Title: 'Sometimes I think Wow I'm doing Further Mathematics…': balancing tensions between aspiring and belonging.

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Abstract:

What can the particular context of 'further mathematics' tell us about conceptions of quality and equity in mathematics education and their changing interactions over time? Further mathematics A-level is a traditional gate-keeper qualification in the UK, but many state schools lack the resources to teach it. A national project to widen participation has promoted further mathematics and allowed students to opt in to out-of-school classes. In this chapter I argue that choosing further mathematics links quality and equity to understandings of the self as individual project and narrative. I show how the promotional texts of further mathematics use metaphors to sustain and address tensions between quality and equity. Drawing on interviews with one student, I identify how these representations of further mathematics intersect with liberal 'practices of the self'. I argue that quality as depth is a powerful

construction that inevitably disables students from understanding themselves as belonging within further mathematics.

Keywords: advanced mathematics, discursive practices, identity, interviews, neoliberalism, participation, policy

Further Mathematics A-level is a small but prestigious secondary school qualification in England and Wales that acts as gateway and 'gold-standard' for advanced mathematics. Despite repeated changes in teaching and assessment practices it remains at the centre of overlapping discourses about rigorous mathematics and quality, widening participation and equity. My research follows Hart (2003) in using a particular context to examine how conceptions of quality and equity in mathematics education have interacted over time, and I link these to Western, liberal understandings of the self as individual project and narrative. The design brings together two approaches: one analysing how further mathematics is constructed through the public documents and practices of mathematics education; the other analysing students' talk about choosing and studying further mathematics. I take 'aspiring' and 'belonging' as processes by which students live out the discursive concepts of quality and equity as practices of the self. This chapter addresses the questions: how are students' accounts of studying further mathematics structured discursively by its sociohistorical positioning, and how is this positioning in turn effected through the accounts of students? What ways of knowing allow/disallow students to identify themselves both as aspiring and belonging?

Why does further mathematics matter?

A-levels are the traditional academic qualifications in the English and Welsh school system, studied by 40 per cent of 16-18 year-olds as preparation for university. A-level students specialise in only three or four subjects over two years. Mathematics is the only subject area with two qualifications that can be studied alongside each other: 'mathematics' and 'further mathematics' A-levels. Taking both is necessary for entrance to some university courses, and about 1 in 7 mathematics students do this. Further mathematics matters because the ways in which teachers and students talk about studying further mathematics construct our understandings of quality in mathematics education, and we use those constructions to position ourselves within its practices. The same applies to equity. Students do not have equal access to studying further mathematics: they are constrained by 'individual' factors such as prior attainment, and 'social' factors such as school resources. When teachers and policy commentators speak their concerns about these structural inequalities, they create and draw upon particular constructions of equity.

Recent UK policy texts (Matthews & Pepper, 2007; Porkess, 2006) have linked further mathematics to alarm about declining participation in mathematics. Their primary concern is to encourage the majority of 16-year olds to continue mathematics, and rightly so. However this is accompanied by celebration of "our very brightest young people" studying mathematics and science A-level subjects who "by doing so are ensuring that Britain has a bright future" (Wright, 2009). This hitches concerns for social justice both to advanced mathematics and to a neoliberal economic concern for the mutual benefits and national competitiveness that are assumed when individuals gain a technological edge. By neoliberalism, I mean a way of understanding society and politics that constructs the process of governing as

guiding and regulating free individuals in a quest for mutual – although not necessarily equal - economic success (Rose, 1999). These policy texts define the equity issues of A-level mathematics according to the dominant "system of reason" that has underpinned the policy-making of successive UK governments since the 1980s, thereby constructing a problem that seems valid and deserving of attention (Popkewitz, 2002). They also construct solutions in those given ways. A national government initiative, the Further Mathematics Network (FMNetwork) was established from 2005-9 to promote further mathematics and provide teaching to students whose schools lacked resources and staff. I have taken this program as the focus of my research because it gives previously excluded students the opportunity/responsibility to make different choices. Their accounts contribute to an understanding of how new teaching practices work alongside traditional representations, producing potentially different conceptions of what it means to them to aspire and belong to further mathematics.

