

UNPACKED BAGS AND MATHEMATICS: THEORETICAL CONSIDERATIONS, CARIBBEAN PERSPECTIVES

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Mathematics, more than many other subjects is regarded as being learned at school. One could thus argue that mathematics most offers the opportunity to 'even the playing field' and reduce privileges or disadvantages students bring to school. This paper explores this argument from a Caribbean perspective, using data from a PhD study of student underachievement in mathematics. Quantitative data from schools in Antigua & Barbuda showed that the proportion of students successful in external examinations was lowest in mathematics across all subjects. This finding though was not true across all school-types, a proxy for social class in the Caribbean. Qualitative data provided alternative perspectives, suggesting influences ordinarily seen as outside the school gate. However, these influences are part of the bags students bring to school. These findings have been considered within Bourdieu's theory of the social reproductive role of education systems.

INTRODUCTION: THEORETICAL CONSIDERATIONS

There is a notion in some academic literature that subjects such as the sciences and mathematics are mostly learnt at school (e.g. Rutter et al, 1979, in their review of American and British literature on school effects; DiMaggio, 1982; Van de Werfhorst, Sullivan & Cheung, 2003 in their literature review). The argument goes that children from certain home backgrounds may be more advantaged at school in subjects such as the humanities in part due to the presence of (objectified) cultural capital (Bourdieu, 1997) in the home (e.g. books, paintings), which via the accumulated labour of a familial investment of time become 'transubstantiated' (Moore, 2004, p455) into an integral part of the child, i.e. into an embodied cultural capital or habitus (Bourdieu, 1997, p47) that these children bring with them to school. On the other hand subjects such as the sciences and mathematics are more likely to 'level the playing field' of such advantage, so that 'school' becomes a more important factor in student achievement in these subject areas. In effect, from this argument, there is an impression that for subjects at school such as mathematics, children are more likely to be at similar starting points, being essentially blank slates whose achievement is amenable mostly to the effects of school. This paper explores and questions this notion from a Caribbean perspective. There is agreement that students do embody aspects of their home background, bringing these with them to school and schooling processes and these embodied histories do influence what happens there. Further, these embodied histories, embodied cultural capital or habitus do come to 'matter' in mathematics, as they guide how some students are prepared (or know how) to be in mathematics classes and ultimately impact on their achievement in *mathematics*.

Cultural capital and habitus, along with field form part of Bourdieu's 'thinking tools' in his theory of practice, and within that the social reproductive role of education systems. Bourdieu (1997) identified three forms of cultural capital, an embodied, an objectified and an institutionalised form. Embodied cultural capital has to do with the 'long-lasting dispositions of the mind and body' (ibid, p47), and is capital (which he defines as accumulated labour) a child acquires from the family via a

prolonged investment of time. Cultural capital in its objectified state is arguably the form that has gained more attention in educational research perhaps because this form of capital is ‘measurable’ as it has to do with a person’s access to resources such as books, paintings, etc., which could be viewed as a form of economic capital. Institutionalised cultural capital has to do with (educational) credentials. In relation to educative processes, Bourdieu noted the following about the operation of cultural capital:

The notion of cultural capital ... made it possible to explain the unequal scholastic achievement of children originating from the different social classes by relating academic success, i.e., the specific profits which children from the different classes ... can obtain in the academic market, to the distribution of cultural capital between the classes (Bourdieu, 1997/1986, p 47)

In other words, the cultural capital (of whatever form) required for success in school is not equally distributed amongst the population, and as ‘capital finds its way to capital’ (Bourdieu, 1998, p19), some children are positioned more advantageously for school by the cultural capital of their home backgrounds than are others.

