

“I JUST MAKE SURE THAT I GO FOR IT”: A MATHEMATICS STUDENT’S TRANSITION TO AND THROUGH UNIVERSITY

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This paper uses a post-structuralist perspective of identity from Fairclough and Norton to investigate the transition from school mathematics to advanced mathematics at university. Four longitudinal interviews with a successful science student were analysed using discourse analysis. I argue that the student invests or does not invest in various social identities, thus succeeding despite the structural constraints of his background. The analysis illuminates the considerable individual material and mental work required for this investment and suggests that the constraints remain a presence throughout the transition.

INTRODUCTION

South African education has undergone extensive structural, policy and curriculum reform in recent years, with the aim of increasing formal and epistemological access. Yet access to education in the sciences at both school and university remain a function of the related constructs of race, socio-economic class, geographical location and language (e.g., Reddy, 2006; Scott, Yeld, & Hendry, 2007). In 2009 South African universities accepted the first cohort of school leavers who had completed their schooling on a new curriculum. Thabo (pseudonym), a Black [1] student in this cohort, talks about living in a “township” and learning school mathematics in “our language” (iSepedi). At school he is “the best learner in school who passed maths”, and is advised by a teacher to study science at university. However, the university positions Thabo as educationally disadvantaged and places him in a four year degree programme in which he completes first-year foundation courses over two years before tackling mainstream courses. Thabo fails his first university mathematics test, yet he makes “sure that I go for it” and wins awards for his performance on the foundation courses. He then fails his first advanced mathematics test in a mainstream course which is “too theoretical, it is all about proofs”. Yet he passes this course (with 50%), thus completing the required mathematics courses for his science degree.

A student’s transition from school to university mathematics can be viewed from various perspectives, for example, in terms of the “fit” between curricula (e.g., Engelbrecht, Harding and Phiri, 2010) or in terms of the student’s personal motivation (e.g., Gibney, Moore, Murphy, & O’Sullivan, 2011). Such studies foreground differences between mathematical practices, yet they may assume unproblematic transfer across practices that “fit” or may locate difficulties in the individual student. Other perspectives look further to the background of a student (e.g., Frempong, Ma, & Mensah, 2012), describing this as “Black” and/or “second-language”. Such studies point to the structural constraints on transition, but as noted

by McGee and Martin (2011), categories such as race may become static and used to explain performance.

A growing body of research in mathematics education views the school/university transition as the interplay between student agency and the wider social structure (e.g., Lerman, 2012; Smith, 2010). Valero (2009) argues that the concept of identity plays “a pivotal role” (p. 218) in understanding this interplay. In this paper I use Fairclough’s (2003) concept of *identity*, supplemented with the notions of *investment* and *imagined community* (Norton, 2010), to investigate the interview texts of Thabo, a successful mathematics student. In particular, I ask what social identities he identifies as set up for him in the practices in which he acts and how he describes himself as investing or not investing in these identities.

THEORETICAL FRAMEWORK

Fairclough (2003) uses three levels of the social to account for the relationship between agency and structure; the concrete *social event* (e.g., what happens in the school mathematics classroom), the abstract *structure* (e.g., race and the English language), and *social practice* which mediates the relationship between event and structure. A social practice such as school mathematics controls “the selection of certain structural possibilities” (p. 23), thus defining how a student should act in class. Yet a social event is only partly shaped by social practice, this due in part to the agency or “causal powers” (p. 22) of participants such as students.

Fairclough’s (2003) concept of *identity* has two parts. The first accounts for structure; *social identity* is defined by one’s circumstances and early socialization (e.g., Thabo speaks isiSepedi at home) and one’s later socialization into particular subject positions (e.g., Thabo is the top mathematics student at school). The second part recognises individual agency; *personal identity* is the personal investment made in the subject positions on offer. An individual’s identity is a product of the dialectical relationship between social and personal identity. Norton’s (2010) notion of *investment* recognises the “socially and historically structured relationship” (p.353) of a student to learning. She argues that a student *invests* in learning, knowing that this brings with it symbolic and material resources. Investment involves aspiring to an *imagined community* that a student aspires to join and which offers particular subject positions in the future.