My theoretical base is a poststructuralist perspective. Power circulates within local practices: it is at the levels of schools, teachers and individuals that knowledge is constructed and reconstructed about who can study further mathematics and how (Foucault, 1991). Martin (2006) suggests that the best way to understand equity is to ask how students live and explain their day-to day experiences of mathematics in relation to school, community and sociohistorical contexts, and how this interacts with the senses of the self that are have meaning for them. I find this compatible with a poststructuralist methodology, analysing in detail "what is given to us as universal, necessary, obligatory" (Foucault, 1991, p45) about mathematics education, and how this knowledge is legitimated over what is presented as "singular, contingent, and the product of arbitrary constraints".

The chapter continues with an analysis of the historical literature on further mathematics, showing how it constructs quality as extremes of measurement and comparison with the past, and inequity as deficits in schools. I then take promotional and regulatory texts of the new FMNetwork and examine how they sustain those old truths alongside constructions of quality as conformity and breadth-plus-depth, and equity as systematised access. In the third section I draw on interviews with one student to identify how representations of further mathematics intersect with liberal 'practices of the self' to enable and disable student choices.

Historical constructions of further mathematics

Forty years ago some 45000 students passed mathematics A-level, and a third of these also took the equivalent of further mathematics and so became eligible for mathematically-demanding university courses (Hoyles et al., 2001). Schools were free to choose among several syllabuses, but these all had a similar structure with two A-levels called 'pure' and 'applied' mathematics. This division in terms of content represented an implicit educational hierarchy. Pure mathematics was seen as fundamental in its own right and as necessary preparation for science and engineering degrees; applied mathematics was the 'optional extra' giving practice in the pure techniques. This familiar classed abstract/concrete binary (Mendick, 2006) configured practical applications as deviations from the higher education route and preferred the abstract, middle-class qualification to assess everyone. In his historical study of further mathematics, Newbould (1981) found that many students achieved relatively low grades in pure/applied mathematics, but that these were invisible casualties with, for example, no records of how many students dropped out of the courses.

Through the 1980s the UK saw a gradual evolution of A-level syllabuses under private exam boards. Increasingly configured as businesses, the boards diversified and competed to attract schools and students: the market and choice were entering educational discourse. New A-level syllabuses introduced the current division into mathematics and further mathematics. 'Mathematics' combined the lower levels of the old pure and applied content. 'Further mathematics' contained topics that are relatively isolated from the core mathematics content (eg complex numbers), or develop it (eg differential equations), or are applied in different contexts (eg mechanics/statistics). This format proved popular, in part because students tended to get at least one good grade, and the old pure/applied format disappeared in 1997 when exam boards were regulated by government. During this time national policies had encouraged more 16-year-olds to stay in a broadly academic program, normalising the A-level/university trajectory as an indicator of educational success. Simultaneously the primacy of pure mathematics was cast as unwelcome specialisation, and applied mathematics was re-valued as relevant and necessary to national economic success. So it was not surprising that schools and students increasingly chose to enter students for the single mathematics A-level, whose syllabus covered both pure and applied content and gave a better grade (Kitchen, 1999). The whole period saw a steady decline in numbers taking further mathematics, falling to only 5000 candidates in 1999, a tenth of those taking mathematics A-level.

How does this historical genesis position further mathematics with regard to quality? First, the title and the very existence of further mathematics suggest that the content of A-level is now structured hierarchically. The syllabus split has designated particular mathematics topics - and the experiences of learning them – as 'further', creating a measure by which they are deemed more difficult, less accessible and

therefore higher quality than others. Whether measuring content or mathematical thinking, further mathematics is awarded a symbolic role in emphasising difference (Hoyles et al., 2001). It constructs quality as a property of extremes, standing out from the norm in some measure of mathematics. Thus the first meaning for quality constructed as 'given' within further mathematics is that quality in education is measurable and there is a way of ranking mathematical study. It is worth recalling that mathematics and further mathematics A-levels are taught concurrently to the same students so this ranking cannot be solely determined by prior requisite knowledge: 'further' is not simply 'later' but 'better'.