Embodied cultural capital is the form of cultural capital which is the focus of this paper, but given that the three forms are not mutually exclusive, it is not to the exclusion of the other two. Embodied cultural capital could be regarded as the most ‘qualitative’ of Bourdieu’s three forms of cultural capital, and writers such as Reay (2004) and Lareau & Weininger (2003) have argued for a wider conceptualisation of cultural capital to include this more qualitative aspect. For these writers, the focus on quantitative conceptualisations has tended to overlook and marginalise a qualitative dimension which can serve as an explanatory framework for understanding how day-to-day micro-processes in schools perpetuate social inequities. In this broader conceptualisation, Lareau & Weininger describe this qualitative dimension as having to do with the ‘micro-interactional processes whereby individuals’ strategic use of knowledge, skills, and competence comes into contact with institutionalized standards of evaluation’ (2003, p569). With cultural capital in its embodied form, children bring with them the accumulated labour of familial investments in the form of dispositions of mind and body, how they know how to think and be, and that they may use in school to trade *on* for the profit of educational achievement. But, unlike some forms of trade which involve a direct exchange, giving up one thing for another, this form of cultural capital is an investment, and the returns are additional, i.e. other forms of capital (institutionalised capital, for example) to that already acquired.

There seems a large overlap area between Bourdieu’s conception of embodied cultural capital and what he has more often consistently defined as habitus. In one such Bourdieu (1977, p72) defined the habitus as ‘systems of durable, transposable *dispositions*’, and further described dispositions as ‘the *result of an organising action... a way of being, a habitual state... a predisposition, tendency, propensity, or inclination*’ (p214 footnote, italics in the original). The point has also been made that these dispositions forming the habitus are a product of a process of inculcation during early childhood (editor’s introduction in Bourdieu, 1991, p12), that is, are acquired via the accumulated labour of early family investments. Considered together, these two notions, embodied cultural capital and habitus do seem to be very close conceptually, being both related to dispositions which a child acquires through the family. The key notion seems to be that of embodiment, and whereas Bourdieu’s conception of habitus has been more easily recognised as the property of a body, that of cultural capital has tended to be associated with ‘things’ outside the body, arguably overlooking the

embodied form of cultural capital. Bourdieu alluded that the notions may well perform a similar function in practice when in delineating his conceptualisation of embodied cultural capital he wrote: 'This embodied capital, external wealth converted into an integral part of the person, into a habitus...' (1997, p48). In relation to field, Bourdieu has noted that the habitus guides the way people tend to behave in 'certain circumstances' (1990, p77); these 'certain circumstances' may be considered as the field, that is, the 'specific social contexts' (editor's introduction in Bourdieu, 1991, p14) within which the habitus operates.

How bags become baggage

Embodied cultural capital or habitus are aspects of their home backgrounds that are already in place and that children embody, bringing with them to the 'field' of school. They could be seen as part of the bags children come to school with. The Encarta World English dictionary (e-resource: encarta.msn.com/dictionary_1861588388/bag.html?partner=orp) provides a definition for bags as portable containers made of strong flexible material designed for carrying someone's belongings. For the purposes of this paper it is important to note that children, as students in school do not leave these bags at the door of classrooms, *including* the mathematics classroom; the bags are still very much present with students in these classes designated as mathematics. Literature conceptions of the notion of 'baggage' have been used in mathematics in relation to the affective domain and the emotional baggage that *teachers* bring with them to the teaching process (e.g. Crook & Briggs, 1991; Bibby, 1999). In these, teachers recall the good and bad times of their experience as students of learning mathematics. My contention here is that as learners of mathematics students also bring with them pieces of their culture ('deep structures of knowing, understanding, acting, and being in the world', Ladson-Billings, 1997, p700), history, home backgrounds that may for some students function more like baggage. The Encarta World English dictionary defines baggage as: 'ideas, beliefs, or practices retained from somebody's previous life experiences, especially insofar as they affect a new situation where they may be no longer relevant or appropriate'. The Oxford Paperback Dictionary (2001) also makes the point that these lived experiences become baggage if seen to be weighing a person down or holding them back. This cultural baggage largely remains unpacked in that they are never/hardly ever exposed or talked about as a part of learning mathematics, so they never get examined and thus remain a part of the load some students are carrying around with them. The load gets added to by the emotional extremes that come to be generated by the way schools have tended to 'do' mathematics.

