'MATHS IN MY WAY': CARIBBEAN STUDENTS' PERSPECTIVES ON THE SOCIAL ROLE OF MATHEMATICS

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This paper looks at social views of mathematics expressed by Caribbean students. The students appear to say in their own words points made by Gates & Vistro-Yu's (2003) in their work 'Is Mathematics for All?' Encapsulated in the students' views are issues to do with gender, ability grouping practices and social class, issues made possible in part by the ways in which 'school' becomes enacted, and how mathematics is done in those schools. In seeking understandings of the students' views, questions are raised such as who is mathematics for, what type of mathematics is for whom, and for which group(s) of students does mathematics get in the way.

INTRODUCTION, BACKGROUND AND CONTEXT

This paper is based on a smaller aspect of a PhD study. That study examined Caribbean students' views of mathematics, how they may have come to have those views, and the influence of those views on their mathematics attainment. This paper will look specifically at an aspect of the first of these, students' views of the social role of mathematics, with some insights into how they may have come to those views. The rationale for the PhD study was born out of concerns within the Caribbean that students were 'underachieving' in mathematics. Assessments of 'underachievement' were usually based on students' attainment in mathematics in the Caribbean Examinations Council (CXC) Secondary Education Certification (CSEC) examinations, taken by students in most of the English-speaking Caribbean countries at the end of secondary schooling. These examinations replaced the former British-based GCE O' level examinations in the early 1980s. A case study of secondary school students' views of mathematics in two of these countries, Antigua & Barbuda (A&B) and St. Kitts-Nevis was conducted in order to gain insights into possible issues that may be influencing student achievement in mathematics.

At this point more will be said about the CSEC examinations, as in excerpts to be presented students make reference to the structure of these examinations. CXC offers two levels which it calls proficiencies at which the CSEC examinations can be written in some subject areas. These levels are called the Basic and General Proficiencies. Whilst the content of the Basic Proficiency is a proper subset of the General Proficiency, the grading/assessment of the examinations is not, and they are treated as two separate examinations. A candidate is deemed to be successful as defined by CXC at both proficiency levels if they receive Grades I-III on a 6-point grading scale. However, society has essentially defined success otherwise, in that in order for students to gain access to tertiary education and also the desired jobs upon leaving school they would have had to be successful at the General Proficiency of the examinations. This has particular implications in mathematics as more students sit the Basic Proficiency examinations in this subject than in any other.

Gates & Vistro-Yu (2003, p49) in their work *Is Mathematics for All?* noted the following about a social 'organising' role of mathematics in part in reference to ability grouping practices in this subject area:

> …*school mathematics* plays a significant role in organising the segregation of our society… keeping the powerless in their place and the strong in positions of power… an accusation that you 'can't do maths'… is a positioning strategy… It locates you as unsuccessful and lacking in intellectual capability; it locates you on the edge of the employment and labour market… Mathematics education thus serves as a "badge of eligibility for the privileges of society" (p49, emphasis in the original)

When compared, it could be considered that Caribbean students expressed, in their own words, similar views of mathematics. As such, this paper will report on and discuss five views students expressed that may be considered 'social'. These views see mathematics as (1) gendered, (2) important, (3) according respect, (4) a means of protection, and (5) in the way.

METHODOLOGY

The over-all PhD study was conceived as a multi-site case study employing a mixed methods approach (Creswell, 2003) to data collection and analysis. As with Hammersley (1992, p172), the choice of this methodological approach was based on 'the purposes and circumstances of the research, rather than being derived from methodological or philosophical commitments'. In this paper I will present findings primarily from student interview with some results of questionnaire survey data. Fourth form students (Year 10 in a British context) from 12 schools in A&B and St. Kitts-Nevis were the study's main participants. Student group interviews were conducted in both territories, but questionnaire data were obtained from students in A&B only. Data were collected over the period September 2004-January 2005. The questionnaire sample of students in A&B (286 students, approximately ¼ of the all 4th form students in A&B) had a mean age of 15¾ years.

FINDINGS AND DISCUSSION: WHAT THE STUDENTS HAD TO SAY

Student views of the social role of mathematics will be discussed with reference to five perspectives. Excerpts from group interviews will be given, followed by interpretations.