Secondly, quality is constructed alongside further mathematics as embedded in tradition and the past. Modern society is alert to managing change and positions individual subjects as responsible for negotiating risks; thus stability becomes personally desirable (Bauman, 2001). Further mathematics certainly offers an ongoing link with the education of thirty years ago, although feeling familiar reassurance alone is not recognising quality. Quality also requires observation and evaluation. Bauman argues that when the world around us changes, the normative response of modern individuals is to make sense of what is happening to us, to rationalise and compare old and new practices; I take this change-inspired evaluation as legitimating quality. Because the history of further mathematics positions it as relatively stable in a fast-changing educational environment, it evokes narratives of sense-making that heighten its visibility and position it as a context for evaluation. I call this a 'gold-standard' construction of quality: the gold-standard only has meaning because we no longer pay in gold. However, by evoking the rationale of calculating back, it continually reinvents itself. So in further mathematics we have stories of a past golden age in which students were well-prepared in science subjects and

competed to enter mathematics degrees. These stories have currency today, even as we accept that practices have changed.

However, further mathematics would be of little interest if it were not for the accompanying story of those who resisted the change: several thousand candidates continued to study it, from a minority of schools in England, Wales and abroad, and the elite universities continued to request it. In a culture of choice, why did it matter that some schools and students continued to choose further mathematics? I have suggested above that further mathematics features in neoliberal discourses as a problem that needs addressing both as a search for quality, for "bright futures", and through the ways it was publically configured as inequitable. I now examine these constructions of equity in more detail.

The 'rules' of the A-level curriculum are that subjects should be roughly equal in teaching time and value, for example they share a common 'points scale' for university entrance. This background parity positions A-level grades as a meaningful discriminator of any individual's "reality of mathematics' achievement" (Matthews & Pepper, 2007, p10). But alongside this official knowledge, teachers and the media disclose a hidden, 'expert' knowledge that certain subjects and subject combinations have greater exchange value for university entrance, and these include further mathematics even with a lower grade. We know that students from White middle-class backgrounds tend to seek more expert advice about their choices and choose these high-status combinations (Ball et al., 2000) Information about further mathematics is thus differentiated by class and ethnicity. Moreover, student choice is constrained by what their schools can offer. Since the 1980s the smaller, state-funded, non-selective schools have been affected by shortages of qualified mathematics teachers, financial pressures on teaching small classes and measures to compare

schools by A-level grades (Smith, 2004). Students in state comprehensive schools are 3 times less likely to study further mathematics as those in independent or selective schools, and 1.5 times less likely than students in 16-18 colleges which tend to be larger and city-based (Vidal Rodeiro, 2007). These differences in school provision challenged liberal notions of equity in all three aspects identified by Hart (2003): students did not have equal opportunity, treatment or outcomes in their mathematics education. Further mathematics was a context in which these differences in individual experiences were made visible as structural differences between schools, not explainable as individual choices, and as such it posed a problem to policy makers. For example the government's advisory body has distanced itself from its own qualification: until there is "universal and equal access to Further Mathematics", it is not "appropriate for higher education tutors to use [it] as a legitimate discriminator" (Matthews & Pepper, 2007, p14).

The role of further mathematics in quality and equity is part of a narrative that society tells itself about itself: we understand the decline of class and class distinctions as central to modernity (Atkinson, 2007). In this narrative quality and equity are linked, but they function as opposites. Society needs more workers able to use mathematics, so mathematics applications were included in the single A-level and the 'higher' pure topics were left out. Students from all schools should have equal access to university mathematics courses so universities had to modify their curriculum. This framing is not simply a zero-sum game but one that is oriented in time. Quality is constructed as the rules of the past; equity as including more students in the future. The opposition seems natural because other factors are taken as unchangeable: the comparability of A-levels, the amount of teaching an

undergraduate should have, and mathematics itself. These are not debated but rather crystallised in the practices of teaching and examining that make up school.

In the next section I turn to the recent FMNetwork and consider the narratives used in its organisation, promotion and evaluation. I don't aim to criticise these choices but to understand more about how they sustain positionings of equity and quality, and how these relate to traditional conceptions.

Changing further mathematics

The FMNetwork was commissioned and funded in England from 2005-9. A national hub provided branded materials in the form of a website, promotional texts, and teaching resources. Regional teaching centres recruited locally for further mathematics, employed tutors to visit schools and collected performance data. Schools effectively subcontracted further mathematics teaching for a group of their students. The centre agreed to teach on a concentrated schedule, typically only a weekly 2-hour session after school. The school and centre negotiated money, timing, duties, access to resources – all means of circulating power at a microlevel. Such deployment of a market model in publicly funded institutions in order to serve particular agendas of quality and equity is typical of applied neoliberalism.