There also seems an inherent relationship between these bags, i.e. embodied cultural capital, habitus, that students carry around with them, and their identity. Holland, Lachicotte, Skinner & Cain (1998, p3) initially broadly defined identity as people's understanding of themselves whereby they tell others who they are, they tell themselves who they are, and then they act in ways so as to make who it is they tell themselves they are true. These self-understandings that people form are a product of their experiences in particular cultural worlds, or fields. Thus formed, identities are 'hard-won standpoints' (ibid, p4) from which individuals form understandings of themselves and for themselves. From this initial definition, Holland et al go on to develop various other perspectives on identity, one of which is a positional (also termed relational) identity. For them this form of identity has to do with:

... the day-to-day and on-the-ground relations of power, deference and entitlement...[it] is a person's apprehension of her (*sic*) social position in a lived world: that is, depending on the others present, of her greater or lesser access to spaces, activities, genres... (p127-28)

In this conception of positional identity, lies the scope for children to also form understandings of and for themselves from what messages they may have implicitly read into who 'others' (e.g. parents, teachers, peers) may have told them they are.

CONTEXT AND METHODOLOGY

Within the Caribbean there is a general perception that students are underachieving in mathematics (e.g. Jules, Miller & Armstrong, 2006). These concerns have largely been based on student outcomes in the subject from the Caribbean Examinations Council (CXC) Secondary Education Certificate (CSEC) examinations taken by students at the end of secondary school (British Yr. 11). These outcomes showed a consistent pattern of approximately 30-40% of students being successful (on a 6-point grading scale, Grades I, II and III regarded as passing grades, Grade I being the highest). However, the proportions reported are for students sitting the examinations, which is a subset of all children of the age cohort. Jules et al (2006) report this subset to be about 25%. It was within this setting that it was decided to conduct a study which investigated further possible explanations for student achievement in these examinations. Antigua and Barbuda (A&B) formed the basis for a case study (Yin, 1998), which took a socio-cultural perspective (Wertsch, del Río & Alvarez, 1995, p11) in investigating the issue. A mixed methods approach (Creswell, 2003) which incorporated documentary data, questionnaire, interview and classroom observations as the main data collection methods was employed to the collection, analysis and interpretation of data. This paper will report selected findings from the first three of these methods. Documentary data concerns mainly students' achievement in mathematics in the CXC/CSEC examinations. Students' views of mathematics, to include affect reactions, their views of classroom processes, how they described themselves in these classrooms, amongst others formed the content of the questionnaires and more focused interviews.

Amidst the general concerns of student underachievement in mathematics, documentary data on past student performance in the subject in A&B suggested that assessments of underachievement were 'more true' for students in a certain school-type than for those in another. In the Caribbean, social class differences amongst students are played out in large part in education systems via the existence of school-types. In A&B these types were mixed and single-sex schools, with the former tending to have proportionately more students from working class backgrounds than the latter.

Data collection for the study took place over the period September 2004-January 2005, with a second period of collection occurring approximately two years later in October 2006. In the first wave of collection, one 4th form class of 11 of the 13 main secondary schools in A&B (seven mixed and four single-sex) was selected for participation in the questionnaire, and formed the quorum from which subsequent students for group interviewing were selected. The questionnaire data yielded a sample of 286 students made up of 177 from mixed schools and 109 from single-sex schools. In the second wave of data collection, documentary data on these students' results in the May/June 2006 CXC/CSEC examinations was obtained. Such data were had for 208 of the students, which represented approximately 25% of all school students in A&B who actually sat the examinations.

FINDINGS AND DISCUSSION: CARIBBEAN PERSPECTIVES

Generalities...

