

The club that rejects me is the club I want to join: Identity, mathematics learning and mathematics education research

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A home is something we carry inside us. Those who do not have a home inside them cannot build one, either from defiance or from stone'¹

Identity comes out of an essentialist, teleological discourse; when I use the term 'identity', I don't mean it in that sense, I mean identity now, in a much more positional way, without any fixed origin. But nevertheless, what else can you say?²

This paper is a response to the rejection of a previous paper by an international conference³. That paper explored identity construction of and by learners of mathematics and the relationship of such identity construction with ideas of inclusion within a community of mathematicians. I am interested that this paper was rejected by reviewers as not relevant to an audience of mathematics education researchers. So here I problematise the notion of success and failure and suggest that what has previously been seen as 'failure' to learn mathematics may be a facet of the inadmissability of certain 'identities' in the normed make up of 'successful' mathematicians. I also mirror the ways in which identity construction can lead to exclusion from a community of learners called mathematicians with the identity construction of mathematics education researchers and the boundaries which are placed on the reporting of such research. The conclusion of the paper calls for a more inclusive and participative view of both our mathematics classrooms and our mathematics education research community. I also wonder if we can have one without the other.

Introduction

Recent work by Jo Boaler, Dylan Wiliam and Robyn Zevenbergen has allowed us to move away from a purely psychological theory of identity when viewing

¹ This quotation is taken from Ivan Klima's novel "Waiting for the dark, waiting for the light." You will notice that throughout the paper I have inserted endnotes in preference to referencing in the text. This is a deliberate attempt to shift my style of writing from that of an academic addressing an audience from a position of authority to one of a co-researcher initiating dialogue.

² Hall, S interviewed by Chen Kuan-Hsing in Morley, D and Chen Kuan-Hsing (1996) *Stuart Hall: Critical Dialogues in Cultural Studies*. Page 393.

³ I must thank the reviewers who rejected the paper. Their comments have proved useful in formulating the ideas which I present here. Unfortunately as these reviewers were anonymous I cannot thank them in person and have been unable to continue the debate with them in person.

mathematics classrooms⁴. They take a sociological approach and view learning as a social process. In this way we begin to see schools and their classrooms as communities of practice⁵. Such communities of practice consist of social processes and shared experiences which play a part in the identity formation of those people engaged in a particular practice. Here identity cannot be seen as fixed but is constantly shifting and dependant on the particular ‘community of practice’ which is prioritised at any particular moment. These communities of practice can operate to exclude both individuals and practices which are defined as outside the ‘norm’. This paper focuses both on mathematics classrooms, and the international mathematics educational research community and the ways in which these communities may be identity exclusive for some facets of individual identity.

Success as a mathematician can be seen as induction into a community of practice. Wiliam, Boaler and Zevenbergen suggest,

It is through the practices in a community of practice (ie secondary school mathematics) that students develop a coherent sense of what it is to be a member of that community. Students attempt to make sense of that community, and in so doing, develop a sense of self in relation to that community of practice. For some students, there is a greater synergy and sense of belonging whereas for others, there is a sense of rejection and hence little sense of identity within the community of practice.⁶

We can conjecture then that for those students for whom there is little sense of belonging and a lack of sense of identity, or facets of an identity, within the community of practice which makes up secondary mathematics education there is greater danger of exclusion from that community of practice. Indeed I would argue for another community of practice which consists of such groups of failure. Those for whom mathematics itself is seen as difficult, complex and the learning of it unattainable. Those who may describe themselves as a member of such a community through the phrase ‘I was never any good at maths at school’. It may be that boys are over represented in such a community of practice. This is mirrored in the research community and we see alternative communities of practice debating the ‘validity’ and ‘generalisability’ of their chosen research paradigms.

⁴ Boaler, J, Wiliam, D, Zevenbergen, R. (2000) The construction of identity in Secondary Mathematics Education in Matos, J and Santos, M (Ed) *Proceedings of the Second International Mathematics Education and Society Conference*. Universidade de Lisboa.