Bringing quality up to date

The constructions of quality discussed above were rooted in the past or in mathematics content that appears timeless, but the FMNetwork supports a new construction that is rooted in present-day technologies. It does so by emphasising that further mathematics is an A-level just like any other, following the rules and practices of the now-regulated examination system. For example, it encourages students to

choose further mathematics by stressing the techniques that integrate the two A-levels (such as exchanging modules to get higher final grades). Thus one way that the FMNetwork constructs quality is as a property of rigorously conforming to an improving school system. This quality-as-conformity promises equity in the form of universal access to further mathematics, and the improved life-chances that follow. For example, the FMNetwork tells universities that "the new QCA rule changes […] will make it far easier for ordinary schools to offer Further Mathematics" (Stripp, 2004, p15) positioning 'ordinary' schools as the appropriate focus of universities. However conformity downplays individual and school agency and positions the structure of A-levels as powerful in itself: the main actors here are 'rule changes'. Stripp adds that schools can "increase the supply" of mathematics students, but "it's up to the universities to ensure this happens by creating the demand." (p16). Changing the rules and demands for further mathematics is taken to be enough to change what schools will offer and students choose. This claim suggests the neoliberal framing of modern society as a complex 'swarm' of individual trajectories, all choosing according to economic forces but choosing alike (Bauman, 2001). The FMNetwork positions itself with universities and policy makers who understand how power works within the swarm and can use that knowledge for change.

I have now traced three constructions of quality. A sociohistorical perspective on further mathematics sees quality as historical continuity and standing-out-by-measurement. Those constructions were reconciled by representing further mathematics as a gold-standard. Because these views of quality were located in the past; the inequities associated with them could be understood as outdated white middle-class privileges. The third, recent, construction was quality as conformity; this time enacted as progress in a presently-improving education system and looking to

the future for equity. Clearly these co-exisiting constructions introduce potential tensions: is quality judged in the past or present; does it concern conforming or standing out; are inequities over or still being ironed out? I have identified one more construction in the FMNetwork texts that functions to resolve these potential conflicts: quality as achieving breadth-plus-depth. The duality in this metaphor manages tensions through flexibility and ambiguity: further mathematics is valuable because it is broad or deep or both as required. This new metaphor was enabled by a specific rule-change that changed the discursive tools available. In 2000 the first half of an A-level course was given its own name – AS-level – allowing separate identities for each year of further mathematics.

How does this breadth-plus-depth construction work? Firstly, the FMNetwork follows many government texts (e.g.Smith, 2004) in associating the AS course with breadth. Breadth provides a metaphor for widening access and inclusion, and also becomes a marker for quality when education is seen as aiming to provide universal, flexible skills suitable for an unpredictable working life (Rose, 1999). When Porkess describes AS students encountering "exciting new ideas, like complex numbers, as the building blocks at the start of Further Mathematics" (2006, p13) he uses 'building blocks' to evoke utility, flexibility and progress– all seen as important for future careers. 'Building blocks' evokes children and manual work, including them in further mathematics. I find it an unexpectedly practical metaphor for complex numbers. Compare it, for example, with a further mathematics student's description of them as uncomfortably abstract: *something that doesn't even exist. Just, it makes me feel sick, the thought of it*. I suggest that the difference illustrates the imperative for the FMNetwork to construct the AS syllabus as accessible.

The second half of the metaphor follows from the historical re-organisation of syllabuses that associated further mathematics with ‘higher-level’ topics. The FMNetwork texts use this association as a given, and rephrase it in terms of depth:

> The new AS will be more a ‘broadening’ than a ‘deepening’ option. This means that AS-Level Further Mathematics is no longer an ‘elite’ qualification, suitable only for A-level Mathematics high-fliers. (Stripp, 2004, p. 15)

Here breadth is written up as a modern contender to depth, but there is still ample reassurance that ‘high-fliers’ should be taking further mathematics. Depth is separated from particular mathematical content, and rather defined as being what the ‘elite’ study, and so inherently bound up with exclusion. It is still firmly attached to quality through the continuation of familiar standards: “The stretch and challenge for the elite is still provided by going on to the full A-level in Further Mathematics […] which is just as demanding as ever”. (Stripp, 2007, p. 35).