METHODOLOGY

The four interview texts in this paper were produced in a wider longitudinal study of the 2009 cohort of students at a South African university [2]. Thabo was interviewed by a trained interviewer in the first half of each academic year. The first three interviews were structured, focusing on Thabo’s educational experiences. His final interview was semi-structured, drawing on the object Thabo identified as representing meaning in his life. The interviews were transcribed to represent the verbal interaction. The study has ethical clearance from the university at which it is located. Thabo’s texts were selected for this paper since he participated fully in the study and he completed the required advanced mathematics course for his science degree.

McLeod (2003) notes that “identities do not simply reveal themselves in interviews” (p. 203). I regard an interview as an instance of “recontextualized social practice” (van Leeuwen, 2008, p. 3), practice being recontextualized in two respects. Firstly, the initial practice that is talked about in an interview (e.g., school mathematics) is “inserted” (p. 14) in the practice of research interviews, with the interaction influenced by the research goals. The second recontextualization involves time; Gordon and Lahelma (2003) argue that the present is “constantly reflected in relation to the past, as well as plans for the future” (p. 252).

The analysis draws on tools from Fairclough’s (2003) method of critical discourse analysis. In the interview Thabo uses language to give meaning to the recontextualized practices, both material (e.g., university) and symbolic (e.g., language), in which he acts. He does this by *representing* these practices, *identifying* himself and others in these practices, and *acting* by enacting relationships with others and with texts. Using Fairclough (2003), in interaction with the transcripts, I have identified certain textual features that play a role in these three meanings. For example, naming signals a particular way of representing the world, transitivity identifies a student as active or a thinker, and pronouns set up a relationship to others.

THABO’S TRANSITION

This section is structured according to the practices in which Thabo acts; for each practice I describe the social identities identified by Thabo and his investment in these identities. Since many analyses can be constructed from longitudinal interviews (McLeod, 2003), I link the description closely to the textual strategies as evidence to show how this particular analysis “is possible” (p. 209).

Being a top mathematics student at a disadvantaged school

Thabo’s representation of his schooling positions him as disadvantaged in terms of his race, language, socio-economic status and educational background. His use of negation and choice of adjectives sets up a contrast between home/school and university. He represents his school as a Black school by describing what it is not; “I am not used to Whites and Coloureds, I never went to a Coloured school or a White school”. Thabo’s use of negation represents the language for learning mathematics at his school and at the university as different; “my school, we don’t talk English,... maths we do it in our language”. He describes his school in terms of absences, for example, “lack of materials” and “shortage of electricity”. In the following text Thabo’s use of negation, pronouns and emphasis to describe people at university (“people here”, “you”) positions him (“I”) as lacking socio-economically:

People here have money, no, I’m just an ordinary person, I’m not even rich too, I wish to have those laptops but I don’t think I fit in,... Back home no-one will tell you about money... the money that you eat for lunch here, I can make use of it for a week there, so it’s a lot, could spend R100 for a whole week, here you could R100 for a day, it’s nothing,....

Despite these constraints, Thabo represents his home and school with fondness, suggested by the possessive pronouns “my” and “our” to talk about language-use at school and his description of “ordinary” people “back home”. He resists his positioning as disadvantaged by investing in the social identity of top student in his school, an identity set up for him by teachers and other students. He invests in this positioning by acting like a teacher for other students:

... I would behave like a teacher and then after school we had some sort of a study group, we studied together,..., it’s not like I didn’t know these things because I was just helping those who didn’t know. If I wanted to go home there would be a lot of stress, some people would come to me crying, “Hey, I don’t understand”.

