

Choosing more mathematics: happiness through work?

Cathy Smith

Homerton College, Cambridge & IPSE, London Metropolitan University.

This paper describes research with A level mathematics students in schools which offer the opportunity to study with the Further Maths Network. Using evidence from observation, interviews and e-mail questionnaires, I examine how the students use the discursive positionings of mathematics and further mathematics students within their work on identity: what Foucault calls their 'practices of the self'. I focus on how they negotiate the contemporary requirement to be happy.

BSRLM Keywords: Further mathematics, poststructuralism, affect.

Introduction

Low and declining participation in advanced mathematics is a matter of recent concern in England and Wales. Mathematics is promoted by the government as crucial for personal success and economic growth, but the proportion of A-level students taking the subject is not growing (QCA 2006). Further mathematics A-level extends the advanced maths curriculum leading to a second AS or A2 qualification. Historically, it has been taken by academic achievers preparing for mathematically demanding degrees, and has a gatekeeper role in enabling "students to distinguish themselves as able mathematicians in the university and employment market" (FMNetwork). Participation in further mathematics declined steeply in the 1990s because of changes in the post-16 curriculum, the availability of mathematics teachers, and student choice patterns. The Further Maths Network (FMN) was set up in 2005 to promote further maths A-level and provide tuition for students whose schools could not. Participation is now increasing, with the greatest growth in state schools (Searle 2008). FMN students typically take further maths as a fourth or fifth subject, attending one 2 hour after-school lesson per week taught by a visiting FMN tutor. In contrast A-level maths has four hours per week in the school timetable. Differences in how maths and further maths are located within spatial, temporal and social practices of schooling (Beard, Clegg, and Smith 2007) produce different tools and tensions for constructing student identities.

This paper reports findings from my doctoral research which explores how students account for their choices to do - or not to do - more mathematics. I draw on interviews and e-mail questionnaires with FMN students to examine the relationships that students construct between happiness and work and how they manage the institutional positionings of modern subjectivity and continuing with mathematics.

Theoretical Framework

The relationship between happiness and work is central to 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. In modern society, life is structured as a set of present and future choices that position the individual economically, socially and psychologically (Rose 1990). The cultural practices that represent choices as individual also represent individuality as experienced through autonomy. Choices are seen as realizations of the attributes of the choosing person. Individuals are constrained to choose and are personally responsible for all the outcomes of those choices. Some outcomes are economic, such as choosing to work in subject areas that enable access to financial rewards; some are psychological, such as being happy.

Modernity positions the individual as the centre of control through strategic institutional practices that govern populations through self-governance (Rose 1999). One such strategy merges aspects of the self that could otherwise be considered as coming under distinct structural influences. Happiness and work are two such aspects: they are represented as ‘naturally’ opposed while at the same time being brought together in the construction of the modern autonomous adult. Weber deems a personal ethic of life-long work to be “irrational” from the “viewpoint of personal happiness”, so that “a long and arduous process of education” (1930, p62) is necessary to form individuals within the ‘spirit of capitalism’. In our modern society, Rose (1990, p119) traces how schools, workplaces and communications media have become increasingly structured by “institutional technologies” that equate work *for* oneself with work *on* oneself and success with happiness:

There is no longer any barrier between the economic, the psychological, and the social. The antithesis between managing adaptation to work and struggling for rewards from work is transcended, as working hard produces psychological rewards and psychological rewards produce hard work.

Schools draw on these discursive understandings to position A-level students as maturing adults, beginning to choose individual life-trajectories that combine work and happiness. Choice does not happen just once in selecting a subject to study but repeatedly presented as opportunities to renew engagement - such as progress reviews, revision sessions, module retakes. In each of these choices students must engage with institutional representations of successful students as those who can transform maths work into happiness. Conversely, unhappiness is equated with failure at maths *and* with having failed to choose appropriately for oneself; the imperative is to choose again and differently.

School practices construct privileged knowledges about what it is to be a mathematics student and to be a knowing autonomous subject. They also structure how individuals can relate to such discourses: who can be positioned as powerful and who can't, which ways of describing experience are legitimate and which aren't (Foucault 1991). These are also the same practices that students can and must use to position themselves as agentic. From this theoretical perspective, work and happiness are not measurable attributes of individuals but discursive tools that students make use of to explain themselves and their choices. Thus my study does not focus on *whether* individual maths students are able to combine work and happiness in structurally deterministic ways. Instead I acknowledge agency and consider *how* they make claims about work and happiness in narrating their personally constructed experiences of further maths.

School framings are contested because competing discourses exist and involve different positions of power. Two important examples are the common adolescent discourses typified as ‘effortless achievement’ and ‘uncool to work’ (Jackson 2006). These produce work and happiness as opposed and construct individuality as requiring autonomy but this is achieved through resistance to school practice.