In summary, the FMNetwork justifies itself as an agent for change by arguing for a new construction of quality as broader relevance and participation. However, since breadth departs from the traditional exclusions, the change is only enabled by a successful defence against itself, that is by simultaneously arguing for depth. Breadth and depth are thus held together as two forms of quality existing on either side of the AS-level but pulling in opposite directions, one including and one excluding. What holds them together is students’ responsibility for choosing: inclusion is systematised by universal access to AS-level, exclusion can thus be left to individuals.

What is equity for the FM Network?

In my discussion above I have started to show how constructing quality in certain ways might entail corresponding constructions of equity. I now use two recent evaluatory texts to exemplify how these constructions of quality and equity function together. One reports the independent evaluation (Searle, 2008) commissioned by the FMNetwork to justify government funding; the other (Vidal Rodeiro, 2007) reports an assessment agency's research into A-level participation. These texts necessarily draw on, and contribute to, the policy discourses of further mathematics.

Examination data show that the FMNetwork program coincided with a revival in further mathematics: from 2004-8 the number of candidates taking the 'one-year' AS-level course more than tripled and the number taking the two-year A-level course nearly doubled. Searle's (2008) evaluation highlights that over three-quarters of this growth was in state schools and concludes that access according to school sector was becoming more equal. It thus prioritises the historical perspective that class-based differences in provision between schools were the primary problem of inequity. This increase strengthens the network's claim to achieving quality-as-conformity alongside equity as systematised access.

Searle then examines equity in more detail by relating school region to socioeconomic status. More affluent areas of England accounted for much of the growth in the two–year A-level, but the 'one-year' AS-level grew very significantly in deprived areas. Presenting this data makes a weaker claim for progress in ironing out differences according to class, but it does strengthen the suggestion that the FMNetwork AS-level is broad in its appeal to previously-excluded students. Hence the FMNetwork is positioned as partially successful in its aim to achieve quality constructed as breadth-plus-depth. However I see tensions between this construction

and equity as universal opportunity that are unstated: how can we account for the social differences in who engages with the 'deeper' material and who stops at AS-level. What individual and social factors might be at play? My research includes students who after one year of study choose to stop mathematics – which can be construed as an exercise of individual agency – but also some who are being taught only the AS-level content over 2 years, a structural constraint. A discussion of equity would be further informed by analysis that linked individuals' outcomes to course opportunity. The fact that this type of data is not within the remit of the official data-collection illustrates how neoliberalism averts its gaze from issues of how individual and social factors interact (Atkinson, 2007).

As well as socioeconomic status and school type, the other factor reported in detail in Searle's evaluation is gender, perhaps owing to its ease of classification and the longstanding concerns over girls' participation in mathematics. The proportion of further mathematics students who are female, between 30 and 40%, has not changed in the period. This is left without comment: it is not clear whether any change was desired or feared. Other individual background factors are not reported. We know that students who are Black African, Chinese, Indian, Pakistani and from a mixed background choose mathematics/science subjects proportionally more than White students (Vidal Rodeiro, 2007), but not how they have engaged with further mathematics over time. Nor can we find out whether students from different socioeconomic backgrounds, but in the same school, choose differently organised lessons and obtain different outcomes. Through the choices made in these texts, no doubt for necessary reasons, equity is constructed as the absence of those differences that relate to institutions, and what affects individual choice is left out of the enquiry.

In summary, the FMNetwork makes use of an educational technology – the decoupling of AS from A-level - to sustain roles for both breadth and depth, and find a compromise where each has a different function but each conforms to institutional requirements. Quality as depth is described in terms of the past and an elite, and thus linked to quality as gold-standard. There is a new understanding of quality as breadth with everyone doing more mathematics, and this links to quality as conformity. Equity is constructed as the opportunity for an individual to start further mathematics no matter what type of school, how teaching is organised, or what was previously learnt. The first year promotes this goal of universality and recruits for the full course, but it also legitimates selection in the second year. This selection is no longer understood as a means by which schools necessarily reproduce privilege because, for the purposes of further mathematics, schools are positioned as operating with an agency that is informed by economic truths. Change is guaranteed by calling on practices aligned with neoliberalism and individuals have the responsibility for choosing further mathematics for themselves. In the next section I turn to individuals' accounts so as to consider an example of how quality and equity enter one student's account of choosing whether or not to continue with mathematics.

