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## Mathematics students' aspirations for higher education: class, ethnicity, gender and interpretative repertoire styles

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This paper reports how students talk about their aspirations in regard to higher education (HE) and their mathematics, what 'repertoires' they use to mediate this discourse, and how students' predominant 'repertoire style' relates to their cultural background. Our analyses draw on an interview sample ( $n=40$ ) of students selected because they are 'on the cusp' of participation or non-participation in mathematically demanding programmes in further and higher education. The interviews explored the students' aspirations for their future in general and HE in particular, influences on these choices, and the place of mathematics in these. Thematic analysis revealed four interpretative repertoires commonly in use, which we call 'becoming successful', 'personal satisfaction', 'vocational', and 'idealist' repertoires. Most of the sample was found to use a single, predominant repertoire, which we call their repertoire 'style': what is more, this style is found to be strongly related to background factors independently obtained. The implications for policy and practice are discussed.

**Keywords:** higher education aspirations; mathematics; identity; interpretative repertoire styles

### Introduction

Increasing participation in higher education (HE) has been a key concern of the UK government recently (DfES 2003a), especially in the strategic subjects of science, technology, engineering and mathematics (STEM) (Roberts 2002). Mathematics has been recognised as crucial to students' access and success in these and other mathematically demanding careers and 'it also provides the individual citizen with empowering skills for the conduct of private and social life and with key skills required at virtually all levels of employment' (Smith 2004, 2).

Government policies for widening participation in HE (see DfES 2003b) have resulted in a considerable increase in participation from students from traditionally low-participative communities (Ball et al. 2002). However, despite this, evidence suggests that patterns of stratification remain within the HE system (Shiner and Modood 2002; Lynch and O'Riordan 1998). For instance, some argue we now have a 'new hierarchy of institutions in which prestigious research universities have emerged as a top layer of elite institutions and these remain overwhelmingly white and middle-class in composition' (Reay et al. 2001, 856). They note the tendency for those from working class and minority ethnic backgrounds to end up in lower status HE institutions.

There is a clear need to recognise how the cultural fabric of society may mediate students' choices and decision-making in respect of education, and so how class, ethnicity and gender

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mediate students' constructions of themselves as learners and potential participants in HE (Archer et al. 2005; Brooks 2003; Reay et al. 2001). For example, Archer (2003) notes how students from middle class families have access to cultural capital, including the knowledge required to guide decisions and actions in navigating available post-16 routes into HE. Further research by the same authors similarly describes how some working class young people adopt identities that are enacted through the practices of 'taste' and 'style' which shape their choices and views of HE as 'not for me', marginalising them into disadvantaged social positions (Archer, Hollingworth, and Halsall 2007). In relation to ethnicity, Beck, Fuller, and Unwin (2006) highlight how students from minority ethnic backgrounds are over-represented in HE compared with their white counterparts. Nevertheless, Ball, Reay, and David (2002) argue that such findings have complex intersections with social class with working class, minority ethnic students choosing to attend institutions which they know to have a certain ethnic mix even if this means attending those that are lower status. This paper reports on findings from a project which investigated widening participation in mathematically demanding programmes at further and higher education (F&HE) level. We are currently conducting a series of longitudinal interviews with students studying mathematics at AS level (usually aged 16–17 years) about their family and educational backgrounds, their aspirations towards future study and particularly, how these are related to mathematics. We are interested in exploring the interpretative repertoires students use in narrating their identity as students in transition to university and how these may be associated with class, ethnicity and gender.

### **Theoretical framework**

We focus on the concept of identity as a way to understand the self and its relation to the world. Our perspective is informed by Cultural-Historical Activity Theory (CHAT) and centres on object-oriented socio-cultural activity as a mediator of identity. This view captures the ontological aspect of learning inherent in Vygotsky's theory – we use 'tools' not simply to acquire knowledge but to become what we do – to become contributing members of the communities with which we engage through activity. Furthermore, because we belong to a multitude of communities and engage in different activities throughout our lives, we are constantly building different social identities for use in different situations. Identity is therefore always in the process of 'becoming' as well as 'being' (Hall 1994). For example, we may use certain identities to function as mathematics learners, but also as teenagers, as fathers/mothers and also as sons/daughters. Certain elements of our identity might come into action, be left in the background, come into conflict or reconcile in different circumstances and times.

