Renegotiating identities: mediation of troubling AS Level mathematics.

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Introduction

This paper explores the "troubles" that some students meet as they journey into, through and out of their study of AS mathematics on two different programmers (AS traditional Mathematics and AS Use of Mathematics) as we attempt to understand how this impacts on their developing identities in relation to their current and future studies and career aspirations. To set the scene we take the unusual step of immediately presenting some data in the form of the summary narrative accounts of two such students before detailing methodology, theoretical framework and analysis.

David's Story

David had a "troubled" relationship with mathematics during his AS studies the result of which being that he eventually opted out of following a trajectory into a mathematically demanding Higher Education course in science or engineering. At school he had always been in the top sets for mathematics, got good grades and enjoyed the subject. However, he felt that he could have been pushed more and ended up "only" achieving an A grade at GCSE rather than A*. He acknowledges that this was partly due to his not having done too well in producing coursework towards his GCSE, for which he got a relatively low mark, and that he had rather enjoyed socialising. His "troubles" continue when he arrived at college as after only a short time he "moved down" to the Use of Mathematics programme from the traditional AS Mathematics course and attributed the move to maths at college being very different and more difficult than maths at school, "at GCSE you could just blag a few good grades but college is a lot harder". At this stage David was also studying physics, accountancy and psychology and planned to study radiotherapy at university (combining maths and physics) and had a back-up plan of studying accountancy.

At the time of a second interview, David talked about his positive experience of the Use of Maths course and how his confidence was increasing, so much so that he planned after successful completion of the AS to get back onto the traditional maths course and complete the whole A-level in one year. At this point his aspirations were to continue with physics and accountancy and after completing the maths to go to a high status redbrick university to study physics. He was determined to do this and talked of doing a foundation year if necessary at his first choice university if he didn't get the required grades. His actions at this point, such as sitting on his own in maths lessons to avoid distractions and his talk of family support, including financial help so he could give up his part time job, all supported his talk of his determination. Family support and approval seemed important, with David telling of how his family recognised future potential job opportunities associated with physics and how he was happy at the idea of providing a role model for his siblings.

However, by the time of a third interview, David's plans had radically changed: he now intended to revert to his original back-up plan of studying accountancy. The key event which had prompted this change of plans was his failure to achieve a grade A in the AS Use of Maths: even though he had been only one mark off David was afraid that he might not after all achieve a good grade after a further year of study towards the traditional A Level Mathematics. His discourse was of maximising his performance across subjects and that when he had arrived at college to re-enrol for the A level year his psychology teacher advised him to stick with the subjects in which he had already got good grades:

"*I came to re-enrol, you have to re-enrol, I was tempted to do Further Maths, re-enrol and do Further maths, maths, accountancy, and like I came to the day thinking I'm going to do Further maths and maths and then I went to see my psychology teacher and my psychology teacher thought it was probably best if I stuck on with psychology and just do accounting because I got such a high grade in accounting. And when I thought about it logically I thought it's probably going to be the same… I enjoy it just as much and I thought maybe I should just stick with something that I've got really good grades in already than put all my eggs in one basket and then fail*."

He justified his decision with talk of maximising his potential earnings as an accountant, but there was also talk of regret that he hadn't stuck with traditional maths from the beginning, as with hindsight he recognised this had been the reason why had had not ended up pursuing a career in physics.

Shane's Story

Shane's "troubles" during the AS year lie outside of the college which in some ways provided a shelter from the storms that he experienced elsewhere. Although having difficulty with Further Maths, he finds maths 'easier' than other subjects' and he reports maths with his particular teacher as 'more colourful, different'. Lessons with this teacher require students to work on mathematics in groups which he liked and he talked enthusiastically of having opportunities to explain and teach others, "…[at lunchtimes] sometimes I stay in and just go through the work with people… the ones that want to come.."

However, getting on with his maths is not always easy as he explained that his family (mother and young brother) had a lot of trouble with "ASBOs" (Anti-Social Behaviour Order) living next door, threatening his family with 'violence': "they threatened to petrol bomb our house once", causing his young brother to have panic attacks and his mother to be ill. This made him angry and frustrated and he mused about starting a political party to do something about this type of (problem) person by perhaps removing their citizenship, "putting them away", or sending them to "1950s style teaching and stuff … like 'Bad Lads Army'".