Questionnaire data from the participating students showed an association between the students' secondary school-type, and other of their background histories, some of which are given in Table 1:

Background	Variable	Mixed	Single-sex	Chi-square tests
Primary school-type/267	Government (free)	124/168 (74%)	35/99 (35%)	$\chi^2=38.244$, df=1, p<0.001
	Private (fee-paying)	44/168 (26%)	64/99 (65%)	
Parent occupational level/224	Working Class (WC)	83/132 (63%)	19/92 (21%)	$\chi^2=50.628$, df=2, p<0.001
	Intermediate Class (IC)	43/132 (33%)	43/92 (47%)	
	Middle Class (MC)	6/132 (4%)	30/92 (32%)	

Table 1: School-type and Student Background

A guide for categorising the occupation of a student's parent(s) to a socioeconomic level (i.e. class) came from that given in Cooper & Dunne (1998, p142-143), with some consideration of Caribbean/A&B contexts. In addition to the above data, a higher proportion of students in mixed schools lived with their mother-only than lived in a 2-parent household (49% and 41% respectively) whilst for students in single-sex schools this home situation was reversed (30% mother-only and 66% 2-parent). This social feature, that is, mother-only households, has in the Caribbean been associated with lower class status and poverty (Barrow, 1999, p152).

One of the general findings associated with the sample students' outcomes in mathematics were that all school-type and home background factors for which data were obtained were significantly associated with these outcomes. As shown in Table 1, school-type and home/family background factors were significantly associated. On the other hand, only two student views (from a series of 23 closed questionnaire items, both dichotomous and Likert-scale type) covering their affect for mathematics, and their views on other aspects of mathematics to include classroom processes, its usefulness, amongst others, were significantly associated with these outcomes. These items were *I do not need to think about the work when doing maths, I just have to remember the rules*, and *Boys are better at maths than girls*. Statistical results for these items along with a selection of school-type and home factors are given in Table 2 which shows proportions for the numbers of students who were successful in mathematics based on these factors:

Student Background/View	Variable/Response	Numbers	Chi-square tests
Secondary school-type /208	Mixed Single-sex	28/124 (23%) 72/84 (86%)	$\chi^2=79.958$, df=1, p<0.001
Primary school-type /198	Government Private	40/117 (34%) 56/81 (69%)	$\chi^2=23.405$, df=1 p<0.001
Parent occupational level /165	MC IC WC	22/29 (78%) 34/64 (52%) 27/72 (39%)	$\chi^2=12.503$, df=2, p=0.002
Don't think, just remember rules/190	SA+A N D+SD	18/54 (33%) 35/66 (53%) 40/70 (57%)	$\chi^2=7.590$, df=2, p=0.022
Boys better at maths than girls/192	SA+A N D+SD	9/32 (28%) 26/51 (51%) 57/109 (52%)	$\chi^2=6.051$, df=2, p=0.049

Table 2: Student Factors/Views and Outcomes in Mathematics

It should also be noted that the first of these views given here (*Don't think...*) had also produced a significant difference in responses for students in the two school types, being only one of two of the total of 23 closed items to produce such a difference between the school-types.

In interview data, there appeared to be some qualitative differences between students in the two school-types in how they were prepared to (and knew they could) be in mathematics classes. In these data two students from different mixed schools referred to absenting themselves from mathematics classes as an option at times exercised; this 'action' was not mentioned by any student in a single-sex school. Also, an issue involving money, a sense of the value students associated with a *need* to be successful in subjects at school, and a relationship to how they were prepared to do or be in mathematics classes based on this issue was brought up by students in three different mixed schools; such a response again did not feature in those given by any student in a single-sex school. And importantly, there were also issues surrounding students' perception of their parents' expectations of their performance in mathematics. 13/23 students in mixed schools thought that their parents would be upset if they failed mathematics (from in-school tests), whilst 8/11 students in single-sex schools thought similarly. Following in this section I will focus on how two students, both girls, one in a mixed school and one in a single-sex school, responded in interviews that give insights into some of the bags they brought with them to mathematics that may facilitate or not a disposition to being successful in it.