The view of identity as socio-culturally mediated recognises its dialectical relation to social practice which offers cultural, discursive tools. These tools provide a resource and, at the same time, a constraint for reflexive identity work. Here we draw on the concept of Interpretative Repertoires (Potter and Wetherell 1987) as discursive tools students use to tell (themselves and others) about their intentions and aspirations to go to HE. Robb (2004) refers to interpretative repertoires as culturally available frameworks that enable individuals to make sense of their experience. Thus, 'interpretative repertoires are part and parcel of any community's common sense, providing a basis for shared social understanding' (Edley 2001, 198) and provide the 'building blocks' (Wetherell and Potter 1988) that people draw on in accounting for their actions, or in storying their identity. It is worth noting that people generally draw upon different repertoires to suit the particular needs at hand. Thus the repertoires belong to the culture, but different individuals from different socio-cultural groups in different situations may draw on these resources in different ways.

**Methods**

**Sample description**

The students taking part in our sample were selected from five different sixth form/FE colleges around the UK and primarily included ‘at risk’ students in terms of prior attainment in mathematics (GCSE grade C or below) or socioeconomic status (SES) (i.e. from neighbourhoods whose families typically have a low participation in HE). As such, they are not representative of the general population in sixth form/FE or of students taking AS level mathematics, but rather represent a layer of students who cause particular concern for widening participation.

The proxy of social class used was based on a geodemographic classification provided by ACORN (see <http://acorn.caci.co.uk>). This classification is based on postcode information, and ‘combines geography with demographics and lifestyle information’ (CACI 2006, 2). Table 1 describes the different geodemographic areas, ethnic background and gender of our students and shows that approximately half of them came from the financially ‘hard pressed’ category 5.

**Analysis framework**

The interviews began with a biographical format: asking students to tell the story of their life and how they come to be studying AS levels in college; then it progressed to future ambitions, choices, attitudes to HE, who/what were key influences and factors and how they see mathematics in relation to their aspirations. The analysis was conducted using the software Atlas.ti, coding on two levels:

- (i) For different categories of identity statements – self identity (e.g. ‘I am...’) and identity in practice (‘I do’).
- (ii) All coded identity statements were analysed thematically based on content, according to aspirations for university/career (STEM, other maths, non-maths), influences on aspirations (parents, siblings, peers, media, location of preferred HE institution), and the student’s view of what it means to study mathematics, in the present and future (e.g. maths as useful, maths as enjoyable, maths as a high status qualification).

Table 1. Number of students in the sample by geodemographic area (ACORN), ethnic background and gender.

		Number of students
Geodemographic areas (and what they mean)	Category 1 – Wealthy Achievers	3
	Category 2 – Urban Prosperity	7
	Category 3 – Comfortably Off	6
	Category 4 – Moderate Means	4
	Category 5 – Hard Pressed	20
	(Categories 5N, 5O, 5P – Predominantly white areas)	(10)
	(Category 5Q – Predominantly multi-ethnic areas)	(10)
Ethnic background	White British	21
	Black	10
	Asian	5
	Chinese	2
	Other White	2
Gender	Male	26
	Female	14

Here we report four distinct repertoires, which we have identified as a particular combination of codes relating to these themes: we first looked at all aspirational quotes and categorised them in four distinct types – adopting a respectable career, pursuing something the student enjoyed, achieving a fantasy/dream and moving along a clear vocational pathway (to be illustrated). We then explored the kinds of influences associated with these aspirational types – focusing not only on the ‘source’ of the influence (e.g. parents vs. peers) but the nature of that influence too (e.g. strong career expectation vs. a desire for their children to be happy). Once we had established some associations between types of aspiration and ‘influence’, we looked at the role mathematics plays in enabling them to achieve their aspirations. For example, some students talked about mathematics as instrumental to their aspirations – a necessary requirement or significant step in moving them along their imagined trajectory. As a result, we were able to establish associations between aspiration, influence and views of mathematics. Furthermore, the majority of our sample students used one particular, dominant repertoire ‘style’, but there were five out of 40 who were left unclassified, either because in their interviews they used different elements of distinct repertoires or because the data in their interviews were insufficient to determine if they were using a certain repertoire or not. Additionally we assume that these repertoires may not be fixed to the person but are used as a tool for a certain kind of ‘identity work’ – in this case identity work implied by the need to account for one’s aspirations in a research interview – identity work that may align with but is not reducible to a certain social group.

