

Asking Questions and Performing Mathematics Identity

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When students begin secondary school they must learn what it means to be a learner of mathematics in this new context. Certain actions are more valued than others and these can be considered *scripts* for successful learning. Students may call upon these scripts when enacting their mathematics learner identity. Sixty-four interviews with 22 students and 16 interviews with their Year 9 teachers were analysed using a performance metaphor for identity to explore the role of scripts in developing learners' mathematics identities. Teachers promote an 'ask questions' script and see their students as lacking if they do not do so. Students, in contrast, receive and enact passive learner identity scripts.

The transition to secondary school is often seen as problematic. These problems include achievement dips, declines in motivation (Anderson, Jacobs, Schramm, & Splittgerber, 2000; McGee, Ward, Gibbons, & Harlow, 2004), reduced engagement (Attard, 2010), and a widening gap between low and high achieving students, particularly in mathematics (Cox & Kennedy, 2008). However an alternative view of transition may consider the change in pedagogical culture as a challenge to the students' sense of what a mathematician might be (Hernandez-Martinez & Williams, 2011). It looks instead at the transition as an opportunity for identity growth for learners (Hernandez-Martinez et al., 2011). Such a stance entails examining transition using the lens of identity rather than measuring the problems of achievement or motivation. An identity lens is particularly useful in highlighting the ways students engage with the subject of mathematics and how they merge this with their sense of self.

Students who can align their sense of self with that of mathematics demonstrate positive mathematics identities and are more likely to continue further study in mathematics (Boaler, Wiliam, & Zevenbergen, 2000). 'Ability' in mathematics is not the sole contributing factor to further participation in this subject (Hodgen & Marks, 2009). Identity focuses on the "whole person and their becoming, rather than part of the person and their knowing" (Lerman, 2009, p. 155). For these reasons identity is a very important concept to consider in mathematics education research (Grootenboer, Smith, & Lowrie, 2006; Walshaw, 2011).

In this paper I apply the lens of identity to the time of transition to secondary school. I focus on the practices of mathematics learning at secondary school and the ways in which Year 9 students understand these practices and merge them with their identities.

Theoretical Framework

For this study I use a metaphor of performance to conceptualise identity. I draw on Goffman's (1959) use of the theatre through which to understand performances of the self. I also draw from Butler's (1988) understanding of gender identity as performative. This means identity is repeatedly constituted through performance acts, as opposed to being merely reflective of an inner identity. In this way I align my understanding of identity to that of Mead's (1913/2011) work rather than that of Erikson (1968). Others have similarly

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applied Butler's work in gender to conceptualise mathematical identity (Chronaki, 2011; de Freitas, 2008). I consider identity to be something one does rather than something one *has* (Gutiérrez, 2013). We *perform* our identities.

To expand upon the metaphor, this view means we can also consider the *audience* of an identity performance. We perform differently to different audiences at different times. Furthermore, the way in which our audience recognises our identity performance has implications for future performances. The *stage* for a performance (e.g. the mathematics classroom or the interview room) may also constrain or enable particular types of performance. This view also allows us to consider the notion of *co-performances*; that is, students simultaneously performing multiple identities. We can question whether these performances work well together or, alternatively, are extremely difficult for some to manage.

Finally the ways in which people talk about mathematics learning can be considered a performance *script*. We may perform impromptu or we may call upon already well-established scripts when enacting our mathematics identities. These scripts form what others have termed 'Discourses' (Gee, 2011) or 'figured worlds' (Holland, Skinner, Lachicotte, & Cain, 1998). Scripts are a resource available to students to follow when enacting their identities, although not all scripts are available to all students. The script for performing 'good at mathematics' may include doing fast calculations and always having the one right answer. Alternatively the script may be one of working collaboratively to solve problems. Society, schools and teachers may promote certain scripts over others and students may recognise certain scripts as being more or less appropriate for them.

Research Design

The study began late in 2011 when I recruited students from two Year 8¹ classes at two different intermediate schools in New Zealand. There were 22 volunteers, 11 from each class. I observed them during mathematics classes and also held semi-structured interviews with them for 15 to 30 minutes each about their experiences learning mathematics and what they anticipated in the transition to secondary school. In 2012 the students moved to secondary school. They attended nine different schools throughout the city and were placed into 17 different mathematics classes. I observed them in class and interviewed them each again in Term One and in Term Three of the school year. I repeated this once more early in 2013 following their transition to Year 10. I also interviewed 16 of the Year 9 teachers during the students' first year at secondary.