Students are thus positioned and position themselves within multiple, overlapping discourses, but they can adopt, adapt, adjust and resist those positionings (Skeggs 1997). The differences in how individuals account for themselves as managing work and happiness help to identify which experiences matter in being able to sustain identities as further maths students – so they help us to understand who succeeds at and who wants to carry on with maths.

Method

The data is drawn from interviews and subsequent e-mail questionnaires with seventeen students in two schools. The initial selection was pragmatic: schools in eastern England with viable groups studying AS with the FMN. One school, in a small market town, had not offered further maths for some years, and had just joined the FMN. The other school, in a large city, used the FMN to cover a teacher shortage for one year only. Both schools offered further maths to all their maths AS students, each class starting with about 10 students. My interviews took place late in year 12, when there were seven students in each class: 3 male and 4 female in one, 6 male and 1 female in the other. I also interviewed 3 students who had chosen not to study further maths. This table shows my participants' profiles of maths and further maths:

| A-levels: | | Further Maths | |
|-----------|------|---------------|-------------------------|
| Maths | None | AS | A2 |
| AS | 1 | 1 (FMN) | - |
| A2 | 2 | 5 (FMN) | 4(FMN) + 4 (FMN/school) |

Of the 17 participants, one described his ethnicity as Indian, one as Mixed-Asian/White and the others as White. All these students were middle-class based on reported parental occupations and education, although their accounts of family guidance and expectations of higher education varied widely and included the student autonomy associated with working-class families (Ball, Maguire, and Macrae 2000).

During the semi-structured interviews I asked about choosing AS subjects, about images or memories of learning mathematics, how their class usually interacted in further maths and maths lessons and how they personally had worked on a maths topic. Students also selected prompts from a list of twelve adjectives (such as talkative, warm, painful) to describe what school subjects were and were not. I analysed the data by selecting any statement which described or explained happiness, work, and any negations such as pain. I reviewed the coded text to summarise how and in what contexts individual students related work and happiness, and then reorganised the data by emerging themes.

Turning work into happiness

Overall, students modified the natural opposition of work and happiness: working is an unhappy experience but work that can be completed makes you happy. Students associated work with unhappiness when it was wasted because it did not bring the grades, success or understanding they desired. More frequently, unhappy situations were ones that threatened to exceed expected limits or where success was uncertain. For example working on exercises with no answers or without a source of help were cited as *painful* and *frustrating*. The third source of unhappiness was when work conflicted with strategies to show achievement without effort, for example when students had to concentrate in class.

Students described enjoying maths work in lessons when they interacted with others at the same time as working: *We all get on, we have a laugh. We talk, we do the work.* It was much rarer for them to describe individual or homework as enjoyable. Some students did associate solitary work with happiness, describing being absorbed in a task, feeling *safe* and *warm* and that they could make progress. Others separated enjoying the subject from enjoying any specific work processes: *I just enjoy maths.* Making such claims about the self uses mathematics as a source of analogies for identity construction (Mendick 2006). These students downplayed emotional reactions to maths work, with its potential for unhappiness described above. Instead they located their enjoyment as a personal quality. Maths work is thus part of the project of the self which is expected to be ongoing, limitless and aimed at happiness. Students who made such claims were also understood to be ‘good at maths’.

I now turn to two linked themes that ran through the descriptions of maths and further maths practices, that underpinned students’ explanations of how maths differed from further maths and how working can be experienced as happiness.

Stability over time

Students accounted for their choices of maths A-level in terms of enjoyment, ability and, to a lesser extent, utility. These are linked: the utility of maths gives it a recognized exchange value and students enjoyed claiming ability in a valued subject. A recurrent theme that allowed students to express this enjoyment and also to describe their experiences of A-level work was the construction of maths as being stable over time. Stability allowed students to connect schoolwork with happiness, using time as the link. Feeling happy about their maths work in the present justified them in predicting future success, while this confidence in future success made them feel happy about the present work. Describing this relationship in terms of individual qualities such as confidence and enjoyment helps students mark themselves as autonomous in mathematics.

Stability works over different time-scales. Over a life-trajectory, maths and further maths were represented as subjects of lasting value in the technological world and as qualifications. Students described their own maths ability and enjoyment as individual qualities that had persisted and matured. This stabilised their hold on powerful positions associated with advanced maths, for example being clever. Maths was also represented as stable on shorter time-scales relevant to school practices, but here further maths differed. In maths, students described *safe, straight* progress from lesson-work to homework, from teachers’ examples to students’ follow-up work, revision to exam, and year to year. However, the pace of further maths teaching meant students could not be sure that success in current work would bring success in the future. Charly (female, A2 FM) described a comfortable experience of ‘normal’ maths based on her claim that “*even if I can’t do it I still feel comfortable about the fact that I will be able to do it*”. Further mathematics practices don’t enable her to make similar claims: “*cos in further mathematics like we move so fast, if I can’t do it I worry a bit*”. Further maths is neither warm nor comfortable, and although Charly plays down her ‘worry’, she also contrasts it with the personal certainty she prefers.