Practices of the self

From 2006-9 I have conducted research in three sites offering mathematics A-level in school and further mathematics with the FMNetwork. I followed 24 students over 18 months, collecting data from interviews, lesson observations and email questionnaires. My analytic focus was what Foucault (1990) calls 'practices of the self': the knowledges and processes that inscribe what it means to be a successful individual within a particular history or culture. Practices of the self establish the

norms and means by which people explain themselves, govern themselves, and engage with others. I have explored the intermingling of discourses of further mathematics and discourses of the self by analysing textual data in the form of observation field-notes, interview transcripts and e-mail exchanges. I chose one student, Mario, to discuss here because he often appeared uncomfortable with seeing himself as a further mathematics student. It is his quote that provides the title of this chapter.

In our conversations Mario positioned himself variously as successful and as struggling, as a natural and as an outsider, and tried out different ways of justifying his decisions to continue. I interpret the ways in which he argues whether doing further mathematics is "doing any good" as examples of how he participates in constructing quality. Mario also describes what "actually" threatens his engagement; I see these as examples of ways-of-knowing through which individual agencies contribute to social patterns.

Mario lives in the centre of a relatively deprived English industrial city. The school he went to until age 16 was replaced by a business-sponsored school that offers further mathematics to all its mathematics students. Mario is white and his family show characteristics of both middle-class and working-class cultures (Ball et al., 2000): Mario's father is a graduate engineer but he lives with his mother and receives some government income support. Mario's passion is rock guitar.

In his first interview Mario describes his initial subject choices as based around maths – the "four core Maths subjects". He presents evidence he has gathered to support this claim for the centrality of mathematics: all university courses want high grades, and mathematics "comes into everything". These claims are based on its

power as a widely accepted currency and a knowledge that will be relevant even – and especially - when he attempts a more idiosyncratic career linking science and music.

Choosing further mathematics is also a way of demonstrating success in unexpected ways:

> First of all when I said about Further Maths my mum was ... 'This is... No, you can't do it.' And I was okay at Maths at GCSE but never like that star, that everyone else was like getting full marks all the time. And when I said Further Maths she was quite shocked and didn't think I could do that. And that made me want to do it even more.

Mario ascribes his mother's doubts to his grades in national examinations at age 16 which were good, but not the best. I suggested above that further mathematics invokes quality as a gold-standard. Mario draws on this representation to challenge the defining power of grades: for him, choosing further mathematics is a way of aspiring to stand out as being different but just as good or better. Mario sets the stakes high by making his comparison with "full marks all the time". The sociohistorical context that positioned further mathematics as rarified because it was limited to certain schools has been reinterpreted as a practice of individual choice so that further mathematics aligns the chooser with extreme personal qualities of ability and dedication.

So far I have commented on those aspects of Mario's choice that position further maths outside the narrow focus of school, but Mario also uses arguments that further mathematics conforms with schooling. His work-experience mentor has encouraged an academic route to his dream; he could take a physics degree first and then work in acoustics. Mario also cites universities telling him further mathematics is the right preparation for physics, and his further mathematics teacher's view that it gives you a head-start at university. These reasons, and their authoritative institutional

sources, emphasise the progressive nature of school mathematics and position further mathematics as ‘further’ along that path. Together, his justifications suggest that his aspirations match the FMNetwork’s breadth-plus-depth construction of quality. He aspires to study further maths because it is broad enough to provide both academic certification and application in a ‘real-life’ setting, and because it is deep enough that he can get ‘ahead’, making sure that he is included in the niche he has picked out as desirable.

In these examples Mario uses constructions of quality in further mathematics to maintain overlap between the talented outsider status that comes with his dream and the reassuring possibilities of exam success. When Mario’s AS grades were lower than he wanted, he was once again threatened by measurement. Other students in the class excused their low grades and nearly all stopped further mathematics; but Mario and Randall continued. At the end of their second year I asked why they had chosen differently. During the discussion (lines 576 to 649), Mario deals with conflicting understandings of what studying further mathematics means to them and about them:

577 We were a lot more clever than them.

594 I think a lot of people say it's the hardest A level.

596 And everyone knows it as well. Which makes us feel cool...

602 It's just it's... I didn't mean it makes us feel cool, it makes us look stupid.

622 And it doesn't make you... People makes ... think it makes you a genius.

624 We should be really clever, but something about it, maybe a bit of common sense, like we just... sometimes we just, like maybe the time of the day, or what mood you are in, but sometimes we feel really stupid.