The interview situation can be considered one of the stages for identity performance. It is by nature different from the classroom stage. For example, the participants did not need to perform other identities they may have felt compelled to perform on other stages and to other audiences, such as 'cool kid' (or 'stern teacher'). The performances may present a different version of their mathematics (or teacher) identities than those performed with other class members, or these performances possibly present an ideal. Despite this, the performances given and recognised are significant because they suggest the types of scripts that are available or promoted on the stage of the secondary school mathematics classroom.

At each phase of the study I audio-recorded and transcribed the interviews and entered these, along with observation notes, into nVivo. As a first step, I reduced the data into sections and then conducted thematic analysis (Braun & Clarke, 2006) on these sections of

¹ In New Zealand, Year 8 is the last year of primary school. The students were aged 12 – 13 years.

the data. The two sections I report on here are the teacher interviews and the student responses to the question, ‘What do you need to do to be successful at mathematics this year?’ which I asked at each interview. Having gathered themes from these sections, I then returned to the entire data set to compare and contrast the themes that had emerged.

During my interviews with teachers we talked about the participants in my study in particular, but also more generally about Year 9 students. When I analysed these interviews I looked for comments the teachers made about the sorts of identity performances they recognised as desirable in their students. Such comments emerged at different places in the interviews. My questions, such as, “What do students need to do to be successful at mathematics?”, “How do Year 9 students in general compare with students at other levels?”, “What do you think is the most important thing for a Year 9 student to learn in mathematics?”, “How does --- usually act in class and how does this compare to the other students?” and “Can you describe for me a perfect lesson?” elicited responses about the types of performances teachers wanted.

Results and Discussion

Three main themes associated with a successful mathematics identity emerged from the teacher interviews. These were asking questions, persistence and confidence. Fourteen of the 16 teachers mentioned asking questions as important to mathematics learning. Eleven teachers spoke about qualities or behaviours which I have grouped together and labelled ‘persistence’ (or, elsewhere, perseverance). These comments related to learning from mistakes, not giving up and persevering with a problem (see Darragh, 2013). Closely related to both of these themes was the third, that of confidence, spoken about by 12 teachers. For the purpose of this paper I will discuss the first theme of ‘asking questions’.

Year 9 teachers consider asking questions to be vital to the teaching and learning process, the implication being that those students who ask questions will be successful.

I think she's improved actually over the year. I've noticed - and she's trying a lot harder. She produces really good homework and she asks a lot more questions (Teacher N).

Asking questions can be thought of as a *script* for a successful mathematics learner identity performance. In this manner students are positioned as lacking if they do not ask questions:

Yeah, she just needs to ask more questions! Quite a few of them need to ask questions (Teacher C).

However another reason for the desire to hear students ask questions could lie in a desire to gain feedback on the quality and effectiveness of their teaching.

But most of the time I want them to - I want them to say what's going on in their head, I want them to, you know, to question me or to - um, to find mistakes (Teacher L).

I like their questions. When I hear their questions I know what they need, what they require. So when I answer them I feel I'm satisfied (Teacher A).

I'd appreciate him coming to me and saying, ‘look I don't know how to do this’ (Teacher E).

‘I want them to say what’s going on in their head’ and ‘When I hear their questions I know what they need’ are two comments that suggest the students’ questions are a teaching tool in the sense they give the teacher insight into how the students are progressing.

Although the teachers view the asking of questions as a key script for learning mathematics at secondary school, a number of the student participants mentioned a reticence towards doing this:

And also if I'm not sure I should ask the teacher. But I don't tend to ask the teacher. That's just one of my weaknesses (Student 19, Phase 2).

I: Do you ever ask the teacher?

S: Yeah I do, but not really that much. I don't know I'm just, I'm more comfortable just going home and asking people I know (Student 2, Phase 2).

These students convey an understanding that they *should* ask questions, but are not willing to do so. Student 19's reluctance to ask the teacher reads like part of his identity—he does not 'tend' to enact this performance and that is 'just' part of who he is—a 'weakness'. Student 2 says she is more comfortable asking family members for help. At a later interview she discusses her reticence further:

But I don't really feel that comfortable, 'cause like, sometimes the teacher thinks I don't get a certain part of the problem, but actually I don't get something that's a lot more basic than that. ... I'll just pretend I understand her and I'll go home and ask my dad. [Or I prefer to ask my friends because] my friends don't really, they won't think I'm stupid if I say ... 'What? I don't get that at all' (Student 2, Phase 4).

