...', 'FOR HANDLING', 'ASK LEADERS', 'MEAN RELEVANCE FROM', 'GIVE STORIES / ASK', 'QUESTIONS / REPORT RESULTS', and 'GIVE GENERAL INFO ABOUT'. There are also printed documents on the table, including one from 'City & Guilds' titled 'Functional Skills Mathematics Entry 1 assessment' and another with 'MATHS WORK' and a table. A person's hand is visible holding a green marker, and another hand is pointing at the whiteboard.

Mathematics in FE Colleges (MiFEC)

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BSRLM Conference, March 3rd 2018

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Aims

The project 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 (Tashakkori & Teddlie, 2010) to explore the complex interplay between factors that directly or indirectly affect students' mathematical trajectories and outcomes.

A multi scale approach (Noyes, 2013) will 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.

A logic model (Funnell & Rogers, 2011) will be used to explore the key issues framing mathematics education in FE colleges.

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 'light touch' college case studies in 2018/19.

Work Package 4

A survey of the mathematics workforce in FE colleges.

WP	Research Questions
1	<p>How has FE mathematics policy and practice been shaped since c. 2000?</p> <p>What lessons can be learnt to improve the design of policy in the future?</p>

Emerging issues

- Reports that have influenced mathematics in FE include some about more general aspects of FE, or adult mathematics as well as those specifically about 16-18 mathematics.
- Funding, governments and ministers are also factors for consideration.
- A number of key reports were published in 1997/8 so this is used as starting point. Other periods of significant activity and change are being highlighted for closer study.
- The origins of influential reports vary over time.
- The flow of ideas from 'report' to practice, research to policy, etc. is of particular interest.

YEAR	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Government							
Government reports: general & mathematics			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	
			2011 BIS. Skills for Life Survey.				
			Government response to Wolf report				
Other reports: general & mathematics	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 of their 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
		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
			2011 April Ofsted Tacking the challenge of low numeracy skills			2014 AELP & ETF English and maths in apprenticeships	2015 Feb NIACE Engaging learners in GCSE english and maths
			2011 January CEE Crawford Meschi & Vignoles Educational choices and institutional value			2014 C&G Sense and instability, three decades of skills and employment policy	2015 March ETF Making maths and English work for all
			2011 June ACME Mathematical needs summary				2015 August PE Porter Crossing the line
			2011 NIACE Numeracy				2014 Nuffield

WP	Research Questions
2	<p>Who attains what mathematics qualifications in FE and how has this changed over time?</p> <p>What are the relationships between prior attainment, FE mathematics outcomes and life experiences at age 25?</p>

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.

NPD/ILR

- The National Pupil Database (NPD) provides baseline GCSE and social data.
- Individualised Learner Record (ILR) is linked, for the following three years, for each GCSE cohort.

NPD base data	ILR data								
GCSE year	2008	2009	2010	2011	2012	2013	2014	2015	2016
2006	Next Steps Survey cohort								
2007	■	■	■						
2008		■	■	■					
2009			■	■	■				
2010				■	■	■			
2011					■	■	■		
2012						■	■	■	
2013							■	■	■



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)

- Different government and college policies have significant effects on students' post-16 mathematics pathways.
- Students also learn specific vocationally-relevant mathematics within their main study programme.

Next Steps survey

Next Steps, previously Longitudinal Study of Young People in England (LSYPE), follows a cohort of young people of the same age.

- 15770 born in 1989/90
- Study began in 2004 (aged 13-14) and has collected information about education and employment, economic circumstances, family life, physical and emotional health and wellbeing, social participation and attitudes.
- The most recent survey took place in 2015/16, when the cohort members were 25 years old.

WP	Research Questions
3	<ul style="list-style-type: none">• 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.
- Key factors for selection of case studies – college size, maths progress measure, number of ‘resit’ students, size of academic provision, latest Ofsted grade, region, type of locality.