... and Particularities

Fay [1], a student in a mixed school, was 15 years 8 months at the time of the interview. She had obtained a Grade IV for mathematics (which meant that she had failed it) and a Grade I for English Language (highest grade possible). With respect to this last, she was one of seven students to have failed mathematics having received a Grade I for English Language. Twenty-seven other students from the sample who received Grade I for English Language had been successful in mathematics. She had attended a government primary school. She lived with her mother only whose occupational level had been categorised as WC. She had consistently throughout the questionnaire indicated that she did not like mathematics, strongly disagreeing with the Likert-scale item (5-point scale) *I like maths*. She had listed mathematics as one of her two least liked subjects and also as one of the two subjects in which she performed worst. She gave as her reason for disliking mathematics '*it is too difficult, I do not understand it at all*'. She rated her mathematics school performance as *Poor*, which was the lowest of five possible ratings given on the questionnaire. She described herself in mathematics classes as '*sleepy, not very attentive*' and what happened in mathematics classes as '*I get bored, and sleepy and most of all I get frustrated. I usually leave math class with a headache*'. These comments contrasted with how she described herself in school generally, that being '*attentive, participative*'. She had also responded in the questionnaire in reference to passing the CXC/CSEC mathematics '*I already know that I won't pass maths. If I do it's a miracle*'. Fay had somehow gained an understanding of herself as being unable to do well in mathematics, but this did not always seem to be the case, as she also indicated in questionnaire data that she had been successful in mathematics up to the 1st form of secondary school. The following is part of the interview excerpt from her school, and highlights how she may have come to this understanding of herself in relation to mathematics:

Int: [...] when you look at the time table, and it's maths next, how you feel?

Fay: Hum, I get an instant headache. [...] 'Cause I don't like maths.

Int: [...] Has that always been the case for as long as you can remember? Even in primary school?

Fay: No, not in primary school.

[...]

Int: [...] Do you find that your parents have any particular expectations of you with regard to maths?

[...]

Shaq: Well, yeah, because for maths, you have to... it's a compulsory subject for CXC and right now we're 4th form students, we're supposed to be like, grasping, getting it to go on to CXC level..

[...]

Fay: Not my mother.

Int: She wouldn't make a fuss if you failed maths? Why?

Fay: Because I always fail it. [...] She says she had the same problems before. (1girl + 1boy)

Fay had already taken on what may be seen as a positional identity in relation to mathematics. That this identity is positional comes from what seems to be her perceived sense of entitlement or access to a space of being successful in mathematics. The sentiments she expressed in questionnaire and interview data had come to be part of the bags she took with her to school. The understandings she

had formed of and for herself about her relationship to mathematics were formed not only there in the field of the mathematics classroom from *her* hard-earned (cf. Holland et al's 'hard-won') experiences of learning mathematics, but were also being influenced by bags she brought to school of her mother's hard-earned experiences. She could be seen as finding solace in a mathematics identity her mother had allowed for her, embodying this, and bringing it with her to mathematics classes to form part of how she was disposed to be in those classes. This source of solace for her, that her mother had also struggled with mathematics in school, had become a position for her to fall back to, a licence for her to do the same. She may have read more into the assessment results she obtained in mathematics from the 2nd form onwards than the intent of the school, and this arguably in part from what she was hearing at home. In a sense, she was (re)authoring herself (Holland et al, 1998) in line with the position that had been afforded her by the comments of her mother. It is in this way that for her, her bags became baggage.

Tia, a student in a single-sex school was 14 years and 8 months at the time of the interview. She obtained a Grade II for both mathematics and English Language (had passed both). She had attended a private primary school. She lived with her mother whose occupation was categorised as MC. She had responded *No* to *Do you like maths*, giving as reason for her response '*maybe because I just don't get it*'. She had listed mathematics as one of her two least liked subjects and also as one of her two worst performing subjects. She, like Fay of the mixed school had consistently throughout the questionnaire indicated a dislike for mathematics, disagreeing with the statement *I like maths*. She had also rated her school mathematics performance as *Poor*. Her response to an item asking what she would personally say mathematics is was that it was '*Torture!*' She indicated that this had not always been the case as her mathematics had been '*good in 1st and 2nd form ... now everything is a blur*'. She however seemed to have a *predisposition* to being successful in mathematics. She described what she did in mathematics classes as '*try to stay attentive and participate in answering the questions*' and also later indicated that she was '*buckling down*' as she hoped to pass CXC/CSEC mathematics. Failing mathematics did not appear to be a fall-back allowance for her, and this was further supported by what she said in interview data:

Int: [...] 'Ah, do you find that your parents have any particular expectations of you in terms of maths, meaning...