Thabo identifies himself as part of a study group (“we”) in which participants have specific roles; he (“I”) helps others (“some people”, “those who didn’t know”), the negation and pronouns identifying him as someone who does know. He reinforces the difference by recruiting the text of his peers in which they describe their own lack of understanding. Thabo’s individual agency in investing in the top student identity is suggested by his repetition of and emphasis on the material process of studying in the following description of his daily routine at school:

I study whole day, I would study during the class lessons when the teacher teaches other people, I would study. I would study after school, go home, eat, study... my self-esteem was high that I was in Grade 12, I managed to go this far so nothing can stop me.

Thabo identifies himself as joining an imagined community of students at university (“tertiaries”), a social identity set up by his school science teacher who recommends he study university science. Thabo suggests that such an identity is rare amongst his peers (“people”, “they”):

Where I come from, it’s not a tertiary environment that people would dream of going to tertiary one day, it’s just that they only want Grade 12... they don’t love tertiaryes.

Thus, as a school student, investing in the social identity of someone who will go to university not only involves the active process of studying very hard, but also the mental processes of thinking and dreaming about this imagined future.

Being a university mathematics student

Thabo’s identity as a mathematics student changes relative to that of his peers. As the top student at school he is the object of interest; “people wanted to be like me, they wanted to know how I do things”. Arriving at university, Thabo continues to invest in this school identity by tutoring school students. However he fails his first university mathematics test and now other successful students (“they”) are in view:

Some of the students, they passed, I used to fail and then I just wanted to be like them, but I approached them and then try to figure out how they do it.

Resisting the social identity of failing student, Thabo actively approaches these students to “figure out” what they do. After two years of studying foundation

mathematics he is winning awards for his performance and, once again, becomes the object of interest to his peers who “want to put themselves close to me”. However, in his third year of study he is failing advanced mathematics, but he resists this identity by representing different degrees of failing:

I studied for those tests but still I couldn't do, not that I failed failed, you know, I managed to get close to the passing mark, but not really pass.

This resistance is accompanied by Thabo's changing description of academic success, from being “the best student” in school mathematics, to achieving 65% in foundation mathematics, to someone with his “background” being one of only two students (“it is this White guy and it is me”) taking a “tough” combination of subjects. He also questions the value of university assessments in defining success:

... you can't say you don't know something if you are not passing... you have those people who can tell you answers if you ask them but they can't pass tests, you know there is a contradiction there.

Thabo is also “angry” about having tutors assess his performance, a critique related to the academic knowledge of tutors who are “only one year above you” and favouritism based on race and personal relationships.

Being a student who loves mathematics

Thabo points to his own passion for his imagined university community by identifying other school students' lack of “love” for this community. He also consistently talks of a relationship of “love” for mathematics, no matter his representation of the practice and his positioning in that practice. He represents both school and foundation mathematics as being about “numbers”, but suggests that the calculations in the latter practice are “more advanced” and require problem solving skills. He links his love of the subject to his identity as a good student; “I'm good in numbers and I love maths”. Advanced mathematics is represented as different to school and foundation mathematics:

... I haven't figured it out yet because I'm used to maths as you know, you know you deal with numbers and stuff, but there is this other module, they do some weird stuff, ja, they call it linear algebra, it is more, it's too theoretical, it is all about proofs and stuff, you don't even see digits there, that's the thing, so it's one of my modules that I don't even see light but I am planning to,... I am sure this term I'm going to be comfortable with that module.

Thabo uses pronouns to distinguish between what he (“I”) and the interviewer (“you know”) recognise as mathematics, and linear algebra which is done by others (“they”). Advanced mathematics is represented as opaque, yet he expresses confidence in his ability to invest in this new social identity. This investment involves his personal agency to “figure it out”. Despite this challenge, Thabo still expresses a passion for the subject, a passion that lies, firstly, in his past positioning as a good student with natural ability; “... if your mind is in, if it is based on mathematics... you

always find ways to solve problems”. Secondly, he invests in the new identity because he sees mathematics figuring completely (repetition of “all”) in his degree programme which is “all about doing maths all the time”.