### **The ‘becoming successful’ repertoire**

#### *Aspirations*

The first repertoire focused on a particular type of aspiration – going to university as a way to achieve social respectability or ‘success’. Jose, for example, wants to go to university to become ‘someone’ because, as he said, ‘if you don’t do nothing, you won’t become no-one’. Furthermore, we noted that career choices were narrowed by what is culturally regarded as respectable professions which can lead to a high status in society, including financial rewards. These mainly involved ‘traditional’ careers such as medicine, accountancy, business or law. Hamal tells us that he wants to go to university to become an accountant, because ‘it has got a lot of money in it’ and he implicates mathematics, as ‘I just like to do number work’.

Similarly, Takeshi, a Chinese student who wishes to pursue a business degree, talked about her imagined future of prosperity and high ambitions, ‘driving a big car’ which can only be achieved through a university education.

#### *Influences on aspirations*

Looking at the kinds of influences students reported as important or significant in ‘becoming successful’, it emerged that parental expectations of the students for HE were strong. Takeshi’s account again:

My mum and dad really have high expectations and they expect me to go to university because in my family only my uncle went to university so they really want me to go...

Similarly, Mustafa, a student from an Asian background who also wants to be an accountant, said he wished to go to university because he wanted his parents to be proud of him, and it would be an honour for them if he went to university.

### *View of mathematics*

Next we investigated whether these could be associated with a particular view of the role of mathematics in achieving their aspirations. We found that for these students mathematics was seen as *instrumental* in achieving their goals, as a high status discipline that can move one along a respectable career path. Hence, students who used this repertoire could speak of mathematics as ‘hard’, ‘not relevant to everyday life’, but as a ‘pre-requisite’ for their future plans, or helpful in their future rather than now. For example, Hamal believed it would be better for his career if he had mathematics A-level, even though the university he is applying for does not require it. He says:

H: I have asked them and they said I would need two ‘A’s and one ‘B’ I think. In any subject.

I: They didn’t ask for mathematics.

H: In any subject. But if I do maths then *it will be easier - it will be better*. That is why I picked maths. Everyone who I talked to, like my family said you really need maths to do accountancy.

Similarly, Albert, who was thinking of doing an engineering degree, considered mathematics as a pre-requisite for his planned career, but otherwise did not see it as relevant to ‘real life’.

To summarise, by exploring associations between how the students spoke of their aspirations, their influences and their view of mathematics we began to identify particular repertoires which the students drew on as a means to describing their ‘imagined future’. In this case we have highlighted a ‘becoming successful’ repertoire where aspirations appeared mostly influenced by parental expectations, and where mathematics was essentially instrumental. However, we similarly established three other repertoires now outlined below.

### **The ‘personal satisfaction’ repertoire**

#### *Aspirations*

A second repertoire identified in the students’ interviews was one in which career choices were not particularly respectable or dominant. Choices often remained open and the discourse focused instead on personal interest and enjoyment.

For example, David talked about how he was opposed to pursuing a university career and instead identified himself as a musician:

I: So what do you want to be?

D: I like music, I am very into music, I write songs as well.

I: Did you have any experience? Did you used to sing when you were younger?

D: It is not serious. I have written joke songs but, kind of more writing serious music now.

I: You don’t want to sing on your own. Just write songs?

D: I write and sing. I want to be in a band. I haven’t learnt any instruments yet. I might start learning guitar soon.

#### *Influences on aspirations*

Parents were again prominent in the interviews but in a different way: they wanted their children ‘to be happy’, and students’ choices were viewed as more open, even to the extent of not going to university. However, it seems that on the whole, for these students, the possibility of going to university was there for them to take if they wished to. For example, Maurice said his parents told him they would like him to go to university, but were not bothered if he chose not to. Andrew, who wants to go to university to study biology, spoke of his parents’ support for his plans: ‘There is nothing that is pushed. It’s like “if you want to do this you go and do it and you do your best at it”, and they are quite supportive this way’.