Tia: Yes.

Int: Yes?

All: Yes

Kay: They say that's one of the most important subjects.

[...]

Int: [...] is that maths in particular, or is that any other subject, let's say you're doing 8 subjects and you failed Home Ec., [...] would she be, or he or she be the same way about that as if you had failed maths?

All: No.

Int: No, they'd be...

Tia: Because I got 63 for mid-term maths and 54 for OP, they still ignored the OP and just told me about the maths.

Int: Oh, okay, so they'd be harder on you about the maths?

Tia: Yes.

(4 girls)

Tia's disposition to being successful in mathematics seemingly regardless of her hard-earned experiences in mathematics at school appeared to come from the accumulated labour of familial investment. From her response in the interview, her mid-term marks would have meant that she had failed OP (Office Procedures) and had passed mathematics (55% is generally taken as the pass mark in schools). However, her parents' concerns had focused on her marks in mathematics. Whatever identity or self understandings she may have been forming with mathematics, these did not include being a failure at the subject. The bag she carried with her of any previous failures in mathematics was not being allowed to become baggage due in part to the cultural capital she embodied of her parents' expectations. This cultural capital had for her becoming her resource for use in mathematics even when other in-school results may have indicated to her otherwise. Thus, despite her views about mathematics coming from her experiences in learning it, she still had a disposition to being successful in it as that was the positional identity being allowed her by her parents.

Considered in relation to Holland et al's conception of identity as being the products of 'hard-won standpoints' of experiences in cultural worlds, i.e. fields, then it would appear that these two girls shared similar such experiences of mathematics, having apparently known some success in it, but then having less success in their more recent experiences. They both could be seen as associating mathematics with pain ('headaches' for Fay, 'torture' for Tia), and both gave a reason for not liking mathematics which had to do with not understanding it. Their responses about their views of mathematics thus appeared to have been gained from their hard-earned experiences of its learning in the field. But how these girls dealt (and knew how to do so) with those experiences were different, and there is evidence that these differences were based in part on the cultural capital they embodied and brought with them to school as a resource they could trade on for educational profit. For both these girls this embodied cultural capital, this habitus, had specific relations for how they could be in *mathematics*. For Fay, she seemed to have accepted her failures in mathematics as her due, and, having been 'told so' from marks she was getting in school along with the space allowed her to fail by her mother, then arguably acted in ways to make the message of the marks 'true' (sleepy, not attentive). Tia on the other hand, could find no such space in the bags of her embodied cultural capital, and acted out in classes in ways that fitted a positional identity one may associate with success.

CONCLUDING COMMENTS

In detailing the profiles of these two girls I am not saying that these girls are representative of all other students in the school-types from which they come. Nor am I saying that the specific cultural capital these girls embodied and how these become realised in the field of learning in mathematics classes are sufficient conditions for guaranteeing failure or success in mathematics. I am also not saying that all students in mixed schools failed mathematics because of lower parental expectations of their achievements and all students in single-sex schools were successful because of higher parental expectations. In fact, as shown in Table 2, there were students in mixed schools who were successful in mathematics, as well as there were students in single-sex schools who were not. What I am saying is that there was a general pattern of things. Not every student in interviews who indicated that their parents would expect them to do well in mathematics at school was eventually

successful in the external examinations; but importantly, there was only one student who thought that his parent had no such expectations of his mathematics success who was eventually successful in mathematics in the CXC/CSEC, and this was a boy in a single-sex school.

Ladson-Billings (1997, p700) has made the point of the ‘profound impact’ of culture on thinking, and the importance of the nature of this culture for the student in *mathematics*. Whilst the *content* of mathematics may be largely learnt at school, the way students are and/or know how to be, the strategic use they make of what they know – and these especially in a subject like mathematics where at times the content can be difficult for some students – is or can be mediated by the embodied cultural capital they bring with them to school. If this embodied capital is at odds with what is expected and implicitly demanded of students in school (e.g. Bourdieu, 1973), then that bag that students bring with them can become for them baggage.

Notes

[1] All names are pseudonyms.

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