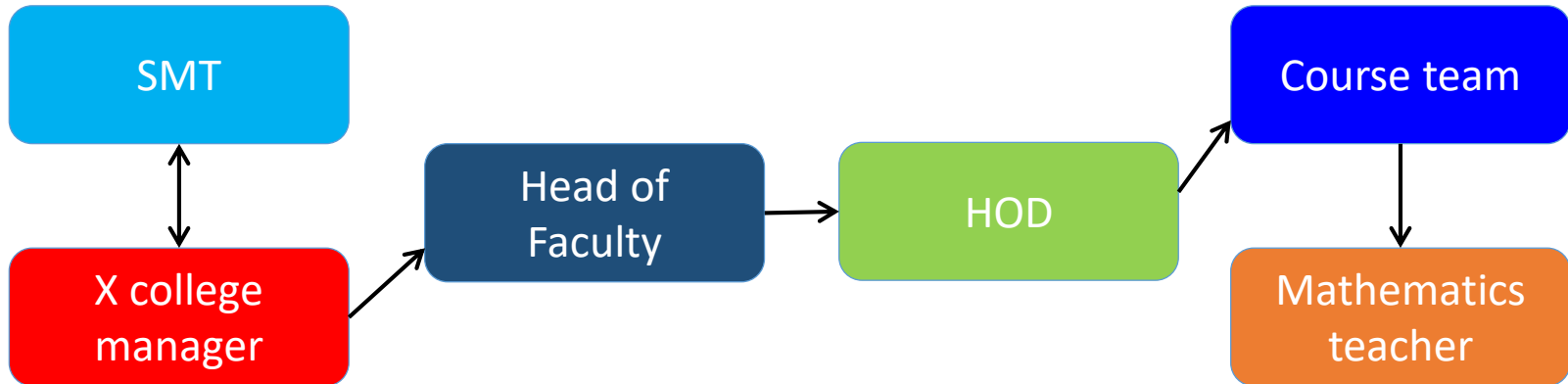
Case study data

	Per main case (6)	Per other case (24)	Other	Total (approx.)
Interviews:				
• College principal or vice principal	1			6
• Senior curriculum manager	1	1		30
• Manager with responsibility for mathematics	1-2	1		30 – 36
• Mathematics teachers	3-4	2		66 – 72
• Vocational managers	3	1		42
• Follow-up	1-2			6 - 12
Student focus groups (6-8 per group)	3			18
Survey	10-15	10-15	tbc	300 – 450

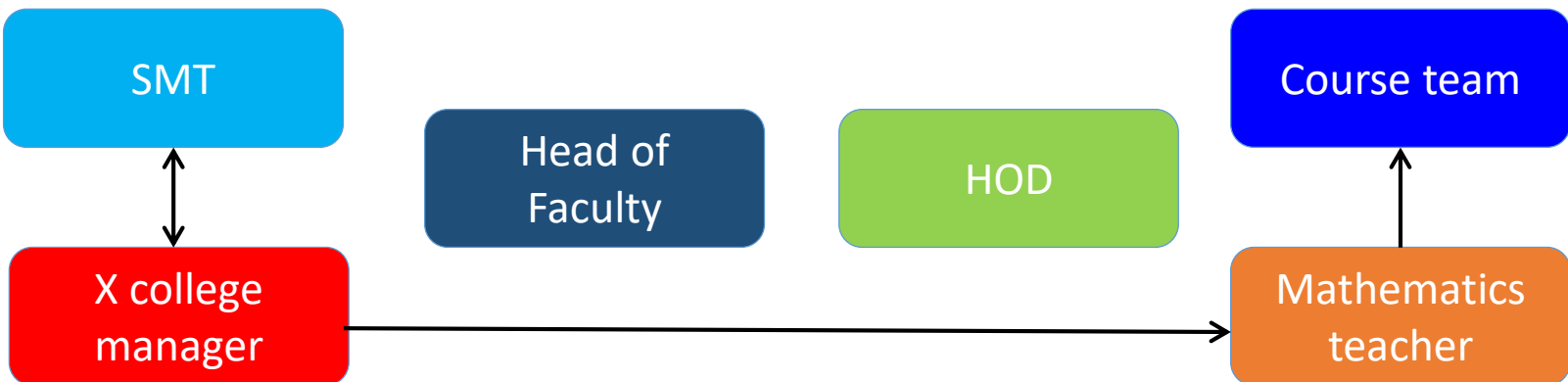
Examples of policy enactment

Example 1

(See Ball, MacGuire & Braun, 2014)



Example 2



Main case studies

Emerging issues for further investigation

- Extent to which the college takes a ‘whole college’ approach to mathematics.
- Commitment of senior managers to the ‘mathematics problem’ and the level of financial investment in mathematics.
- Stability of mathematics teaching team.
- Organisation of mathematics staff across multi-site provision.
- Use of data to inform decision-making processes.
- Sources and type of professional development available.
- Differences between teaching approaches used and student perceptions of ‘what works’.

WP	Research Questions
4	<ul style="list-style-type: none">• 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:

- The national shortage of mathematics teachers has a significant effect on the quality of the student experience in some colleges.
- There is considerable variation in the stability of the mathematics teaching teams in FE colleges, depending on the locality and college strategies for recruitment.
- 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.

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

Teachers' roles and responsibilities: their place in the college structure; their teaching hours; additional responsibilities and the key elements of their daily work.

Changes over last 5 years: how have mathematics teachers' roles in FE colleges have changed as a result of (policy) changes in the sector. This will include changes to workload, teaching approaches, curriculum and student learning.

Training and PD: teachers' mathematics qualifications, teaching qualifications and engagement in professional development to assess possible skills needs.



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