***View of mathematics***

These students talked about understanding and enjoying mathematics, and said that their choice to study it was guided by a sense of satisfaction with the subject, even if they were not planning on continuing with a mathematically demanding HE programme or career. For example, Preston regarded mathematics as his favourite subject:

Yes, I'm really enjoying maths. Maths has to be my favourite subject now. I am finding it really easy and a lot of stuff I learned and it's just build in on top of that so it's kind of... it's just increasing my knowledge of maths.

Similarly, Andrew talked about his satisfaction and enjoyment with mathematics even though it was not essential to his plan to study biology. Furthermore, when mathematics formed part of their future aspirations in terms of an HE programme or career choice, some students spoke of finding the subject particularly 'interesting'. For example, Jack, who wants to be an engineer, said:

There are loads of different interesting things like you have the science formula for string theory which links everything in the universe to one thing. But it is all a mathematical formula. Little interesting things like ... that will make you go 'oh yeah', it makes maths seem more interesting rather than just being numbers.

**The 'vocational' repertoire*****Aspirations***

A third repertoire identified focused on the representation of a clear vocational pathway where mathematics was integrally connected and useful. The majority of students who used this repertoire were males on BTEC courses in engineering and spoke predominantly of their intention to pursue a career in this field. For instance, Punab said he had chosen the BTEC course with the specific aim of becoming an electrical engineer. Similarly, Fred outlined his plans to become an electrician for British Telecom:

I want to become an electrician in the future, and I want to work for BT, so in university I am looking to do telecommunications.

***Influences on aspirations***

There were no consistent influences on students' aspirations identified within this repertoire, which may be connected to the fact that many had already opted for a particular vocational pathway.

***View of mathematics***

Most of the students using this repertoire talked about mathematics being highly useful and relevant to what they were doing and wanted to do in the future (i.e. engineering). These students' identity as mathematics learners was very much aligned with their desire to become engineers. For example, Malik says:

Maths is the main part of electronics. Because to work out what is wrong, you have to work out the formula. You need maths to calculate stuff, to calculate voltage to current. You need lots of maths to do that as well. So my maths course right now is helping me to do my electronics course as well. That's why if I don't do maths I can't do electronics.

And Punab talked about the utility of mathematics in electronics:

I said before like...equations we are doing that in electronics side of the course. All three [his other BTEC classes] give a different way of doing it. But maths [use of maths] gives the mathematical way of doing it, the right mechanical way of doing it. They give another way of doing it. But I guess this way it helps with their way of doing it and if you apply it both ways to make it your own way. So yeah, it does help.

However, despite seeing the apparent value or 'utility' of mathematics to engineering, the subject was not viewed as easy. Punab regarded it as a 'challenging subject'. In summary, this repertoire involved a particular combination of themes – a clear vocational trajectory towards engineering and a view of mathematics as useful to this. These students – many with apparently weak grades – used this repertoire to express a strong identity as mathematics learners. Mathematics was not only useful for their future plans, but also for the everyday activity of doing engineering in the here and now.

### The 'idealist' repertoire

#### *Aspirations*

In this repertoire, aspirations related to pursuing a future which was marked out as either different from the reality they currently lived (escapism) or as the realisation of a dream – a fantasy which had sometimes been with the student for a while. For example, Gemma spoke of her desire to become a marine biologist – a decision which she had made at the age of 8:

- I: You say 'I am going to university'. What do you want to do?  
 G: I have decided it since I was 8.  
 I: Have you? Tell me about that.  
 G: I've just always liked Orcas the killer whales. *Free Willy* is my favourite movie.

Another example is evident in Rachel's account of her long-term 'dream' to move to California and become an architect, a dream that came to be whilst watching interior design programmes on TV.

Most of the students using this repertoire did not appear to know how they were going to achieve their dream. Typically, one student claimed he wanted to work with computers – having a liking for computer games – but had no idea that this might involve learning to programme. Going to university was seen as a possibility which might bring about a change in cultural experience for the student, but other options were still also very much a possibility. For example, Caroline, who was certain she wanted to become an accountant, said that she was seriously considering going to university but that an apprenticeship was also a good possibility for her.