1. *As gendered.* Some students' responses in interviews suggested this view, rather than its being explicitly stated. Such may be interpreted in the following excerpt:

> B2: My mother would say that 'am, you used to be good at maths in school when you were small, how come you can't do it now, […] what kind of man…

> B1: My mother would say, right, she keep saying she ain't good on maths, 'cause she always used to fail it at high school and primary school right, but yet she would still tell me that she'll be doing good, right, and when I ask her for help she can't help me. My father good on maths but I don't really see him ...

G2: Well, it depends. If I do good in maths my mother ain't goin' say nothing but if I do bad she going, she going say. (2b+2g) [1]

The excerpt points to a source of these students gendered view of mathematics. In the excerpt, B2 alluded to the way in which his mother (and arguably society) viewed who it is who *ought* to be good at mathematics, when he recounted an exchange with his mother due to his falling grades in mathematics. Although he does not continue the line of response, his mother's comment of 'what kind of man…' signals that there was an implicitly held view, perhaps even belief, that a characteristic of a *man* was that he could do (well in) mathematics.   B1's response also reflects gendered views about mathematics; his mother was not good at mathematics and had said so, nor could she help him with his mathematics schoolwork. B1 did not say whether his father had described himself as good in mathematics, but B1 did seem to *know* that his father was good at mathematics even though he was not able to get help with mathematics from his father. The implication is that all *men* should be able to do mathematics.   The students did not suggest that women could not be good at mathematics, but this, presumably, was not an inherent characteristic of a woman. None of these students (nor most of those interviewed) espoused any *explicit* views of mathematics as gendered. However it is arguably the case that messages students were getting in part from parents about who is or ought to be good in mathematics become embodied into dispositions that may unwittingly influence students in their learning of mathematics at school, these messages becoming part of the habitus (Bourdieu, 1990, p77) they bring with them to school.

2. *As important*. This view had to do with mathematics as important for *getting* a 'good job', less so for mathematics being particularly useful *in* the job.   In the students' views, a qualification in mathematics guaranteed a person a 'good job', as suggested in the following excerpts:

G1:   Anybody who has a good brain in maths, it's like, they know they're gonna get a good job and, you know… (3g)

B1: Cause when you go college, you need it. […]

Int: Where.. why do you need it?

B1: You need it… 'am, without maths…

G1: Maths is in everything.

B1:   … you can't get jobs.

B2: You need maths certification to get a good job in the future. (2b+2g)

This student view of mathematics could be compared to Gates & Vistro-Yu's assessment of being unsuccessful in mathematics bringing a person to 'the edge of employment'. This does not discount that students also saw mathematics as being useful in everyday life, and as important for getting into higher education (HE). However, related to the view of mathematics as important was also that of

mathematics as *necessary* because of where it could take you, the access to places and spaces it provided, and much less so for any intrinsic worth of its own. Students had bought into the view that success in mathematics (i.e. a qualification therein) was related to the quality of life a person could have after leaving school.

3. *As according respect.* The two interview excerpts following came from students in separate single-sex schools. In this country, single-sex schools are an indication of parental socio-economic status, having proportionately more students of middle-class parentage than students in mixed schools. There was a practice in the two girls' single-sex schools of 'ability grouping' students at the beginning of the 4th form for mathematics teaching based on the levels of the CSEC examinations (i.e. General or Basic), a practice which did not occur in any other subject area. Then, approximately two years later, the girls would be entered for the mathematics examinations based on these levels. These 'practices' did not occur in the two boys' single-sex schools, and boys at the school leaving stage sat only the General proficiency examinations.

> B2: When they [employers] look at your report or look at maths they see it's good, respect, they respect you.' (3b)
> ----------------
> G3:   'Am, also, the students that do General maths, they look down on us.
>
> G2:   Not all.
>
> G3:   Not all of them, but some of them. Some of them was with us, and just went over.
>
> G1:   I find that the Antiguan society is like, if you're a maid, it's like people don't care nothing, if you're a doctor, people will more see, respect you… (3g)