At times these experiences interfered with Shane's work and he talked of having to leave it for another day. He reported talking to his teachers about these things which he appreciated as an opportunity to let him get things off his chest.

By the time of a second interview it is clear that Shane's enjoyment of helping others with their maths is being encouraged by his teacher, as he talks warmly of helping two girls who are in his group in the classroom and at this stage he is considering becoming a maths teacher. Shane, who was planning to go to university, appeared torn between his need to be able to look after his mother and brother (both of whom were ill and continued to need intermittent hospital care), in the role he had adopted as Head of the family since his father left home, and the possibility of getting away. As the university in his home city doesn't offer mathematics if he was to study this it would mean living away from home.

By the time of a third interview Shane reported having got a grade C in maths (his minimum target grade), and having failed Further Maths which he had expected, and he introduced a new option that he was considering of studying History at university which would allow him to remain in his

home city. Consequently he applied to study history at his hometown university and mathematics at another further away, leaving a final decision until later.

Teachers and his relationships with them are very important to Shane, so much so that he dropped studying ICT as he didn't like the teacher. He spoke highly of his Maths teacher throughout his AS year, and although he didn't do well in Further Maths he also rates the teacher of this group highly. However, not all was plain sailing at the start of the A2 year as he recalled a difficult period of getting to work with a new maths teacher:

> "*Those first few weeks... I got really annoyed with him because there was stuff going on [family] and he didn't help... it was the way he was criticising the way I did stuff ... so I actually did tell him I was dropping out of Maths ... But then I came back the next lesson because it got sorted… I'm still in there. I think it's sorted*."

It was crucial for Shane to have teachers who had time not only for his maths problems, but also who were interested in him as a person,

Background

David and Wayne's summary narratives have been constructed from interviews at three different points as they progressed through a year or so of further education (usual age 16-19 years) as part of the project *Opening doors to mathematically-demanding programmes in further and higher education (FHE)* which explored students' dispositions for further study, particularly in higher education, and particularly to study courses in which mathematics might be relevant. Interviews were conducted with forty four students on up to four occasions over the course of the year during which mathematics was at least initially part of their studies and when they made decisions about university applications. Alongside the interviews the project also conducted a longitudinal survey and focused on teaching and learning in five case study colleges from which the interview sample was built. This sample was constructed to ensure that it included students likely to drop out of maths at this level due to 'risk' factors such as low previous mathematics grades, first generation into higher education (34/44) and so on. In a series of interviews we enquired about students' biographies, their dispositions and future intentions (Williams et al, in press).

Most of the participants were on a general education A Level programme and twelve were taking a BTEC National in engineering. With the exception of one mature student, participants were between the ages of 16 and 19, fifteen were female with no females on the BTEC Engineering programme. and twenty five of the students were non-white having a range of different heritages.

Theoretical Frame and analysis

According to Geertz narratives are the stories we tell ourselves and others about ourselves and are central aspects of culture. Such narratives are therefore the lenses through which we understand and organise our world as individuals and collectively. As we develop narrative accounts we draw on joint cultural understanding of our lived in world: Gee (1999) refers to the everyday theories (i.e. storylines, images, schemas, metaphors and models) that people use to make sense of their lives as cultural models. "Cultural models are not static… and they are not purely mental but are distributed in socio-culturally defined groups of people and their texts and practices" (Gee, ibid: 23). Thus we can draw on cultural models to tell us what is "typical" or "normal" and mediate our actions, not universally, but from the point of view of our experiences. According to Holland et al (1998: 51), it is this "stuff of existence", which grants shape to the co-production of activities, discourses, performances and artefacts. This then articulates well with Holland et al's notion of "figured worlds" which we find a useful construct to help us understand how students become

engaged in learning, whether this is learning mathematics or learning to become a university student, because it provides a way to understand how students assume orientations necessary to participate in (collectively) imagined situations. Figured worlds are, therefore, simplified interpretive frames that describe characters who are inspired by a particular set of concerns to participate in a narrow range of meaningful activities. Thus, we can view our interviews as attempts to capture the "figured worlds" of students in relation to learning maths and university subject choice.