Further maths requires unusual work practices from the students; ones that threaten their image as able students. Mario (male, A2 FM) expects to ‘skim’ maths lessons, gleaning enough to complete the work, but in further maths “*if you don’t listen for one little bit then you don’t know what to do*”. For Clive (male, AS FM) happiness in maths relies on stability because past efforts allow him to minimise

current work: “*I can do that off the top of my head because we have done it before*”. Like many others, he enjoys having control over his future revision: “*I have just got to put my head down a week before the exam, and get it in my head right*”. Clive limits his academic work for social reasons; he must not be an “*all-working boy*”. This can conflict with completing his further maths work: “*I'm not going to sit there for two hours thinking; there's no point*”; and this is a reason that he stops after AS.

Maths is thus constructed as stable over time within teaching practices, discourses of rational technology and student accounts. Students use this stability to make claims about how they experience work as happiness. Year 12 students did not find that further maths work was ever wasted but did find that some of its practices threatened the ‘normal maths’ discourse in which students could predict success and limit public and private work. This contrast between maths and further maths meant that students found tensions in positioning themselves as happy in both subject practices. They may then give up further maths, or they may find ways to reconfigure its instability while retaining autonomy. Mario did exactly this when he found a positive in having to concentrate in lessons: “*It's all about independent learning which makes it more difficult*”.

Working with others

Whereas stability entered into students’ reasons to choose maths A-levels, working with others was a theme that appeared in their descriptions of working practices. Both maths and further maths were described as *talkative* subjects. All students represented working with others as essentially pleasurable. In this respect maths practices that allowed interaction are a context for establishing agency and self-knowledge in relation to other people. For example, students found both power and pleasure in helping each other and described this as progress to autonomy. However, working with others was not external to learning. Students described it as the best, and, for some, the only way for individuals to engage successfully with maths.

Many of the A-level teaching practices built social interaction into maths. Lessons usually included time for students to work together, they worked on the same problems, and were encouraged to seek out and prefer other students' explanations. These practices positioned maths as objective but in a world of subjective knowledge. Learning was seen as developing an individual perspective on fact: “*If you don't understand it then you need a different point of view of how to explain it to you.*” Students described their maths work as shared and public. Whereas ‘creative subjects’ enabled them to display individuality, maths enabled students to collaborate without criticising others’ opinions. Students linked these practices to happiness; for example taking part in the “*little argument/ debate things*” going on in maths lessons was seen as the marker that you “*really really enjoy it*”.

Despite time pressures further maths lessons were also largely based on teacher-student talk. Students were very critical of one tutor who allowed “*no room to openly discuss*”, and this *stale, painful* experience made her give up. Students thus experienced lesson work as collaborative and pleasurable for both further and ‘normal’ maths. However this discourse constructed the solitary homework required by further maths as a contrasting unhappy experience given as another reason to leave. Students found ways to resolve the tension. Some restated their individual commitment to maths, repositioning solitary work as expressing individual interests and so pleasurable as a lifestyle career choice (Ball, Maguire, and Macrae 2000). Students tended to hold this position indirectly: “*if you want you can just work on*

your own and do it yourself" (male, A2 FM). Many more students limited their solitary work by scheduling work with others:

What we usually do is we'll put... We'll sort of work on it ourselves and we'll get so far and then stop half way through or three quarters of the way through it. And leave some of the questions. Then we'll come in on a Monday and [...] we'll sort of go through it together, see if we can. (Tom, male, AS FM)

Here working with others is combined with scheduling an end to instability. It thus avoids the multiple unhappinesses of: solitary work, work that exceeds time-limits and work that does not progress. Since other people are understood as the means to progress, working together can be used to limit and socialise the work that makes students unhappy. From this perspective students are not becoming dependent on friends, but are taking over from teachers in creating collaborative learning spaces.

Implications

My study takes a setting of FMN teaching and shows how students draw on local practices to construct maths as stable and involving collaboration. Stability permits maths students to absorb time-related risks within the self; collaboration legitimates using other people in work on oneself. These constructs allow students to claim personal qualities such as ability, confidence and control which contribute to happiness through self-governance, and thus justify choosing to continue with the subject. Further maths involves limited time in lessons and isolated work between them so does not always permit students to absorb risks. Some students successfully transform work into happiness by changing when and with whom they work; others change the meanings they give work. My future research will consider how FMN practices could change, either to sustain stability and collaboration or to offer other compatible ways of transforming work into happiness.

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