The boy's comment in the first excerpt here could be seen as an example of mathematics serving as a "badge of eligibility". It is also instructive that the comment comes from a *boy* in essentially a *middle-class* school.   This is not to say that students in other schools did not have similar views of mathematics. However, the nature of this boy's comment, which was agreed to by the other boys in this interview, suggested that for him mathematics was his insurance in the world of work outside school, and there was no sense of mathematics being 'in his way'. This contrasts with the perspective of the girls in the single-sex school given in the second excerpt here. These girls had been grouped into a Basic proficiency class for mathematics. For these girls, mathematics had become a positioning device. The analogy G1 used in a discussion primarily surrounding those of her classmates who were now in a General mathematics class is notable. This discussion of General/Basic mathematics and the social consequences of the division as was already being played out in the school – was arguably a 'class' division even in this single-sex (i.e. middle-class) school, delineating the 'intellectual capability' of students, being made possible by how the school chose to 'do' mathematics. As this practice occurred only in mathematics, mathematics thus becomes a resource of power, and these girls come to 'realise their conditions within a system of class division *through their mathematics education experience*' (Valero, 2003, p14, my

emphasis).   Thus it seems that at least in relation to mathematics, students who would otherwise be seen as advantaged because of their social class, become disadvantaged because of their gender.

4. *As protection.* This view of mathematics is connected to students' views of mathematics as important. Much of the locus of this view surrounded students' impression of mathematics as keeping them safe, and further, preventing them from being susceptible to the wiles of other perhaps more powerful people.   The following are the views of the girls in the single-sex school (from no. 3 previous), and that of another girl in a mixed school.

> Int: So the disadvantage to doing…
>
> G1:   Basic maths, you're not sure about the future.
>
> G3:   Exactly.
>
> G2:   I do not believe that.
>
> G1:   That is my fear. I am not sure about the future because I'm… bare. (3g)
> -----------------
> G1:   Well, yeah, I don't like maths, but […] the disadvantage [to not doing well in mathematics] is […] me having my own business, I won't be able to count and knowing how to do this and that to get, so people can rip me from my money and so on, so I would make, instead of making a profit, I would make a loss… (2g)

In the first excerpt here the girls spoke as if they had already failed mathematics, although the interview took place approximately 1½ years prior to their actually taking the CSEC examinations.   Basic mathematics was equated with being unsuccessful in mathematics, and, from the reference to being 'bare' to no mathematics at all. In the second excerpt, the student, a girl in a mixed school, expressed a view of mathematics which was more specific and also more common amongst students in mixed schools, that specifically of mathematics offering protection from being robbed of money. The view expressed by the girls in the single-sex school was a more generalised view of mathematics offering protection in an after-school life. In both these views however, the students appear to see mathematics as (a part of the) armour they will need outside of school.   Again, there is a sense here of the power that resides in mathematics, and of access to this mathematics providing a share in that power. The essence of these students' statements compares to Gates & Vistro-Yu's assessment of mathematics as 'keeping the powerless in their place and the strong in positions of power'.

5. *As in the way.* The following excerpt is a continuation of the perspective of the three girls given in nos. 3 and 4 previously.

> G3:   And I want to be an accountant and I see Basic maths in my way.
>
> G1:   Exactly. (3g)

There is an inherent tension here; whilst these girls may not have had 'good' mathematics grades prior to the ability grouping process, mathematics had now

effectively been placed in their way, blocking access to hoped for career-paths on leaving school.

Although said in relation to the Basic proficiency of the CSEC mathematics, the girl's comment in the last excerpt has wider meaning. Society has given mathematics, and in the Caribbean, the General Proficiency mathematics, an importance that becomes by its absence an obstacle in the pathway to what some persons hoped to be. Other data from the case study in A&B do suggest certain types of persons for whom mathematics may more consistently get in the way. One such type comes from evidence of out-of-school persons taking the CSEC mathematics, where it is for females more so than males that mathematics appears to be 'in the way', as more females write the examination than males, and further they do so in proportions higher than the in-school male-female ratio. A second person-type for whom mathematics becomes an obstacle is students in mixed schools, i.e. those from working class backgrounds, this based on the results of the proportions of students who are successful in mathematics. For example, the 2006 CSEC results of the study's questionnaire sample of students in A&B showed that whereas 53% [2] of the students in mixed schools had been successful in five or more General Proficiency subjects, with 61% of them being successful in English, only 23% of them had been successful in mathematics. Similar results for students in single-sex schools were 90%, 90% and 86% respectively. Thus, just as mathematics may empower persons who are successful in it, it perhaps also more poignantly dis-empowers persons who have not enjoyed such success.

NOTES

1. This (2b+2g) refers to the make-up of the interviewed group of students.
2. Percentages are given as a proportion of the no. of students sitting that proficiency of the examinations

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