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This paper portrays voices of students pursuing mathematics at their gymnasium. Obtained through narrative interviews, the students voiced were observed and interacted with through their academic year. The opting out by one of the students from the standard level course for another course less demanding, forms backdrop to voices reported. An attempt is made to look beyond the label of modernity and seek to understand how the learning of mathematics by students is intimately connected to their experience of schooling. An example of close-to-practice research, highlighting tensions and contradictions of classroom practice, is presented.

Keywords: student voice, schooling, post-modernity, close-to-practice research

INTRODUCTION

In this paper I examine Bruner's (1996) institutional tenet of education – one which prepares our young to participate actively in other institutions of culture. Further to examining this problematic with students studying mathematics at grade six (Gade, 2010) I report this time with students at their gymnasium. My approach to eliciting students experience of studying mathematics at school, through their narratives, is to unpack their situatedness within institutions and their susceptibility to contemporary social, cultural and economic factors. In such efforts I respond to Olson's (2007) call for an anthropology of schooling, enabling research to reflect on students' problems of learning. By adopting narrative inquiry I respond also to Gudmundsdottir's (2001) call for reclaiming the language of practice of students, which she argues could be lost in a process-product research tradition. I thereby ask two questions. First: What are the experiences of students studying mathematics at their gymnasium school? Second: What educational concerns did students voice?

Prior research into students voice follows from Flutter and Rudduck (2004) in the action research tradition of Lawrence Stenhouse. Consulting students they argue, has two benefits - inform an intergenerational dialogue between researcher and students as well as promote a democratic manner of working for either. More recently Fielding (2009) suggests that beyond being mere data source, students can actively participate in research themselves. Fielding also points to two enduring challenges that remain in research on students voice: whether their voice gives them distinctive insights and whether it is possible for them to transform the system of education they are part of. Fielding however recognises that a strong sense of partnership is found to exist when students are consulted about their learning. Within mathematics education, research of students voice is thin and wanting with the possible exception of Lange (2009). Through narrative inquiry, Lange shows how students backgrounds and foregrounds are resources which inform identity, meaning and their learning of mathematics.
THEORETICAL PERSPECTIVES

Bruner's (1996) psycho-cultural approach to education, ties together two aspects that I focus upon in my present study – schooling, by which human culture inducts young into canonical ways of knowing, and narrative, the mode and means for expression of an individual's meaning making of a culture's world view. As an institution preparing young for entry into human culture, Bruner argues for the need to constantly reassess what schooling does to students conception of agency and self-esteem towards coping with life both in and after school. Pointing to Bruner's concern that schooling needs to look beyond meritocratic criteria and be satisfying in experiencing a deepening of understanding and increasing level of control, Olson (2007) points to the need for an anthropology of schooling. It is to appreciate the complexity of student life and its exposure to contemporary social, cultural and economic aspects that I study students' narratives, having potential to inform educational theory as well as practice. Research within mathematics education that has voiced the need to empower students through their very learning of mathematics has been termed as critical (Skovsmose, 2006). Research, theory and practice Skovsmose argues must grasp complexities of context and question foundational certainties promised by modernity. It is to uncover aspects of this very problematic that I approach teaching-learning of mathematics at the gymnasium school, through students voices as narrated in my study.

In adopting a socio-political examination, I see the conduct of my research to be in line also with Dorothy Smith who argues for a sociological examination that is for the students (Gardiner, 2000). Adopting such a stance Smith points out is not an issue of methodology alone, but a pursuit of eliciting in my study the meaning that students have of learning mathematics in their everyday schooling. My attempt to grasp the challenges of learning mathematics in schooling as both Skovsmose and Bruner draw attention to, would be an attempt following Smith, to uncover in my study what she terms as relations of ruling – those relations that are mediated by various texts in the actual realities of day-to-day existence. Such an inquiry into student life would I contend, enable understanding of the societally constructed practice of contemporary studenthood within which students' learning of mathematics is embedded.