Asking the teacher a question has potentially negative consequences—Student 2 does not want to reveal exactly how much she does not know, or perhaps she does not want her teacher to think her 'stupid'. Such concerns compel her to pretend she understands and to maintain the charade until she can gain help at home instead.

From these responses we can see the students have received the 'ask questions' script promoted by the teachers, yet some remain reluctant to enact it. The following illustrates some of their reasoning behind such actions:

I: Does anyone stand out in the class?

S: Um, the girls that were at the front. ... They're always asking questions or if she asks somebody to write something on the board they'll all put their hand up.

I: Have you ever done anything like that?

S: [Shakes head]

I: No? Why not?

S: Too scared of everyone (Student 12, Phase 2).

Yeah, I like - Mr N---, I don't really ask him many questions. I just ask my friends more. 'Cause Mr N---'s trying to teach everybody else (Student 19, Phase 3).

I: 'Cause I noticed you didn't ask the teacher anything in class the other day.

S: [laughs]

I: Does that happen very much?

S: Um, well usually if I don't understand something someone around me would, so, I don't want to like, stop the whole lesson just to ask a question that others might know and interrupt what he's doing (Student 10, Phase 4).

Student 12 indicates she is too scared of the people in her class to put her hand up or ask questions and Students 19 and 10 do not want to interrupt their teachers, who are busy teaching everyone else.

In order to unpack these students' explanations we need to consider the *stage* for mathematics identity performances and the change that has recently occurred for these students. Arguably the biggest pedagogical difference with the move to secondary school is

a change to whole class teaching from learning in small ‘ability’ based groups. Every single student in my study experienced this change, regardless of which secondary school they moved on to. Asking questions (for any reason) had suddenly become a very public performance. It either required putting a hand up and asking in front of the entire class or walking up to the teacher’s desk, which was at the front of the room in the majority of the classrooms. For some students this may have required acting in a way that made them feel uncomfortable.

If teachers recognise asking questions as an essential performance script in the Year 9 mathematics learner, then we must consider whether all students are equally able to perform this act. Research in New Zealand suggests Pasifika learners are less willing to ask questions in the whole class setting of the traditional mathematics lesson (Hunter, 2010) and Zevenbergen (2001) has found class-based differences in following the hidden classroom rules of interaction, which Lerman calls “recognition and realisation rules” (2009, p. 155), drawing on Bernstein. The scripts for performing in a secondary school classroom may be less available for some learners to take up than for others.

The data described above demonstrate how on one hand teachers appear to be promoting the ‘ask questions’ script for success and yet the classroom stage simultaneously constrains the performance of this script for some students. In light of this, it is useful to consider what other scripts are seen as available for students to perform.

At every secondary school interview I asked the students, “What do you need to do to be successful at mathematics this year?” Their responses to this question illuminate the different scripts they see as important in their mathematics learner performances.

I made eight categories of response. These were: Listen/pay attention (14 students), Work hard/focus/concentrate (13), Do homework (12), Study/revise (12), Ask questions/ask for help (9), Try to understand it (5), Take notes (3), Other (e.g. “don’t get left behind” 6).

Responses typically contained more than one category, for example, “... pay attention, do your homework and make sure if you don’t understand something you ask, don’t get left behind” (Student 1, Phase 3) was coded in four different categories. Students were only counted once in each category, even if they made a similar response in two or all three of the interviews.

The majority of students had received the message that they need to listen and pay attention in order to be successful at mathematics. ‘Listen and pay attention’ is therefore another script for successful learning at secondary school and this suggests that teachers are promoting such a script to students. However, during interviews the teachers did *not* talk about listening as important in learning. Eight of the 16 did not even use word ‘listen’ a single time during their interview. Of those who did, five were talking about listening to students; for example:

Because feedback is important ... and it’s not just giving [to] them, it’s listening to them that’s important, ‘cause then you know where they [went] wrong (Teacher B).

Only three of the teachers indicated to me that listening was an important performance for students’ successful mathematics learning. Where then did students hear this script? It is possible that teachers are not aware of their promotion of this script during class. During a number of observations I heard teachers asking students to listen and pay attention, and on one occasion the following:

T: You are not learning because you are not listening. (Field notes, March 2012).