⁵ See Lave, J., and Wenger, E.(1991) *Situate Learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press and Wenger, E. (1998) *Communities of Practice: Learning, meaning and identity*. New York: Cambridge University Press.

⁶ Boaler, J, Wiliam, D, Zevenbergen, R. (2000) The construction of identity in Secondary Mathematics Education in Matos, J and Santos, M (Ed) *Proceedings of the Second International Mathematics Education and Society Conference*. Universidade de Lisboa. Page 195.

Mathematics learning and research has a particular place in this debate. Mathematics learning at school plays a part in the construction of individuals through feelings of belonging and exclusion. A feeling of belonging to the community of mathematicians can empower individuals and groups of individuals to make interpretations of reality and to construct alternative models of reality⁷. This may support us in challenging injustice within our everyday lives and within those communities which we build outside the context of school. Alternatively a feeling of exclusion from the community of mathematicians can lead to individuals blaming themselves for future injustices. "The situation is my fault - I didn't try hard enough in school."⁸ Another important factor when exploring any issue which takes as a reference point mathematics education is that mathematics qualifications have a significant affect on the viability of individual life plans⁹. Put simply, we are more likely to earn more later in life if we are 'successful' in school mathematics than if we 'fail' in mathematics at school.

The paper develops through an extended vignette which defines my theoretical view of identity formation as both a personally construct and a response to social context. I then use extracts from classroom observations to illustrate how a 'normed' view of mathematics learning can be formed and how this can operate to exclude particular groups of learners. This is followed by a personal reflection to illustrate how the same process is operating within the community of mathematics education research. Finally I move to suggest that there are criteria around which alternative communities can be formed that would offer identity inclusive classrooms and research communities.

I deliberately take an overtly personal standpoint throughout the paper. This approach is influenced by critical psychology particularly the work of Valerie Walkerdine.

We ... need to construct new and different narratives which recognise specific practices, which see the place of these stories in the construction of us all. After all, if I can move from being a 'plodder' to being a 'professor', there have to be some different stories to tell, stories which do not universalise one thing only to pathologise the majority of the world's population.¹⁰

⁷ Fischer, R (1993) Mathematics as a Means and as a System, in *Math Worlds - Philosophical and Social Studies of Mathematics and Mathematics Education*, Restivo, S. Van Bendegem, J.P. and Fischer, R (Eds.). State University of New York Press, Albany. Pages 113-134.
Fischer, R (1993), Mathematics and Social Change, in *Math Worlds - Philosophical and Social Studies of Mathematics and Mathematics Education*, Restivo, S. Van Bendegem, J.P. and Fischer, R (Eds.). State University of New York Press, Albany. Pages 197 - 218.

⁸ Apple, M. (1982), *Education and Power*, London, Routledge, Kegan and Paul Ltd. Page 59.

⁹ See page 42 in The Commission on Social Justice, (1994), *Social Justice, Strategies for National Renewal*. London, Vintage.

¹⁰ Walkerdine (74)

Identity formation: James's story.

I had passed the 11+¹¹ and had to travel to my grammar school from the London borough in which I lived. On my first day at school I realised that everyone else seemed to know a whole group of friends. I seemed to be the only one who didn't have such a group of friends. However I slowly began to become a part of a group of 'outcasts'. This particular grouping took place through bus routes. In fact, some of the group radically altered their travel routes so that after a while we were all travelling into school together. The group grew closer and closer, doing everything together and gaining a reputation for being troublemakers. I remember the head of the first year calling us all into his office to tell us that this was the first time he had ever had such problems with a group of pupils. We took a pride in this label and tried to live up to it. We even christened ourselves 'The Magnificent Thirteen'. There was never any space for new members. We were a closed group with a strict code of indiscipline.