Being a university student who studies mathematics in English

Thabo does not allow his initial difficulties with foundation mathematics to challenge his identity as a good mathematics student. Rather, he explains his difficulties with reference to his new social identity as a student who studies mathematics in English. He emphasises (using repetition and negation) that he is not comfortable with this new identity; “No, absolutely, no, I’m not”. In tentatively identifying his lecturer as a “White guy”, Thabo also suggests his difficulties are related to his race (not “White”). Thabo identifies himself as a volunteer public speaker at school and he actively chooses a variety of African languages to talk to other university students; “I speak any language that I want to speak”. In contrast, his use of English in academic spaces at university is passive (it “happened to him”) and he no longer “talks a lot”:

... it’s uncomfortable, but I talk. I don’t know what happened to me, I used to be someone who talks a lot, especially in front of people, I did public speaking in high school, I did debate, I don’t know what happened to me when I came here.

Yet Thabo invests, through material and mental action, in this new social identity:

I just make sure when I sit somewhere and people are talking, I just grasp the accent, the way they say the words and then I put them in my mind.

Thabo’s feeling of discomfort learning in English continues during his academic career. However, he also ascribes his later difficulties to the action of taking “too many courses”. It seems he was investing in the social identity of good student, set up by his university student advisor; “he told me, no man you can manage”.

Not being a foundation student/being a foundation student

Thabo’s placement in a university foundation programme positions him as disadvantaged, a social identity in which he alternately invests and does not invest. Initially “happy” with this placement, he soon resists this identity as it challenges his love of studying. His “normal”, “very fast” pace is contrasted to the “slow” pace of his foundation courses:

... in high school I studied very, very, very fast, I used to be a fast learner, but here it’s slowing my pace, ja, I don’t normally do this.

However, in his second year of study Thabo interacts with mainstream students in some courses and he repositions himself in relation to these students His new social identity as someone who doesn’t “know everything” opens the space for him to make use of the “unlimited help” offered by the foundation programme:

Okay, in the foundation programme they do like, I don’t know how to put it, what can I say, they feel sorry for you, like they help you, you have unlimited help,... they know, they understand you, they take it that you don’t know everything and here [the

mainstream] they, okay, you managed to get into mainstream and then you know everything, so they just touch you up and they just leave you.

Thabo's difficulty knowing "how to put" his new identity points to the personal struggle that this investment involves. Yet, in his third and fourth years he draws on his identity as a Black foundation student to account for his academic difficulties. He describes the courses with the adjectives "difficult" and "very tough" and he recruits the texts of university staff to confirm his representation; "they tell me this is a tough combination". Yet he also uses his identity as disadvantaged to celebrate his achievement in making the transition, identifying himself along with one "White guy" as the only students in the "whole of the university" taking this combination.

Being alone at university

While Thabo may value the "unlimited help" offered to him as a foundation student, making use of this resource involves a repositioning, from student who teaches others to a student who needs help. Thabo attributes his difficulty investing in this new subject position to his identity as someone "from a disadvantaged area" who does not know anything. Rather than approaching a lecturer with questions straight after a lecture, he uses the textbook and the internet to "prepare what I'm going to ask". His use of the pronoun "you" (rather than the first person "I") suggests that this is the way people like him should act; "if you don't know anything, you can't ask".

Thabo's positioning as different to his school peers was on account of his superior academic knowledge. He also identifies himself as different to others at university, but this time his superiority is replaced with a sense of being completely alone. In contrast to his school identity, he uses negation to position himself as inferior in relation to his lecturer's academic knowledge, use of language and race:

... it's a problem, most of the lecturers are White, so when they set the papers, they understand, they know how to write questions and you come there with your less knowledge of it and then you can't answer it well.

Although he studies with peers at times, he usually studies alone. His investment in his position as a successful student involves both the material action of repetitive practice, but also telling himself that he can invest in this social identity "next time":

I... tell myself that next time I'm going to do better and study more and make sure I practice and do everything all over again, all over again.

