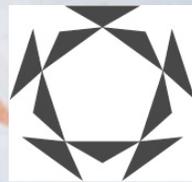


# Learning mathematics as developing identity in the classroom

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Von Neumann:  
'It's not a matter of  
*understanding* mathematics,  
it's a matter of  
*getting used to it*'

# Structure of my talk

- Introduction
- Review of research in our field
- Review of Bernsteinian work in our field
- Identity in late modernity
- Effects of policy on teachers' and pupils' identities
- Voice studies
- Mathematics teachers' goals

Develop a mathematical  
consciousness

But leave your life, ideas, and  
feelings at the door of the  
mathematics classroom



If the culture of the teacher is to become part of the consciousness of the child, then the culture of the child must first be in the consciousness of the teacher (Bernstein 1990).

In 1996 Stuart Hall said, “there has been a veritable explosion in recent years around the concept of “identity”, to which Zygmunt Bauman (2001) added “the explosion has triggered an avalanche.”

We have argued that, from the perspective we have developed here, learning and a sense of identity are inseparable: They are the same phenomenon.  
(Lave & Wenger, 1991, p. 115)

Contrasting mathematical  
*identity* with mathematical  
*subjectivity* (e.g. Dowling,  
2001)

Recent research project: The production and use of theories of teaching and learning mathematics

<http://myweb.lsbu.ac.uk/~lermans/ESRCProjectHOMEPAGE.html>

## Identities of researchers in an academic field

What we are interested in is to understand openings of the sub-field of mathematics education research to influences coming from the wider intellectual field, and by tracing any changes in the pattern of influences to analyse their consequences for how knowledge is defined; the latter taken to constitute the basis for identity formation.

## The focus on identity in education and educational research

- Children's lives:
  - Labels on clothing
  - Music
  - Sports teams and personalities
  - Religions, especially those with external signs
  - Social groups (cliques), ethnic/racial groups
- Studies of gender, ethnicity, social class etc.

## Theoretical climate in mathematics education research:

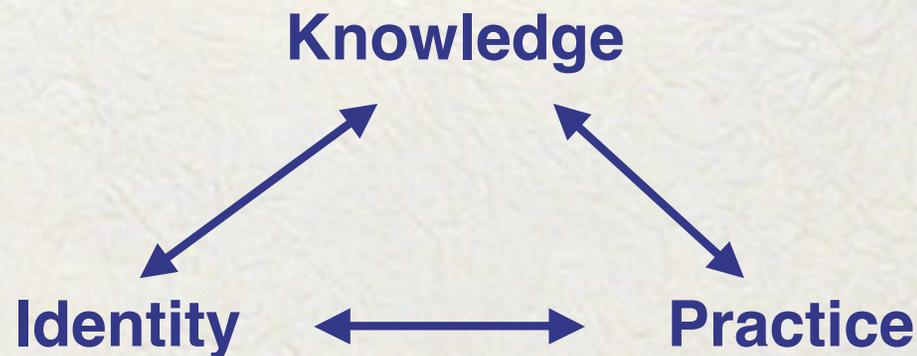
- Focus on mathematical thinking/competence
- Lave, anthropology, situated theories
- Ethnomathematics, cultural psychology, socio-cultural theories

## Within mathematics education:

- Boaler (1997)
- Boaler & Greeno (2000), drawing on Holland *et al* (1998): “They talked not about their inability to do the mathematics, but about the kinds of person they wanted to be – creative, verbal, and humane.”
- Boaler’s current study of a school using Elizabeth Cohen’s ‘Complex Instruction’

## Boaler (2002):

Some learners advance through the 'dance of agency' (Pickering, 1995), the interchange between human and disciplinary agency, others through a more passive relationship



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- Mellony Graven (2004), drawing on Etienne Wenger, (1998), a study of in-service teacher education
  - Mendick (2003)
  - Bartholomew (forthcoming)

- Mendick (2003)
  - “What [students] enjoy when doing mathematics is the identity work they do through it”
- Bartholomew (forthcoming):
  - “The identity work in which students are engaging, and the associated emotional factors, are implicated at all levels, not as a background which may facilitate or hinder mathematical achievement, but as an inevitable part of what it means to do mathematics and regard oneself as mathematical.”

# Identity/subjectivity

- Basil Bernstein, (2000) *Pedagogy, Symbolic Control and Identity*
- Post-structuralism: consciousness is an effect of signification
- Late modernity: doing the work of identity-as-self-determination

Cooper & Dunne (2000):

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1. Solve simultaneously:  $C + P = 90$  and  $2C + P = 145$

2. A drink and a box of popcorn together cost 90p. 2 drinks and a box of popcorn together cost £1.45

What does a box of popcorn cost?

In the second form of question one child answered:

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*I said to myself that in a sweetshop a can of coke is normally 40p so I thought of a number and the number was 50p so I add 40p and 50p and it equalled 90p*

Holland's (1981) research used the example of classifying foods. She found that middle-class students were more likely to classify them according to food groups - a school-based classification system - whereas working-class students were more likely to offer local classification systems, such as what would be offered as Sunday lunch.

Moreover, she noted that middle-class students were able to switch between codes when asked to offer different classifications, whereas this was not the case with the working-class students who tended to rely on local pedagogic codes.

## Morgan (1998) and Morgan, Tsatsaroni & Lerman (2002)

- Teachers' assessment practices in the context of written investigation tasks
- Using critical discourse analysis, Morgan focused on linguistic features of teachers' interviews to identify their *positioning* in discourses of assessment.