Bruner (1996, pp. 133-143) outlines a number of key attributes of the narrative form of cultural 'reality': temporal structure, generic particularity, reasons, hermeneutic composition, canonicity, ambiguity, 'troubles', negotiability, and historical extensibility. Of these we recognise temporality, reasons and troubles as being most significant for gaining purchase on a student's trajectory of their developing identity in relation to their current and future (mathematical) study which is of particular concern to our research project.

Therefore, in our quest to come to understand the trajectories of our interview sample students we as researchers synthesised and condensed the serial interviews into holistic short stories. These we might also consider as 'accounts', in the discursive psychological sense (Potter & Wetherell, 1987) but are ultimately more than this, in that their structure demands a narrative, biographical form that weaves together many elements into a whole (in the sense of Bruner). Developed in this way the synoptic account becomes an object that stems from a process of immersion in the data and facilitates the analyst in re-entry to that state providing props in the form of aide memoirs for theory building/inductive analysis.

Thus these synoptic accounts allowed us to identify "troubles" and canonical storylines to do with students' education and imagined future careers, and so allowed for scoping across the stories in order to map out canonical trajectories for the sample. Such analysis led to the construction of three categories of narrative "*steady as they go*", "*when troubles come, aspirations adjust*", and "*when troubles come I persist*". Of the forty four interviewees, eight narratives were classified as "when troubles come aspirations adjust" and five were classified as "when troubles come I persist". These categories were constructed by pin-pointing "troubles" and subsequent changes in students' narratives, which could be connected with these. Outline trajectories could then be compared and grouped, e.g. aspiration a → trouble → aspiration b, *or* aspiration a → trouble → aspiration a.

The main classification of students' accounts was one of "steady as they go". This reflects how students had often already a firm idea in mind about their imagined futures at the point we entered their lives. Historical troubles might have come and gone, but we refer to these in the synoptic accounts and their classification, *only* if such troubles were significant in their decision-making with regard to university degree subject or career choices.

David's story gives just one glimpse into the troubled world of a student who readjusts his aspirations in response to developing troubles. The crucial "trouble" in David's narrative is performance -the attainment of a grade B in AS Use of Maths, which for many would have been a success. This, following a talk with his psychology teacher, encouraged him to drop maths in favour of psychology A2 providing a solution he believed would maximise the likelihood of a first class A Level performance. David eventually decided instead upon studying for an accountancy degree which he reconciled as providing status and future rewards as well as allowing him to study at a 'good' university. His alignment is with a culture of performativity, although he does also

articulate some regret about having dropped maths and the opportunities this might have then afforded him to realize his earlier ambition.

On the other hand Shane's story is unresolved at the point we leave it, but illustrates how troubles can be situated outside of college and how through the time-span of the project his trajectory might be categorized as "when troubles come I persist" (although ultimately Shane may adjust his aspirations). Central in Shane's story is the agency he develops in studying mathematics in a meaningful way by helping others: indeed his role as "helper" and the relationships he develops with adults in his family and with teachers are important in both college and out of college contexts and keep him " in" even though we are never far from a sense of being on the edge and at risk of drop out..

Conclusion

We found that when confronted with a "trouble", a student's renegotiation of identity could be recognised in the interview text by a change or shift in positioning towards or away from certain cultural models related to (i) making one's way into adulthood and (ii) emerging professional identification with specific intended careers. Students who articulated a view of their projected professional selves, which showed an intrinsic valuing of a "chosen" profession were all in the category of students who persisted with their goals in the face of "troubles", whereas students who made adjustments in the face of "troubles", showed a strong identification with values of performativity and status. "Troubles" to do with performativity (concerns about grades or desire for a high status career) were the most common kind of "trouble" for our sample leading to drop out from a mathematically demanding career trajectory. Indeed very few students dropped mathematics because they said it was too hard. Outside College "troubles" e.g. to do with family or health, were crucial for some and socially inclusive practices made a difference.

Students' explanations/accounts of decision-making are nuanced by a myriad of socio-cultural circumstances, to do with class, gender and ethnicity, but are also very much about their imagined futures. With regard to widening participation in mathematics we have a complex case because students take mathematics for a wide range of reasons often to do with its perceived exchange value for future life gains, rather than for its tangible material use (see Davis et al, 2008), hence, the mediating power of the discourse of performativity in their narratives and its threat to decisions to persist with mathematically demanding courses.

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