Responding to a question about what has contributed to his successful transition, Thabo's use of negation and repetition reinforces the sense that he works alone:

Nothing, to be honest, nothing,... This question that you have just asked me made me realise that I have actually been doing everything alone, you know, nothing, my sister's family, they never contact me about stuff like that, never – nothing.

Being a successful university student involves not investing in other social identities, positioning that illuminates the sense that Thabo is alone at university. He does not

socialize “because ... I am here to study” and does not pursue his “love” of acting. Thabo’s meaningful object, presented at his fourth interview is a picture of people “performing drama”, something Thabo represents as “exactly what I used to do a while back”. However, being a science student is the natural thing to do, and he assumes that the interviewer shares this view (“you know”) about “how people are”:

You know how people are, they give you this potential that you didn’t see, like, you good with maths, why can’t you just do this. And you know you follow them because you you are good with that.

In addition, Thabo identifies the symbolic and material power associated with being a scientist, a choice that provides “a faster way up the ladder” than becoming an actor. Gaining this power is part of investing in the social identity set up for him by his family who “see me as a successful scientist” and his identity as a Black person (“we”), “... we are Black people, we have families we have to take care of and we need to go back home”. Thabo’s investment in this social identity involves taking two specializations; one (which he “is not ... passionate about”) and another so that he can “just do research”. However, investing in this identity also involves not investing in certain home identities; he studies during the vacation at home as any other identity is “so not me”, and he clears his mind completely of thoughts of home when at university (“everything that happens at home just stays there”).

DISCUSSION AND CONCLUSIONS

Thabo completes the mathematics courses for his science degree, despite the structural constraints he identifies and which are mentioned in the literature as affecting performance in mathematics in South Africa. His investment, in response to his changing social identities, takes on different forms, a result that both confirms and supplements other post-structuralist identity research on the transition. Thabo invests in social identities that remain stable in his transition, for example, the student who loves mathematics (e.g., Bartholomew, Darragh, Ell, & Saunders, 2011) and who imagines himself in a community that does mathematics (e.g., Black et al., 2010). However, continued investment in a social identity may require redefinition of that identity. To avoid the role of assessment in his positioning as good student (e.g., Boylen & Povey, 2009), Thabo removes assessment from his representation of success. He also invests in new social identities (the student who learns mathematics in English) and resists other identities (those that prevent him from studying). Lastly, Thabo alternates between investing and not investing in the social identity of foundation student.

Yet this analysis suggests that neither the structural constraints nor the personal struggle involved in the transition can be under-estimated. Firstly, the constraints remain present in the power relations between Thabo, his peers and his lecturers. Thabo actually harnesses his disadvantaged identity for “positive agency” (McGee & Martin, 2011, p. 1349), using it to explain his difficulties and celebrate newly defined success. While McGee and Martin (2011) intentionally focus on the construct of race,

this study in South Africa points to the inter-connectedness of race, language, socio-economic status and education in defining disadvantage. Secondly, I use the word “work” to emphasise the considerable individual agency required in the investments (e.g., Smith, 2010). For Thabo, this agency involves material action like studying hard and mental action like thinking about his future. His mental action is also relational, in that it involves reflecting on others (e.g., McGee & Martin, 2011). There is a strong sense in this analysis that Thabo is working alone, and that the changing social identities impact on his sense of himself as a person (e.g., Black, Mendick, Rodd, & Solomon, 2009).

The story of Thabo’s transition develops our understanding of how the successful mathematics student works to overcome the constraints of his background. Yet his investment work is relational, and thus points to the role of institutions in positioning students. As educators we should be asking questions such as, “How do we support a student to develop a mathematical identity in a way that does not require resistance to home and other university identities?”, and “What support enables a student to negotiate the power of language, race and knowledge to make use of the resources on offer, rather than doing the investment work alone?”

NOTES

1. I use the term *Black* (for *Black African*), *Coloured*, and *White* for race groups since this terminology is used in reporting educational participation and performance in South Africa.
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