The group gave me the security I needed for a while but eventually I wanted more. I remember that for once I found myself concentrating in class. As I listened to the teacher questioning the group I realised that I knew an answer. I was suddenly forced to make a decision. As a member of 'The Magnificent Thirteen' I had taken our set of vows. One of these pledges was that we would never answer a question in class. But for some reason, on this occasion, I wanted to answer. I took the plunge and answered, correctly. It was almost as if the teacher sensed change, as if she visibly relaxed. However, as soon as I answered I looked back down at my desk – I dare not meet the gaze of any other member of 'The Magnificent Thirteen'. When we left class all hell broke loose. I was teased and ridiculed: it was as if I had betrayed a trust, as if I had changed sides.¹²

In the above vignette James is both constructed through the context in which he is placed and through which he develops, and simultaneously constructs a space in which he can make choices. It is not so simple as to say that the classroom context predicts and produces the practices that occur. Rather here the identities and practices constitute the very context within which they become practices and identities. This is not to dismiss notions of identity. Rather I am trying to emphasise the ways in which we both construct personal identity and are constructed by the contexts in which we find ourselves. I want to explore here the way in which identity is constructed in contrast to perceived otherness. For example as a boy I construct myself as 'not female', similarly if I feel removed

¹¹ This was a state examination taken at the age of 11 to determine the secondary school which children would attend. Passing the 11+ allowed access to academic 'Grammar Schools' with the expectation that this would lead onto a university education. Other children attended secondary modern schools with the expectation of a career in manual trades as a result. The 11+ has been abolished in most English schools for over 25 years although some education authorities still continue with the practice.

¹² Cotton, T (Ed) (1998) *Thinking about Teaching*, Hodder and Stoughton: London. Page 63/64.

from the community of mathematicians I construct my identity as ‘not mathematician’.¹³

The tension present in James’ Story is described by Zizek¹⁴ as the relation between the ideal ego and the ego-ideal. This is also seen as the operation of ‘imaginary identity’ and ‘symbolic identity’. Imaginary identity is the image in which we can ‘like’ ourselves. Symbolic identity is the view of ourselves from an outside observer. In James’ case above his decision to answer the question shows a battle with his imaginary identity; member of the magnificent thirteen, not co-operating with school, and his symbolic identity as perceived by the teacher. Through answering the question he removes one of the differences which have constituted his identity. This in turn means rejection from the group at first but later a re-negotiation of the group identity takes place which redefines the ‘rules of membership’ for the group.

For me the clearest articulation of such a construction of identity is given by Morwenna Griffiths¹⁵. Her image of self-identity is as a web. As we construct this web we are partly in control of its development and at times at the mercy of the contexts in which we build our web of identity. Such a web is individual yet only develops through membership and ‘belonging’ to a range of communities, indeed it is the nature of the membership which defines and redefines such communities. For Griffiths the concept of community includes both personal communities and the wider society. The experience of acceptance and rejection so clearly stated by James cannot be separated from the structures of power and the political context in which he found himself.

The next section of the paper explores the ways in which the ‘rules of membership’ of the community of learners of mathematics are formed in school. The data I use is drawn from 2 years research with a focus group of pupils as they moved between primary and secondary education¹⁶. The pupils I worked with all attended the same primary school in a midlands city and kept journals during their last year in primary education. Having worked alongside their primary teacher I followed the 6 of the pupils into 4 different secondary schools in the same city. I observed each pupil on 8 occasions during their first year in secondary education and we met as a focus group on 3 occasions.

Identities in the classroom, identities of the classroom.

Let me open with the observational note which first raised for me the question of the ways in which pupils import personal social practices into their mathematics classrooms.

¹³ See Di Stefano, (1991) ‘Masculine Marx’ in Shanley, M.L. and Pateman, C. (Eds) *Feminist Interpretations and Political Theory*. Cambridge: Polity Press.

¹⁴ Zizek, S. (1989) *The Sublime Object of Ideology*. London: Verso Books.

¹⁵ Griffiths, M (1995) *Feminisms and the Self: The web of identity*. London: Routledge

¹⁶ Cotton, T. (1998) *Towards a Mathematics for Social Justice*. Unpublished PhD. Thesis.