#### *Influences on aspirations*

The students who used this repertoire generally reported being the first in their families to be going to university, so did not have an immediate role model in this respect, and their parents did not generally provide them with guidance. Some of them knew people in their extended families or had friends who had been to university, but mainly their ideals had weak foundations, and were often based on the popular media. Gemma's desire to become a marine biologist was influenced by the film *Free Willy* and similarly, Adele reported that her decision to study forensic science came from watching the television series *CSI*:



- A: I hope to go to university to study forensic science and criminology because I won't mind becoming a criminologist.  
 I: How did you decide this?  
 A: Probably whilst watching CSI, the programme ... it is really interesting.

Annette, who had wanted to be a nurse since year 9 at school (aged 14), talked about the 'glamour of TV' as an initial influence on her aspirations. Parental influence was still present in this repertoire but in a different form – rather than providing positive direction, students mostly talked about 'escaping' the lives that their parents led and expressed a desire to not be like them. For example, Gemma stated:

Nobody in my family... they've been to college but not university and *I see my mum working in a shop... cleaning and I don't want to do that*. So that's kind of influenced me in my own way not to follow that path.

### *Moving away/staying near home*

Despite the escapist nature of this repertoire, this was the only one wherein students often spoke of wanting to maintain ties with their current social networks (friends/families) when they went to university. Some, like Caroline, stated they would prefer to stay near their families, even if this would narrow their future possibilities. This sometimes implicated their role as a carer, or a concern of not wanting to leave their parents or siblings. Others, like Will, said they would like to stay near to home but felt pushed to leave because their local universities did not offer the degrees they wanted to pursue.

### *View of mathematics*

Mathematics within this repertoire generally did not play a central role; rather, it came into play mainly by chance if it was understood to be implicated in their dream. Students spoke of their decision to choose maths at AS level because it seemed like 'a good idea' at a specific moment in time (e.g. because they liked it at school), even if they did not 'need' it in the future. For example, Annette stated:

I chose to do health and social care as obviously it will help me in my career, and applied science because originally I wanted to do biology (...) *I just chose maths because I thought it would look good on my CV and I found it easy in Year 11 and I thought why not*. That's why I chose it.

By contrast, Gemma recognised mathematics as important to becoming a marine biologist at PhD level. However, she was insufficiently knowledgeable about this to ensure she had the right GCSE qualification in preparation for college, being misled into taking a statistics GCSE instead of the higher level mathematics she really needed.

In summary, the 'idealist' repertoire mediates an account of an imagined future, driven by a 'dream', or 'ideal'. But for many, the pathway to attain that dream was hazy. Within this repertoire, the media or popular culture was influential, but there was an interest in dis-identifying from the life trajectories of their parents. Studying mathematics might or might not have prominence in this style.

### **Repertoire styles by geodemographic classification, ethnic group and gender**

We wish to be clear that the repertoires we have identified are not hypothesised to be fixed for particular individuals or social groups. Nevertheless, for the majority of students in our sample

(although not all), one particular repertoire did appear to dominate much of their interview, i.e. they mostly adopted a single repertoire style. Therefore, using postcode analysis, we investigated whether the students using each repertoire belonged to particular geo-demographical classifications, ethnic groups or were predominantly male or female. The findings from this analysis are provided in Tables 2a–2c.

This evidence suggests that the ‘becoming successful’ style was commonly used by students from minority ethnic backgrounds (4 Asian, 3 Black, 1 Chinese and 1 Other White). In using this repertoire, many spoke of wanting to fulfil their parents’ wishes by pursuing high status careers such as medicine, business, and accountancy. Whilst we can only speculate regarding the role of ethnic background in mediating such aspirations, the literature is consistent with this finding (e.g. Beck, Fuller, and Unwin 2006), and in other contexts too such differences have been found between immigrant and indigenous students (Sfard and Prusack 2005). Beck, Fuller, and

Table 2a. Repertoire types by geodemographic area.

Repertoire type	Geodemographic area					Total
	1	2	3	4	5	
1 (success)	0	2	2	2	4	10
2 (satisfy)	2	2	2	0	0	6
3 (voc)	0	2	0	0	7	9
4 (ideal)	0	0	1	1	8	10
unclassified	1	1	1	1	1	5
Total	3	7	6	4	20	40

Table 2b. Repertoire types by ethnic background.