My intention of privileging students' participation and experience of schooling brings me finally to two writings that draw, as Smith does, upon Bakhtinian perspectives. First, Gudmundsdottir (2001) draws upon Bakhtin and offers language of practice as unit of analysis. Narrated by students, such language Gudmundsdottir argues is a reservoir of their beliefs, ideas as well as ways of doing and seeing. Rooted in the ambiguities of everyday life Maybin (2001) too argues in line with Bakhtin, that any everyday language of practice is the very cite in which social struggle takes place. Far from being neutral, the language of practice of students in the context of teaching-learning is thus populated with their own and other peoples voices, allowing research to grasp the embeddedness of what learning mathematics meant to them. Mediated within larger practices of schooling, it is these voices that I attempt to grasp. It is to the methodological approach of eliciting these voices that I turn to.
METHODOLOGICAL APPROACH

In studying narratives and voice, I adopt a qualitative approach to theory building in line with Alasuutari (1996, 1997) who views theories as deconstructions of realities and social conditions, within which human beings are active subjects. Life story narrating Alasuutari argues, is a phenomenon to be studied in its own right as humans are constructions lived by and not mere objects in the physical world. These writings are in line with a discursive theory of self forwarded by Harré (Langenhove & Harré, 1999; Harré & Moghaddam, 2003). Alluding to the dynamic nature of participation by people in a social group, Harré's writings proceed on the basis of what he terms as position, a loose set of rights and duties that limit possibilities of human actions. This in turn allows analysis of what is logically possible for a person to say or do and what is socially possible in the context of those actions. I allude to these constructs since in the classroom practice of my study, I found students' attention to be largely focussed on portable computers to use their e-textbook and since possible listen to music.

Challenging the participant observer role that the teacher, students and me had agreed upon at the beginning of my study, the above constructs led me to reposition myself and acknowledge the mismatch I found between aspects that are considered logically possible in 'classrooms' and those that were socially possible in the conditions that I saw in my study. The voices of students I narrate in this paper thus arise from my (re)action as researcher to Elin (all names are pseudonyms) leaving such a classroom practice for a mathematics course less demanding. Elin's teacher Lukas' reaction to her leaving was 'I am not sure if I should ask her to stay.' I thus conducted narrative interviews with students whom I had interacted with through their academic year. I have since also been able to view the identities of both students and Lukas as being impinged upon by opposing forces of person-to-world and world-to-person. In line with Harré and for this purpose, Bamberg (2004) suggests two other useful constructs for an analysis of the self. These allow me to consider if the students and teacher in my study were able to position themselves with respect to these forces, or were the being positioned in the teaching-learning discourse of their classroom.

For method and analysis of narrative interviews that I report on, I draw largely upon two writings. First, Clough (2002) who expresses a need for rigorous research which does not ignore, but rather addresses the complexity of various aspects of schooling. Clough views the goal of narrative and educational research as being able to produce accounts that embody the truth of situations as perceived. Such accounts he argues have potential to deny any reader the comfort of shared ground with the author. Obtained in a relational manner of interviewing, Riessman (2001) argues narratives to be the object of analysis. Importantly, these are geared not towards objectivity, but positionality and subjectivity of those interviewed. Narratives do not reproduce but represent, she adds, connections forged between the past, present and the future. Far from being faceless, they provide windows into lives that confront the constraints of circumstances. It is while adopting such a stance that I portray the experiences of students whom I perceive as agents acting in worlds of their making.
STUDENT NARRATIVES: DATA

In presenting narratives of four out of nine students in my study, the rationale of my choice has been to showcase those voices which lent expression to experiences of studenthood in relation to their learning mathematics. These narratives need also to be viewed against a background of a school they all seemed to like and expressed as not having to conform to stereotypes, the presence of an international student fraternity or even the brick tiles of school walls in their language of practice. While most identified with stories individual struggles, more than a few identified *The Big Bang Theory* as their favourite TV series. Observing classroom practice helped me to also record how Lukas' own voice through wry humour kept his students at ease, an aspect I report elsewhere. In addition I found students across school to visit Lukas for guidance during his teaching periods. At times Lukas set up time at his home to assist his students, with whom he was available also through *sms* messages.