7/10/96 Imran and Lee involve themselves in a conversation about the weekend, during the conversation Imran flicks backwards and forwards in his exercise book. After four minutes Lee gets up to collect the cubes which they both need to make a start. On the opposite side of the room Rupa and her friend quickly settle and quietly work through the work sheets, occasionally having conversations not related to their work but which do not seem to distract them from filling in answers in their exercise books. They remind me of people engaged on a production line in a factory. They are working on an undemanding task and spend the time simultaneously carrying out the task and socialising.

As I noticed this line of thinking developing I was drawn to another extract from my journal.

Rupa follows her friend as if attached. She collects the same worksheet as her only seconds after her friend has collected one. She follows her up to the teacher to find out the answer to the question "Shall we draw the cubes. By listening in to the conversation between her friend and the teacher.

There were many occasions during my observations of the girls in my research group when this way of working with a partner was evidenced. There were also many references in girls' journals to the importance of 'best friends' and the genuine hurt and unhappiness when there are problems in such friendships. I reread the journals with this in mind and found that 8 pupils regularly mentioned a best friend that they were working with in some way, either positively, as for example, " On Friday I am going to the theatre and my partner is" or more often when there was a problem, "I am sad because Gemma is moving house so I'm always talking about it when I'm supposed to be working," or, "Yesterday Katy went to Cambridge and I was quite bored." It is worth noting that out of the 8 pupils who mentioned friendships in their journals, seven were girls.

This way of socialising clashed with my observations of the boys at this school and would seem to suggest that their friendships operate in different ways. Rather than having a particular friend with whom they sit and spend a large amount of time they spend time making social calls, taking in several friends, for example, again in the same lesson,

Another male friend moves to join Lee and Imran - again a social call. He is on his way to exchange worksheets

and later

Imran moves over to his mate's desk and checks some answers with him.

I noticed similar behaviour in Kenny's lesson.

25/10/97 Kenny comes over to ask me what I will be doing in the lesson. He engages in a conversation with a girl sat across the room from him about East Enders on his way to collect some equipment. The atmosphere can again be likened to a production line - on the whole heads down getting on with a task, yet the task is such that it allows conversations which are not about the task to continue. There is also a feeling of the rewards being similar to piecework. Someone shouts to the teacher, "I am already on question 5." Kenny is not taking any notice of the football conversations to his right - however as I watch he chats

to the lad sitting in front of him on his right. His conversations are not limited to one or two people, he quickly makes many links with pupils sat all around him and even across the classroom

For me these unconscious habits show how we carry our social behaviours into the classroom. Ways in which cultural capital evidences itself in ways of working, and of course these ways of working occasionally coming into direct conflict with expected behaviours from teachers. Cultural capital can be seen as the ways in which aspects of certain pupils culture is acknowledged as an accepted way of learning, or responding to school. In this way success is linked to the identities which pupils develop outside school and bring with them into school - the ultimate reward being academic success. In this way cultural capital is transformed into educational capital which can be cashed in at a later date for employment and economic capital. However in a similar way, pupils who bring with them aspects of identity which clash with school imposed norms do not have access to this same transfer of cultural capital to economic capital. Working in pairs, as exhibited by the girls at Fieldview fits an accepted norm, certainly for the early years in secondary school. Collaborative work is acceptable - making social calls to breaks up the humdrum of everyday existence is not. In the lessons I observed the view of mathematics being presented by the teachers was not that of a mathematics as a social activity - yet many of the behaviours I observed had the feel of a social activity.

In contrast, even though the mathematics clearly did not demand concentration for the whole of the time pupils reported worries when they were prevented from 'working' through activities which they interpret as peripheral to the core curriculum. For example at the Primary School the school play was a very important part of the school year. 9 pupils mentioned it as something they were proud of being involved in, but it was also a worry to 3 other pupils as it fell at the same time as a national high stakes assessment (the SATs or Standard Assessment Tests¹⁷). They write

We have been coming in and out for Billy rehearsals so I can't finish anything off.