Repertoire type	Ethnic background					Total
	White British	Black	Asian	Chinese	Other White	
1 (success)	1	4	3	1	1	10
2 (satisfy)	6	0	0	0	0	6
3 (voc)	2	4	1	1	1	9
4 (ideal)	10	0	0	0	0	10
unclassified	2	2	1	0	0	5
Total	21	10	5	2	2	40

Table 2c. Repertoire types by gender.

Repertoire type	Gender		Total
	Male	Female	
1 (success)	7	3	10
2 (satisfy)	5	1	6
3 (voc)	9	0	9
4 (ideal)	3	7	10
unclassified	2	3	5
Total	26	14	40

Unwin's (2006) study for the Equal Opportunities Commission found that twice as many Asian/Chinese and Black respondents expressed an interest in business (compared with their White counterparts) and few were interested in the caring professions or the creative/artistic sector. What is new here is the role mathematics plays as essentially 'instrumental' to accessing the socially respectable careers they identified with.

In contrast, the 'personal satisfaction' style was found to be primarily used by students from White British, more middle class backgrounds: all six of them came from geodemographic areas of 1–3. Given the liberal humanist nature of this repertoire, where enjoyment and happiness are given priority over status, the geodemographic distribution of these is perhaps unsurprising. However, we were surprised to find that rather than talk of university as their pre-determined 'right of passage' (as with Reay 1998), these students sometimes used it to speak of a greater agency and freedom in their 'alternative' choices (e.g. adopting a musical identity). It is significant, too, that these students' view of mathematics directly contradicts those of the first repertoire style.

The 'vocational' style provides a yet different role for mathematics: here mathematics was integrally connected to its vocational use. Most of these students were males on BTEC courses in engineering and in the lowest geodemographic category, and came from minority ethnic groups. It is difficult to form conclusions about the relationship between social class and ethnic background and the nature of the repertoire in itself: it may be that their aspirations have been mediated by their participation in a vocational pedagogic culture, even specific to their engineering programme. Such findings are again supported by Beck, Fuller, and Unwin (2006) who found that Black students were more interested in doing a national vocational qualification than the other respondents in their sample, and more male students were interested in technical/engineering occupations when compared with female (83% male students versus only 17% female).

Finally, the 'idealist' repertoire related an imagined future characterised by a 'dream' and was used predominantly by female students from a White British background and lower geodemographic areas (nine come from geodemographic areas 4 and 5). The fantasy aspect of this repertoire, and its predominance within this group of students, suggests that it may be used to mediate a certain positioning of themselves at a distance from the 'reality' of their present lives. Our findings certainly concur with those of Lucey, Melody, and Walkerdine (2003) who also noted the element of 'escapism' in such fantasies and the dis-identification with 'ending up like my mum'. Nevertheless, this repertoire seemed to reveal little in the way of cultural resources to achieve this in reality: the ideal often seemed very fragile in real life. Additionally, for some there was a sense of conflict between their desire to escape and their desire to maintain the social connections and security of their current world (by wanting to stay near home). Thus, we suspect this repertoire may be associated with those experiencing obstacles threatening the achievement of their imagined future.

## Conclusion

We have delineated four distinct 'aspirational repertoires' that students used to relate or account for their aspirations for HE with 'influences' and 'the role of mathematics' in this. We understand that these ways of expressing aspirations may be conditioned by the interview situation, i.e. by adults asking them to account for their aspirations in a 'research interview' in the context of widening participation in HE. However, we find it significant that just four distinct styles emerged, each of which represents a generic story about how mathematics may or may not play a particular role, and that these were significantly related to socio-cultural variables.

We called these repertoires: 'becoming successful', 'achieving personal satisfaction', 'vocational' and 'idealist'. Each repertoire has different features in relation to (i) the nature of their

aspirations, (ii) parental (and other, e.g. media) influences, and (iii) the role of mathematics in relation to their future. These features provide affordances and constraints on aspirations and related choices. While there was no *a priori* requirement that each individual be categorised in just one repertoire, we found that 35 out of 40 students could be so categorised, and we argue that such students have adopted a ‘style’ of aspirational repertoire. As such, we have used the notion of a repertoire to portray the distinct ways our students use shared discursive resources to construct their aspirations for a future ‘self’ and position themselves through their choices both in the future and in the present (e.g. in choosing or not choosing mathematics). Finally, even though this was a small sample, we have shown empirically that styles were quite strongly associated with socio-cultural backgrounds albeit in complex, intersectional ways. This is important because it suggests that there may be a limited number of clearly definable aspirational styles used by young people, that mediate socio-cultural experiences of and ‘ways of aspiring’ in the world. Knowledge of these can provide us with understandings of how to influence aspirations, choices and decision-making and particularly help us to understand the role mathematics plays in such aspirations.