I begin with Elin who it was that left her standard level course to pursue a course which was less demanding - one which was sufficient she said to get admission to an economics course of her choice at the university. Elin's interest in mathematics had a chequered history, in which she credits her mathematics teacher at Grade 9 to have taken special interest in her. Asked to explain in what way Elin responded:

Elin: He laughed and he laughed about it ...@... ya, he did and he was very funny, and I didn't know what $x$ is ... and he would say 'x is a letter of course you know!' and he really made it ... *he took off this I don't know it* and he used funny examples, like when we did geometry he actually brought fruits, and a cake when we did fractions ... I know its the 9th grade that's kind of embarrassing because in the 9th grade you should know it, but I didn't ... he made it fun and some teachers may say she won't be able to catch up, that's a huge load of work but this teacher in Grade 9 decided to do it all over with me ... and it took a lot of his time and it took a lot of my time ...

Articulating the divide there existed between knowing and not knowing mathematics and the pivotal role her teacher, Elin referred to her learning of mathematics prior to receiving help as a downward spiral – something she thought could well be arrested. Asked to articulate the negative experience some had with the subject she said:

Elin: a pain in the ars frankly ... I believe that some feel that they have these gaps and that the pace is too high, and they, you know, feel that they are *not stupid but unsmart*, because they don't know things they are supposed to know and that makes it negative and makes them feel, no, I don't like math ... because that's how it made me feel then ...

Wanting to ascertain the uneven nature of demands placed by different subjects I also asked all students which of these they considered most, as well as least demanding and why. I present Julia's response and describe her as a student who seemed to meet the expectations demanded of her. She was able to sustain arguments with Lukas on her own and was someone Elin found unable to partner with on equal terms.
Julia: like toughest ... well I'd say that math is really hard ... because we have to do everything so fast, and learn everything so fast and its hard, *it's not hard hard, but it's hard ... we have to really keep up* ... but, history is also hard ... because there is so many facts and so much to learn, it's hard in another way ... [about how she overcame this] ... I work for hours

When asked how she would compare her learning of mathematics now with how she thought her learning of mathematics in grades 7-9 was, Julia added:

Julia: I had a really good math teacher, and that helped me a lot ... [in what way] I don't know ... he took everything slowly and he explained every single step, you could like see them ... it helped a lot ... ya, I liked it

Despite differences in their current performances Julia, like Elin before, credited her disposition to mathematics to having endearing teachers. Asked about how those who opted for the lesser demanding course felt, Julia said:

Julia: I think, those that have math studies consider its very very hard ... therefore, they don't like it either, huh! because they think its hard ... I think it depends on the person ... if your think it is hard you probably don't think it is fun, because you have problems with it ... well *it's the kind of official thing* that they think math is hard and therefore its is boring ... ya well, I don't listen, you have to think for yourself, this is what I have to do and ... well they can say that Oh my God! you are so ambitious because your studying math, *wow, I'm impressed, but its not like, its easy* ...

I found Julia to articulate the demands that mathematics made both as a subject and a subject whose doing was considered ambitious by her peers at school. While such a situation asked that Julia think for herself and not be swayed by others, Julia also acknowledged the hours of work she herself committed to its pursuit. I now present Moa who credited her liking of mathematics to her present gymnasium school. Moa remembers not being too keen on the subject at her earlier grades and said:

Moa: cause I ... in the beginning of the gymnasiet *I began to like math more and more and ever since I took higher level physics I thought they would hang in together* ... I like physics even though its quite hard sometimes ...

When asked what it was they would like changed about schooling and even their learning of mathematics Moa unlike all the others was quite specific:

Moa: Schooling ... hmm ... well I don't know, maybe ... the IB is quite different from the other ... but if I was looking at the Swedish school system it would be ... like more *specs* in the grading system that we have ... if I have an ok grade that is godkänt – G and then we have VG and then MVG and IG ... it's like if we have something in between then ... we get VG plus and that doesn't count ... it is just VG ...

Moa agreed to my surmising her narrative as wishing for a grading system that could be helpful in making a better assessment of herself, something she may have been
reflecting upon, since it was during her IB program that she developed a liking for mathematics and physics. The *specs* or specifications she was seeking, reveal the usage of a terminology that may have been picked up in computer programming – something she currently indulged in as an amateur and wanted to pursue in the future. Moa's rektor, whom I interviewed subsequently, mentioned Moa to be involved in the politically active *Pirate Party* in Sweden. Moa wished for more money with which to pursue her needle work and said she wanted personal attention, beyond her grades alone, from her parents at home. She was happy she said for our conversation.