Teacher-centred classrooms with explanation/demonstration based pedagogies create a script for mathematics learning that writes the passive ‘listening’ and ‘paying attention’ as desired performances, no matter what teachers may say themselves. While the teachers said to me that they wanted students to ask questions, the students said they needed to listen and focus. The contrast between these scripts is stark—a dichotomy of active versus passive learning.

However, ‘listen’ is not the only script students are receiving, as evident in the other categories identified above. In the ‘ask questions or ask someone for help’ we hear an echo of the teachers’ ‘ask questions’ script. Yet the nine students who responded in this way made comments that also suggest a passive role in mathematics learning:

“... do the work and if you don’t understand ask a teacher or a friend who knows how to do it”
(Student 22, Phase 2).

The purpose behind asking for help seems to be simply to get an explanation or demonstration of what to do. In order to unpack this further I returned to the full data set and examined an interview question from phases three and four: “What do you do when you find you don’t know how to do something in mathematics?” With this question I was trying to gain an insight into whether students would persist with problems during mathematics lessons.

An overwhelming majority response was “ask someone”. Twenty-one of the 22 students said this as part of their response at least once, most often twice.

I either ask like my friend if they know it. And if they don't know it and - if they explain it to me and I still don't understand it, I'll ask the teacher (Student 6, Phase 4).

I ask the teacher, or, like um, usually I'll ask my friends first and if they don't know I'll ask my teacher (Student 17, Phase 4).

Ask the teacher or someone next to me (Student 4, Phase 3).

These responses highlight the importance of considering the context in which an interview response is made. While a few students talked about asking questions when we were discussing *success* in mathematics, nearly all of the students said they would ask someone if they did not know *what to do* during a mathematics lesson.

This suggests two things. Firstly students are hearing their teachers’ promotions of the ‘ask questions’ script, yet they may be performing this script in the wrong situation. Secondly the asking of questions becomes a passive script rather than a pro-active one. My understanding of the teacher script (based on my own teaching experiences) is that a pro-active and successful mathematics learner would ask questions to clarify their thinking and push their understandings further. However, the performance of asking questions (read ‘asking for help’ here) when stuck on a mathematics task is a passive action and works against a ‘persistence’ script, which the teachers also promote (Darragh, 2013).

In summary, it seems the students have ‘heard’ their teachers’ promotion of asking questions, but I believe they are performing from this script at the wrong time and this is why the teachers read the students as lacking. Rather than participating in whole class discussions and asking probing questions that illuminate misconceptions and expand their understandings, students ask for help when they do not know what to do. It appears they perform the asking questions script when they should be performing the persistence script. Furthermore they have received and are enacting a passive listening script, one that is perhaps unintended by their teachers. These actions lead them to be recognised by their teachers as lacking in their mathematics learner identity performances. They are seen to

lack persistence and lack agency in their mathematics learning because they do not enact the right scripts at the right times.

Conclusion and Implications

What does it matter if a teacher may view a student as lacking? As argued by Walshaw (2011), “the student’s construction of herself as a learner in the classroom is highly dependent on the teacher’s image of the student as a learner” (p. 100). If a student is seen as being lacking in their mathematics learner performance then they will come to see themselves similarly and continue to perform a negative mathematics learner identity in the future.

Furthermore, by mis-applying the ‘asking questions’ script students are negatively affecting the quality of their mathematics learning experience. Rather than engaging in high level discussion and asking probing questions to clarify their understanding they are instead listening passively to teacher explanations. When they could be persisting with mathematics problems and attempting to solve them by exploring different avenues they are instead asking someone, most often a friend, to tell them what to do. In this manner the students are constructing mathematics learning at secondary school as an extremely passive endeavour.

To summarise, I would argue that both teachers and students in my study were generally invested to perform ‘Year 9 mathematics learning’ productively. However, there appears to be a mix up with the performance scripts. Teachers want the students to ask questions and students receive this script, yet the reality of the stage may make them reluctant to perform the asking of questions so publicly. Instead the students play this script when they should, according to the teachers, instead be performing persistence. Furthermore the pedagogical style employed in many (traditional) mathematics classes promotes a passive, ‘just listen’ script that the teachers may not even intend to suggest. This ‘mix-up’ may impact on the types of identities students performatively construct as well as the quality of their learning.

These results highlight the need to make explicit the performances expected of students. Teachers should explicate how, when and what type of questions they wish to hear. They need to then ensure that the stage enables all students to feel comfortable to enact this script. Furthermore teachers should consider what scripts they may inadvertently be promoting through their practice and also consider the implications these have for students’ identity performances.

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