Mario is conscious of positioning himself as clever, cool and different but, importantly, not alone in ‘belonging’ to further mathematics. The feelings are

described as the result of their common choices and so personal to *both* of them. Mario starts here by comparing himself with others; his belonging is based on their exclusion from 'the hardest A-level'. He ends up worried by how "it" positions him compared to the "genius" model he has just helped to build. This illustrates again how exclusion is inherent in these constructions of quality. Mario not only has to defend his sense of belonging against structural threats such as AS grades but also against how he explains his self-practices to himself. If he doesn't "feel" clever, how can he belong? In line 624 he calls up an explanation which constructs two oppositions: either his self-doubts are momentary irrational lapses from cleverness, or cleverness is not related to common sense and practical experience. This answers one threat to continuing, but introduces a second threat - how he sees himself as practical and 'hands-on'. This recalls the historical classed constructions of advanced mathematics as removed from work applications. Mario formulates this in terms of his personal qualities when he wonders:

> whether I'm patient enough to actually go through all the Physics and stuff, and be good, really good at it at the end, or go straight into it and build up experience in it.

Again Mario links education with having to be "really good", and contrasts having to "go through" it with actively 'building' authentic, direct experience. Staying in post-compulsory education, and studying more abstract disciplines are the types of choices that produce structural class inequalities (Atkinson, 2007). Here Mario is constructing them as choices based on truly understanding himself. Randall, too, positions mathematics as inauthentic, and Mario as excluding himself from their dream:

> Randall: I'm going to be there. But Mario's gonna be like working out all these equations.
>
> Mario: And I'm gonna be paid ten times more than you.

Randall: And I'm gonna be the happier one. It's not all about money Mario.

Mario: No. I'm gonna be happy.

Mario is on the defensive. He uses mathematics to make a claim for economic success but Randall excludes him not just from practical experience but from happiness. From a neoliberal perspective, the key practices of the self are concerned with gaining the self-knowledge to pursue personal happiness (Rose, 1999). Mario's case is an example of how the constructions of quality and equity in further mathematics can reappear as ways of understanding oneself as included and excluded not simply from mathematics but from one's self.

Conclusion

In this chapter I have used the context of further mathematics A-level to analyse how its sociohistorical role provided understandings of equity and quality as privileged access to a 'gold-standard' mathematics education; how an influential reform program created new agendas of universal opportunity and had to reconcile them with existing understandings of quality in order to recruit support; and how an individual explains his experiences and choices in ways which translate these issues of quality and equity as saying something about his own self and his choices. Throughout, I have tried to show how the opportunities for choosing built into the education system in England and Wales position schools and government as powerful in guiding rational economic choices but individual students as responsible for making them.

The FMNetwork has tried to preserve quality while addressing inequity by removing barriers to starting further mathematics. However the ways in which quality is constructed mean that some students must be excluded, or rather must choose to

exclude themselves. School factors do exclude students: for example reduced teaching time affects AS grades so that students opt out. Students also experience questions about belonging that spring from the same discursive representations that made them join. In further mathematics the associations of quality with measured success and abstract learning is difficult to sustain against the risks associated with competition, and also against a desire for present happiness and authentic experience.

It is easy to focus on ways in which students may find themselves threatened in belonging to further mathematics, but there are also ways in which they can resist. Mario described his final push for success as deciding to change how he thinks about himself and his goals, giving up some of his independence and using FMNetwork connections to find a tutor. In the process of including himself, he strips further mathematics of the quality of separateness that once attracted him: “it should just be called different modules”. Quality as depth is a powerful construction, but aspiring to include ourselves is accompanied by consciousness of how to exclude ourselves. Although my policy analysis suggests that the FMNetwork required a dual breadth-and-depth construction in order to defend itself against the past, individual students may show how ‘further mathematics’ can be rethought as an inclusive ‘more mathematics’.

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