I've really enjoyed being in the play and like I say I have not got time to do all of my work like my maths.

I need to do some of my HBJ (Maths) because I have not done any because there were so many rehearsals for Billy so I hope Karen doesn't get cross with me but Katy hasn't done any either.

I suggest that here some of the pupils are beginning to interpret what is needed to gain acceptance to the community of practice which is mathematics. They are prioritising particular areas of the curriculum, here mathematics, over other areas, here the school play. This clearly represents an understanding of the

¹⁷ These are national tests which are used to measure success and failure both of individual pupils and of schools and teachers through public reporting in the media.

different 'values' placed on different areas of the curriculum by national assessment regimes.

Another way I observed pupils developing their identities as mathematicians was through the mimicking of social behaviours in the classroom outside the classroom, or redefining a part of home life as pseudo-school. Although this may be beneficial for pupils in terms of developing an identity which offers inclusion the community mathematics. This of course may not be beneficial in terms of developing a breadth of experience outside school, or valuing those experiences which are unique to home and not experienced at school.

The pupils kept their journals during school holidays and this data shows how the life that these pupils had chosen to write about in their journal mimicked the day to day routine in school. For example in Jenny's journal she writes

Saturday : On Saturday I read Alice in Wonderland. I read 19 pages until 8.45. It is a good book I think.

Sunday : On Sunday I did some of my HBJ (Maths. The page I did is page 31. It was good fun to do. The words I know are encouraging, contemptuously. I am on chapter 5 it is called Advice from a Caterpillar but I have not started my homework.

Monday: Today I did some of my speech work. 5 words. I also did my 1 hour story, it is about moving house and I also learnt my spellings and maths too.

Tuesday : Today I have not done much but I have done my reading 6.30-7.00 but I also did learn my spellings

Wednesday: Today I have done some of my reading 7.00 - 8.00. The book is good and I also did my times table race too it was good fun.

Thursday : On Thursday I did my reading 6.30 - 7.00 but I did not do anything else I did my spellings and my test.

Friday : On Friday I did nothing but I did my reading and my spellings.

Similarly Nazama describes the way she spent her time during her holidays as follows,

Monday 16 October: Today I went out for quite a long time. I did some more of my tuition homework which was boring but easy. I have also done the boring housework. I have finished the ten minute planning for my story but I haven't finished the end. I have finished my yesterday's maths. I did some easy and hard multiplications and I have done some divisions that were quite easy.

I am left wondering why the girls offer these descriptions of their holiday time. Do they think school will not value anything about their life outside school apart from those experiences which relate directly to school? Are they attempting to be 'good' pupils and show that they are model pupils, so much so that they have turned home life into a school? We are also offered clues as to what it is these

girls see as acceptable behaviour in terms of a successful pupil at school. This is perhaps another sign of the tension between ego ideal and ideal ego.

The data I have shared here shows ways in which facets of identity, seen here in terms of social behaviour in mathematics classroom, prioritisation of curriculum areas and the bridge between behaviours in and out of school, develop in and through children's experience of mathematic education. There are also clues as to what is developing as a 'normed' identity. It seems relevant that the girls in the study chose to describe their home life in terms of pseudo-school and had developed efficient ways of working collaboratively in mathematics classrooms. It is also the girls in the group that expressed worry about mathematics 'work' being sacrificed for the school play.

If the data above illustrates the way in which the community of 'successful mathematicians' takes shape what follows illustrates the more overt ways in which the community of mathematics researchers is formed.

What is mathematics education research?

A version of this paper was presented to the reviewing process of an international conference. All three referees rejected the paper and their comments offered to me a clear view of what was deemed by these reviewers to be acceptable or 'normal' in terms of mathematics education research. The following comments were common to all three referees.

"The study refers to abundant related literature, however most are quite unknown in the mathematics education community."

"It is difficult to figure out if the experiment brings evidence for the theoretical assumptions – I did not understand ... the scientific status of the statements ..."

"The paper is too well written with brilliant sentences and a rare vocabulary (or a rare use of a well known vocabulary)."

