Maths as a gatekeeper – maths difficulties as a barrier to learning

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Introduction

In this session I will look at:

- The scale of adult maths difficulties
- Impact of low attainment/maths difficulties
- Maths as a gatekeeper
- Functional Skills in this context

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Adult Maths Difficulties

- The Sheffield Study (reported TES 2010a) found 22% of 16 to 19 year olds lack basic skills and are 'functionally innumerate'. **This percentage has remained the same for at least 20 years.**
- The Needs and Impact Survey (DfES, 2003) found 15 million (46%) of adults had Numeracy skills below Level 1. Only 18% achieved Level 2 in both literacy and Numeracy. 6.8 million (1 in 5) were below entry level 3 in maths.

cont.

- Stringer (1979) stated: "There are indeed many adults in Britain who have the greatest difficulty with ... adding up money, checking their change in shops or working out the cost of five gallons of petrol. Yet these adults **are not just the unintelligent or the uneducated** **...** some are very highly educated indeed, but they are hopeless at arithmetic and they want to do something about it."

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Charles – Brian Butterworth

- Butterworth (1999) describes 'Charles' who has a degree in psychology yet says he is unable to estimate his shopping basket prices, and can only do straightforward calculations on his fingers.
- "He couldn't tell whether 9 was bigger or smaller than 3 and had to use his fingers to work it out."

Impact of low maths attainment

- The CBI (2006) found, "weak functional skills are associated with higher unemployment, lower earnings, poorer chances of career progression and social exclusion."
- Parsons and Brynner (2008) went further, stating people with poor FS have worse physical and mental health, live in poorer accommodation, experience more family breakdowns and are more likely to be in trouble with authority.
- Cockcroft (1982) stated, "…mathematics could induce feelings of anxiety, helplessness, fear and even guilt".

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Maths as a gatekeeper

- Noyes (2007) argues, "[Mathematics] sacred position as the gatekeeper to many education, employment and life opportunities is now firmly established."
- Volmik (1994), agrees, "[mathematics] more than any other subject, has been cast in the role as an "objective" judge, in order to decide who in society "can" and who "cannot".
- The C/D GCSE borderline acts as a 'magical threshold' (Noyes 2007). This arbitrarily maintains a lower proportion of the cohort achieving the required grade and is an obstacle to future education and employment.

Student experiences

Paul

- Paul is retaking GCSE maths after being two marks off grade C. He is an Art graduate and wants to teach secondary school Art. He gets frustrated as it is two years since leaving University and he is still struggling to get through the 'gate'. He questions whether he needs Level 2 maths to be a successful art teacher. Will those extra two marks really make a difference?

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Student experiences

Ben

- Ben wants to study Plumbing but he is dyslexic and his maths and English results are weak. This year he did Fabrication and Welding Level 2 but his maths is still not at the level to allow progress to Level 3

Student Experiences

Haylie

- Haylie is hoping to progress to University but needs Level 2/GCSE maths

Activity

In pairs discuss:

In your experience

- Does maths act as a barrier to progression? Can you describe examples – students, family members …?
- How does maths impact on wider life chances and wellbeing?
- Should maths be a barrier?

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What are functional skills?

- OCR (2009) states, "Functional Skills are practical skills in English, Maths and ICT that help learners gain the most out of work, education and everyday life."
- Piloted from 2007 and became available in September 2010
- Part of the 14-19 reforms and a constituent of Foundation, Higher and Advanced Diplomas and Apprenticeships.

Tutor experience

J

- Lack of contextualisation with vocational study
- Some Universities may not accept FS – would GCSE be better?
- Harder to pass – therefore students are being entered for a lower level

L

- Likes FS maths as it tests real life skills
- But worried about amount of information to handle
- A test of maths or a test of organisation?
- Better than Key Skills that it replaces (this was a multi-choice paper)

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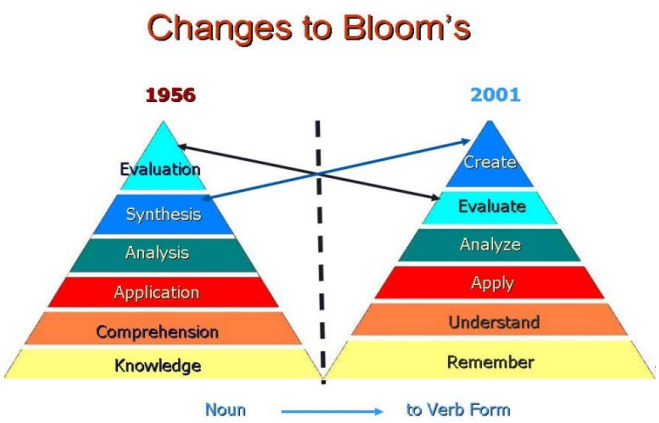
FS - Context

- QCA (2008) acknowledges, "the level of demand of mathematical activities increases when it is contextualised in 'real-life' scenarios."
- Consequently, the "level of mathematical skills and techniques ... are slightly lower than [equivalent] national curriculum levels."
- This suggests a slight dumbing down of the maths content given the tasks' higher cognitive demands.

Higher Order Thinking Skills Bloom's Taxonomy



Higher order thinking skills

Students earn marks by showing how they solve problems. The focus is on process skills - representing, analysing and interpreting. This language used suggests complex and abstract cognitive levels.

- 'explain solutions' (5th order of difficulty on Bloom's Taxonomy) is used at entry level 2;
- 'in an organised way' (5th) - level 1;
- 'draw conclusions', 'provide mathematical justification' (6th) - level 2.

This suggests there isn't the expected gradual increase in cognitive demands through the performance levels.

Pass rates FS

- OFSTED (2010) reported only a third of entrants passed the new Diploma courses following difficulties passing FS.
- Worryingly, OFSTED (2010) reports the take-up of Diplomas by learners with learning difficulties and/or disabilities was low. They reported, "Teachers considered level 1 FS were too hard for such learners who might otherwise gain a level 1 in the 'principal learning' ".
- Consequently, one could argue they are disadvantaged.

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Student experiences

- Anthony
- Jason

Discussion

In your college/setting:

- Experiences of Functional Skills (positive and negative)
- What is the entitlement for maths teaching and support?
- What qualifications are offered? Adult Numeracy/ Functional Skills/ GCSE/ Key Skills
- What advice is given on progression?

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Summary - questions

- Is achievement in maths, particularly at level 2, is a gatekeeper to progression?
- In the new FS - Are we increasing the difficulty and restricting progression?
- Are we assessing literacy and higher order cognitive skills rather than maths skills.
- Should we be barring skilled plumbers from the certification required to practise, or skilled Art students from becoming teachers.
- Are we inadvertently 'disabling' students?

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