In a semistuctured manner, my interview with each of the nine students was a combination of more direct and factual questions and those that allowed for them to narrative their experience of studenthood and learning of mathematics. It is Sofia's response to my last question that I turn to now, one given in response to my asking: Do you wish for anything. Via this question I wanted to ascertain both what it was that students may be wishing for at this stage in their lives, like Moa wanting money for her hobbies, as well as gather what students may have to share about the future that lay ahead of them. It is Sofia's response to this question that I now present at length as the last of my narratives. As a student Sofia pursued three languages: English, French and Swedish, and opted for mathematics as one of the subjects in her IB program. In response to where it was that most of them encountered mathematics outside of their classroom Sofia, unlike a grocery shopping response had from most, mentioned that mathematics was something she discussed with her boyfriend. Unlike wishing for a good life or grades like most other students Sofia said:

Sofia: It's a hard question ... do you wish for anything ... I wish for ... my God I don't know ... *I don't know what to wish for* ... I wish I wish that I could find my own way ... because I'm always like I don't know what I'm going to do, I don't know what I'm gonna do ... when I chose this program for school I just went *ole dole doff, kinkel ake koff* and said ok I'll take IB, and it will be exactly the same next year ... and it will be the same when when I go on to the university next year, I will have idea no what I ... they is so much and I really like so many different things ... I don't know what to focus on ... I wish I had something to target ... a goal ... because it would be really important for me, something to work ahead for ... *that is what I wish for ... something I can work for, something that I want to do* ...

In a sensitive and personal manner I found Sofia to portray what is typified as a post-modern scenario, one where the choices that students face far outstrip their having a goal to work towards for which they seem to have many choices. Sofia's introspection concludes in this paper, the voices narrated by four students in my study articulated in their own language of practice. In these there is opportunity to appreciate in addition to Sofia's predicament, Elin's travails of being a student of mathematics, Julia's pursuit of mathematics despite her peers and long hours the subject demanded of her, as well as Moa's voicing how she actually began liking mathematics more and more while pursuing the IB program at her gymnasium school.
STUDENT NARRATIVES: DISCUSSION

In examining students' narratives I begin with language of practice (Gudmundsdottir, 2001). Representative of ways of doing and seeing, this analytical construct reveals how students' learning of mathematics was intimately connected with experiences of schooling. Constructed within the social conditions of their school (Alasuutari, 1997) the students voiced the following. First, that mathematics could become a downward spiral for some (Elin) could be hard and time consuming (Julia) yet a subject liked more and more at the gymnasium (Moa). Second, that teachers at grade 7-9 schools were instrumental in their positive relationship with mathematics, with some of going out of their way to teach them (Elin, Julia). Third, that students were likely to have gaps in understanding mathematics, leading to their feeling not stupid but unsmart (Elin). Studying mathematics was considered negatively as being ambitious (Julia). Finally and in relation to schooling, school grades seemed not to inform students of their own aptitude for mathematics (Moa). Students however had options available from which to choose (Sofia). Yet the 'official thing' or 'relation of ruling' following Smith (Gardiner, 2000) was that mathematics was hard and boring (Julia).

In analysing complexities of schooling Olson (2007) distinguishes goals of schools in terms of mastery of norms and rules; from goals of students, in terms of their agency, accountability and responsibility. With respect to goals of schooling, the students in my study voiced their struggle with meeting the expectancy of knowing say fractions by grade nine (Elin) as well as going against norms of being ambitious even though this meant spending hours of work doing mathematics (Julia). The rules for grading being currently received was also questioned (Moa). With respect to goals of students, there was evidence that students showed agency as well as accountability in deciding on courses adequate for their career plans (Elin, Julia). They wanted to be responsible and pursue courses which thought would be in line with their personal goals, towards something that they really wanted to do (Sofia).