"This paper could be interesting in a congress of research in education but it is not relevant to (a mathenmatics research) audience. Nothing specific to mathematics is presented here, it could be about the learning of English Literature or Geography as well."

"The referencing style adopted is not one of the 'accepted standard forms'."

"Since the paper gives no clear examples that deal with teaching and learning mathematics, it seems to be not really relevant to the PME audience."

Of course, as a reader you can draw your own conclusions as to how this relates to the paper you are reading and my response is not one of disagreement with the comments but one of interest as to how these comments define a set of criteria for belonging to this particular community of mathematics education research. If I had to characterise these criteria as rules I may create the following list.

Mathematics education research should:

Make explicit the implications for mathematics and mathematics classrooms.

Be specifically aimed at mathematics classrooms rather than take a general view.

Always give clear examples that deal with teaching and learning mathematics.

Draw on theoretical frameworks that are known within the mathematics education literature.

Follow a methodology which is recognised within mathematics education research.

Use experimental evidence to make scientific statements.

Use language that can be easily interpreted internationally.

Should describe phenomena specific to mathematics.

Should follow a traditional form of referencing.

As researchers we all draw on the reactions to our work by a range of audiences. It is worth us reflecting the ways in which this mirrors the process of learning mathematics. Do our learners interpret our responses as mathematics teachers in a similar way? Do they draw up a set of criteria which they feel they must conform to if they are to be successful learners of mathematics? If they cannot conform to this set of criteria do they define their identity in opposition to this criteria thus defining themselves as ‘not mathematician.’

So where next?

This paper has shown how practices in mathematics classrooms can operate to create a ‘normed’ view of what makes a successful mathematics learner. I have illustrated this using data from classrooms and exemplified the process through the description of personal feelings of exclusion from communities of practice. The question that remains is of course, what is the alternative? What I offer here are some suggestions which may allow us to open up our classrooms and our arenas of research for wider participation as identity inclusive rather than identity exclusive.

In our classrooms we can acknowledge and build on learner’s own heritage, valuing and emphasising cultural practices and knowledges. Earlier in the paper I showed learners describing practices at home in ways which mirrored practices in school. Here the identity of mathematics learner was created predominantly at school. Practices which acknowledge and develop the diversity of backgrounds within every classroom are both culture creating and challenging of the domination of particular ‘normed’ behaviours. Such practices emphasise connections between groups of learners and between the learners and the learning of mathematics. The developments within mathematics education research to support this would be in the areas of practitioner and participant research. Such research would take the needs and interests of mathematics learners and practitioners as starting points and work collaboratively to connect practitioners to research.

Promoting collaborative and mutually supportive ways of working allows for the development of connected relationships between teachers and learners and within the research community. This can also challenge the domination of a particular view of identity of and builds a sense of security within the learning environment. Such a sense of security within the research community is developed through collaborative research between institutions and organisations. A move towards open refereeing and open fora for research would also work towards a negotiation and debate within the research community as opposed to a closed community with a fixed set of rules.

As teachers we can encourage learners to become active in both interpreting and changing their worlds, develop critical consciousness through maths activity. In this way we reveal to students the ways in which the 'rules of the game' operate. As researchers a focus on student centred research and research for educational change would support this development as would developing research programmes which use issues in mathematics education to explore wider social and political issues.

As a conclusion to this paper I wish to conjecture that if classrooms were different then the identities constructed within and through our classrooms would be different. In these classrooms the emphasis is not attempting to change learners from what they are into something I and they can call mathematician. Similarly the aim of research would not be to conform to a methodology which we can all agree has 'validity' for mathematicians. Rather I am attempting to create a space in which we (teachers/learners/researchers) define/redefine what it is to be mathematician/researcher. Such a redefinition would be one in which identity norms are questioned and challenged and communities of practice are both opened up and jointly constructed and critiqued within the mathematics classroom and research arena. I would suggest it is the very process of redefinition which creates inclusivity rather than exclusivity.