## **Morgan found 8 positions:**

- examiner, using externally determined criteria
- examiner, setting and using her own criteria
- teacher/advocate, looking for opportunities to give credit to students
- teacher/adviser, suggesting ways of meeting the criteria

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- teacher/pedagogue, suggesting ways students might improve their perceived levels of mathematical competence
  - imaginary naïve reader
  - interested mathematician
  - interviewee

Taking another look: developing a model based on two dimensions of *voice* and *forms of practice*, elaborated by two other dimensions, *specialised/localised* and *focus on absence/presence*

## Four positions emerge (in place of 8):

- Examiner: using externally determined criteria
- Examiner: setting his/her own (professional) criteria
- Teacher-adviser
- Teacher-advocate

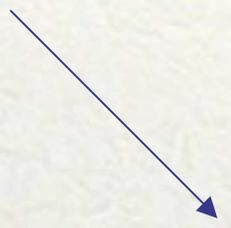
Power



Classification



Boundaries



Identities

Control



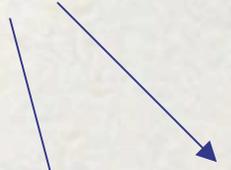
Framing



Curriculum

Pedagogy

Assessment



Boundaries



Identities

Traditional/performance  
model



Visible pedagogy

Teacher/textbook  
the authority

Supported by  
behaviourism

Liberal-  
progressive/competence model  
(reform)



Invisible pedagogy

Authority diffuse

Supported by  
Piagetian psychology

## The formation of *mathematical* identities?

- performance → competence → new performance
- Recognition
- Realisation

What should the student do when faced with the following question?

This is the sign in a lift at an office block:

**This lift can carry up to  
14 people**

In the morning rush, 269 people want to go up in this lift.

How many times must it go up?

## Extending the framework:

- Reflexive modernity
- Effects of education policy
- Voice

## Giddens, Beck, Lash, Bauman, etc.

- From traditional society to modernity to late modernity
- Has structure fallen away as a determinant of life choices?
- The project of the self?
- De-traditionalisation or re-traditionalisation?

## Social, localised identity

Basil Bernstein (2000):

Distinction between 'pedagogic identities' and 'local identities'

**TYPES**

De-centred

Retrospective

Prospective  
re-centring

**RESOURCES**

present

past

future

**MODES**

thera-  
peutic

instru-  
mental

gender

race

region

fundamen-  
talist

elitist  
(cultural)

religious

nationalist  
populist

# Performativity – Ball (2001)

- League tables
- OFSTED inspections
- KS tests
- Prescriptions of content and method, numeracy and KS3 strategies
- Continual packages of materials
- Language, e.g. delivery, targets, quality
- Performance indicators/pay
- Research Assessment Exercise (RAE)

“I don't have the job satisfaction now I had once working with young kids because I feel every time I do something intuitive I just feel guilty about it. 'Is this right; am I doing it the right way; does this cover what I am supposed to be covering...”

“My first reaction was 'I'm not going to play the game', but I am and they know I am. I don't respect myself for it; my own self respect goes down. Why aren't I making a stand?”

“I’ve never compromised before and I feel ashamed. It’s like licking their boots.”

“She was the only year 6 teacher at Trafflon and after criticism of their SATs results she resolved to go down the path of ‘improvement of results’. She changed her curriculum, and achieved her aim of getting the second best results the following year in her LEA. She justified this by saying that she was ‘now just doing a job’; and had withdrawn her total involvement to preserve her ‘sanity’. ‘The results were better because I acted like a function machine’.”

(Jeffrey and Woods, 1998, in Ball, 2001)

## Ball:

Self-regulation, but not of the panopticon. “Instead it is the uncertainty and instability of being judged in different ways, by different means, through different agents; the ‘bringing-off’ of performances – the flow of changing demands, expectations and indicators that make us continually accountable and constantly recorded.”

Pupils' own social lives are dominant for them, the social mores of their interactions have priority.

In contrast, and often in conflict, in the (mathematics) classroom we, as teachers, are concerned with imposing/encouraging a mathematical identity onto their already dominant (fragmentation) localisation of identity.

(the end of Shaun's first year at secondary school)

It's getting harder because like some boys, yeah, like a couple of my friends, yeah, they go 'Oh, you are the teacher's pet' and all that.

Right? What? Am I a teacher's pet because I do my work and tell you lot to shut up when you are talking and miss is trying to talk? And they go, 'yeah so you're still a teacher's pet'.

*Reay, (2002), p. 228*

*Mike:* It's a sort of a stigma ain't it? A quiet person in the class would be called 'gay' or summat. I was for a time 'cos I was fairly quiet in the classroom and for a while everyone was calling me gay.

*Kehily, (2001) p. 120/121*

## Researching 'voice' (Arnot & Reay, 2004)

- Unstoppable spiral of ever more fragmented voices
- Problem of the pedagogic relationship producing/regulating 'voice'
- Voice is the power to constrain and message (realisations) the potential to transform
- Not so easy to separate, voice is realised in message

## The formation of (school) *mathematical* identities - enculturation

- Performance → competence → new performance
- Recognition and realisation
- Children's lives in the classroom - alienation
- Language, e.g. re-voicing, Sfard's four features: words; visual mediators; discursive routines; relevant narratives
- Aesthetics, argumentation, reasoning, beauty
- Disciplinary agency
- Tools for researching discursive approaches in mathematics teaching and learning (Lerman, 2001)

Few studies look at the development of (mathematical) identities:

Waywood, and Borasi & Siegel on writing,  
Pimm on speaking

Looking to be systematic and 'rigorous' in research on developing mathematical identity, taking into account as many elements as possible, both to 'describe' and to observe.

Performative  
identity

Pedagogic  
identity

Social/localised  
identity

Mathematical  
identity

Identity expressed  
as voice/message

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