The narratives of students lent voice to an important aspect that Bruner (1996) drew attention to, the institutional aspect or schooling in education. Educational theory which normally treats learning as of individuals who participate, is confronted in this paper as being inseparable from learning mathematics within schooling. In line with Bakhtin (Gudmundsdottir, 2001; Maybin, 2001) the four voices I portray were not merely their own, but populated with those of teachers, peers and the society at large. These accounts of contemporary studenthood portray individual selves dealing with the tensions of acting between the opposing forces of person-to-world and world-to-person (Langenhove & Harré, 1999; Harré & Moghaddam, 2003). In the form of personalised voices, these voices exemplify also the nature of complexity that lies behind being students of mathematics, in contrast to faceless references commonly found in educational documents (Clough, 2002). Though spoken in relation to the context of their school, classroom and computers, these students voiced how leaning mathematics was very much intertwined with experiences had in the past and present, as well as those they were each creating for their future (Riessman, 2001).
STUDENT VOICES: CONCLUSION

A sample size of four student voices limits the extant to which one can generalise. Yet a small sample may be opportunity for research to personalise the impersonal student encountered in educational documents. My attending to students voice, which sprung from shifting my researcher position vis-a-vis prevailing conditions of practice, was opportunity for me as researcher who grew up in modernist assumptions of certainty to appreciate how students were negotiating selves in post-modern times of greater choice and lesser certainty. In terms of school-based research though, I found the very conduct of my study to be one that created a confessional platform for student voices and narratives (Fielding, 2009) aspects that I understandably refrain from reporting. A common thread in these accounts however, were complex relationships had in their adolescence with parents, yet hopes filled with confidence for their futures. In this my study reports the lives of contemporary students, the well being of which is persistent focus in the functioning of democratic societies. In line with prior research on student voice and intergenerational research (Flutter & Rudduck, 2004) this paper while informing mathematics education research more generally, also informs educational research at the gymnasium level within Sweden in particular.

If education is conceived as simultaneous enculturation and transformation, then this study illustrates, in response to my first research question and through narratives how students were negotiating this process while learning mathematics at their school. Yet it is my second research question in relation to educational concerns that students raise, that I find arduous and interpretative. Towards this I refer to Langenhove & Harré's (1999) and Harré & Moghaddam's (2003) two constructs of what is logically possible and what is socially possible for the formation of the self for both students and their teacher. Following progressive educational discourse, it is fair to say that what is logically possible in any gymnasium school is quite large. The more pertinent question is what Lukas and his students found socially possible in their classroom. For this I bifurcate the possibilities that either had. For students their voices suggest their having many choices, though making the right choice was seen as a problem by some. Their having access to portable computers within classroom practice seemed a double edged sword here. While their use made it possible for students to carry their e-textbook and do away with carrying its physical copy, the use of headphones and listening to digital music also accompanied such use. This limited the possibilities of discourse and attention that students had for each other, their teacher Lukas and mathematics. This leads me to wonder if the policy of handing out computers to students envisaged this kind of social possibilities in practice. As a consequence the role of the teacher towards both teaching mathematics and carrying out the societal role of guiding students seemed pretty limited. Lukas seemed to find himself on his back-foot. His position in relation to the larger debate of falling intake of students in mathematics on one hand, while loosing the few students he had on the other, was far from a happy place to be in. In line with Bamberg (2004) he was unable to position himself, but was being positioned poorly, unable to effect serious change.
Observing how inextricable the voices of students in my study were with Lukas' position, I was asked while presenting this paper at the conference what implications my study has for teacher education. My response is to fall back on Niss' (1993) article where he points to two pertinent aspects. First, that mathematics is a taught subject whose learning does not take place spontaneously and automatically. Second, that the invisibility of mathematics makes it a difficult subject to learn, in which the paradox of the subject and learner's worth persists at the individual psychological level. The voices of students in my study seem to qualify the paradox of worth that Niss draws attention to. Yet it is the consequence of the first aspect that needs greater attention. If mathematics is a taught subject, the benefits of which three of the four students I report seem to have realised and voiced, then there is surely a need for allowing a teacher of mathematics to position himself for teaching in his or her classroom practice. It follows that only when a productive discourse for mathematics can take place in classroom practice that the teacher would be in a position, logically as well as socially, to address the variety of educational concerns that students voice. In light of this, I find myself in agreement with Skovsmose (2006) who asks that mathematics education research look critically beyond modernist assumptions of certainty. And towards ending on a constructive note I refer to Edwards, Gilroy & Hartley's (2002) arguments, that in response to post-modernity teacher education research needs to seek as well as interrogate uncertainty. Such a search they suggest would be possible in close-to-practice research, as has been the case of student voices in my study. Such a study enables educational research to highlight the tensions and contradictions that prevail in classroom teaching-learning, as was exemplified by the case of students studying mathematics at their gymnasium school.

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REFERENCES