The contribution to knowledge here is seen in terms of analytic generalisation. We do not claim that these are the most important, or worse, the only, repertoires that mediate students’ expressions of their aspirations, or that the socio-cultural backgrounds of students generally influence repertoires in exactly the way they did for our distinctive – and in our view distinctively important – sample. It is important in reading our specific results to take account of our sampling strategy which aimed to investigate a particular group of students many of which were ‘on the edge of participation’. Thus, we selected students who were (i) studying some mathematics at AS level, but (ii) relatively at risk of failing, of dropping mathematics or even leaving college due to demographic circumstances and previous grades. Therefore we claim that such repertoires do exist and are likely to be important to widening participation strategies, that they can be sufficiently dominant in some situations for some students to speak of a repertoire ‘aspirational style’, that they shape the students’ expression of a view of mathematics in relation to their aspirations, and that they are related to socio-cultural background.

Given the socially situated nature of such repertoires, one might have expected that they might be *in themselves, discursively* classed/gendered/ethnically mediated, e.g. by the use of explicit class or gender references (such as ‘people like us from round here don’t do university/maths’, or ‘maths/engineering is not right for women’). But our analysis suggests this was overwhelmingly not the case. Rather what we found was that the four styles identified were significantly *related to* intersections of class, gender or ethnicity.

These four styles imply significantly different relationships with mathematically demanding courses in the future. In using the ‘becoming successful’ repertoire, students speak of an instrumental approach to their subject choices – taking AS level mathematics as a high status university entry qualification, which has exchange value, in achieving success. For those using the vocational repertoire, the ‘use value’ of mathematics in their current course becomes significant. For example, mathematics is a central part of becoming and acting like an engineer, and therefore is integral to the students’ imagined future as well. The other two repertoires do not necessarily speak of mathematics as ‘useful’, but instead may relate it as an enjoyable subject in its own right. Appeals to developing an ‘intrinsic interest’ in the subject may then speak to some students’ aspirations more readily, in their own language as it were, than others. If it turns out that the classed nature of the ‘personal satisfaction’ repertoire is general in the population, as we suspect, then this may make uncomfortable reading for those who seek mainly to widen participation through making mathematics more personally satisfying. Clearly there is a need for multiple voices in widening participation appeals to aspirations.

The variation amongst these repertoires (and their users) has implications in terms of policy and practice. Thus, widening participation requires that students' aspirations be addressed: the fact that different groups of students' aspirations are manifestly differently structured is important. Policy and practice – in seeking to appeal to youngsters' aspirations and to influence their choices – requires an understanding of what different aspirations exist, and more importantly how different students' aspirations can be spoken to. If policy seeks to address these youngsters it must speak their language.

For example, students adopting an idealist style might be offered more concrete understandings of how to actually achieve their 'dreams' (some of which may involve mathematics 'now' and in the future) through the provision of resources and advice, or role models. Students aspiring to 'become successful' take an instrumental view of mathematics and may respond chiefly to its exchange value: thus, we have noticed that these students will choose 'traditional' mathematics courses that confer status even when alternative courses might be more 'relevant' to their vocational preference or 'accessible' to students with their grades. There is also clearly an aspirational constituency amongst some (probably under-represented in our sample according to the demographics) that need to see mathematics as personally fulfilling and enjoyable if they are to choose to study mathematics. Additionally, there have been major initiatives to develop a view of mathematics as 'useful' and otherwise 'relevant' in practice over many years: in the context of widening participation this view of maths was particularly prominent in our 'vocational' group, and shows how vocational programmes can be important in structuring mathematical identity in students' aspirational repertoires. Finally, in the best traditions of the movement for critical literacy, we might argue that practitioners and students could benefit from becoming aware of how different students account for different life aspirations and identities, and how this is related to class, gender and ethnic background.

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