Ewing, Bronwyn (2004) "Open your textbooks to page blah, blah, blah": "So I just blocked off!". In Putt, Ian and Faragher, Rhonda and McLean, Mal, Eds. Proceedings Proceedings of the Twenty-Fourth Annual Conference of the Mathematics Education Group of Australasia Incorporated:Mathematics Education for the Third Millennium: Towards 2010 1, pages 231-238, Townsville, Queensland.

"Open your textbooks to page blah, blah, blah": "So I just blocked off!"

Bronwyn Ewing
Queensland University of Technology
<bf.ewing@qut.edu.au>

The use of textbooks in mathematics classrooms has the potential to displace a teacher's ability to shape in their learners an identity of participation. In such settings, issues of inclusion and exclusion in learning communities are revealed. Thus, some young people are shaping an identity of non-participation maintained by the practice of relying on textbooks to teach mathematics. This paper draws on research in progress to argue that the practice of using textbooks influences identities and the forms of participation in mathematics learning communities.

Learning mathematics in secondary mathematics education classrooms and to a certain degree in primary classrooms is still largely based on the assumption that it is learned from a textbook (Harries & Sutherland, 1999; Shield, 2000), is an individual process, and separated from other curriculum areas and activities (Askew, 2001; Nickson, 2002). In this context, students are restricted to solving routine problems that are broken into discrete steps and isolated from students' real world experiences. In much the same way, students are tested on their knowledge and understanding which has largely been acquired, if at all, through repetitive drill and practice exercises from mathematics textbooks, and with some explanations from teachers with how to arrive at the correct answer (Nickson, 2002). These practices continue to dominate mathematics classrooms as they are seen to transmit content that can be tested efficiently (Askew, 2001; Zevenbergen, 2001). In this regard, meaningful learning and collaboration is considered cheating, whereas slogging through pages of practice exercises and then testing learners is considered to show what they really know and understand. Thus, it is understandable why learners consider mathematics learning irrelevant, boring, and difficult, and consequently, shape an identity of *non-participation of marginality* (Wenger, 1998). This paper argues that learning mathematics in this way influences the shaping of an identity of participation in mathematics learning communities.

Whose Power Really Turns the Page? Some Emerging Issues

Research indicates that teachers who rely on teaching mathematics from a textbook also learned mathematics this way (Brown, 1998; Lubinski & Jaberg, 1997; Romberg & Kaput, 1997). This claim is not surprising, given that the pedagogical approach that has informed the teaching and learning of mathematics is framed largely around the transmission of knowledge; changing this tradition has been met with strong resistance, despite commitment to reforms in mathematics classrooms (Lubinski & Jaberg, 1997). For example, one reason for the resistance may lie with textbooks providing a routine approach

to teaching and learning mathematics, thus relinquishing teachers from the responsibility for planning lessons which are engaging for students (Harries & Sutherland, 1999; Lubinski & Jaberg, 1997). As a consequence, teachers were found to be reliant and dependent on textbook schemes to inform what happens in mathematics lessons; thus, talking about mathematics in relation to exercises or chapters in textbooks with little or no conceptual framework for the subject (Harries & Sutherland, 1999). Lubinski and Jaberg (1997), for example, found that content selection was framed largely around suggestions in textbooks and "restricted to topics and numbers that the textbook recommended" (p. 234), rather than around student learning and understanding. As a result, when mathematics is taught this way, meaningful learning about mathematics and shaping an identity of participation is ignored; thus, discounting how learning transforms a learner's ability to participate in the activities of a mathematics community.

The widespread practice of using textbooks to teach mathematics has other consequences for learners. In studies of textbook use in classrooms, Romberg and Kaput (1997), found that authority was invested to the textbook authors and not classroom teachers as first thought. For example, they cite the work of Weller who suggests that

> the expert knowledge of the teacher was deliberately subjugated to that of the textbook. As a result of that process, the teacher was able to camouflage his [her] role as authoritarian, thus eliminating student challenges of authority. (Romberg & Kaput, 1997, p. 358)

When textbooks were used, Romberg and Kaput found teachers used the term *they* to imply that the authors of the textbook knew what students needed to know. Consequently, teachers protected their own authority and reduced any likely challenges from students. This was more likely to occur in classrooms where there was a reliance on textbooks to demonstrate how something was done, and where learners were expected to work individually to reproduce what the teacher and textbook has shown them (Romberg & Kaput, 1997). In such a context, it can be assumed that when imitation is the result, the relations between teachers and students are overlooked, as is the fact that learning mathematics also involves the construction of identity and meaningful participation in mathematics communities.

The widespread use of textbooks raises further concerns about the learning activities in the texts which students are expected to engage. Research indicates the activities are often poorly thought out and written, thus focusing more on repetition and review with topics covered superficially. Shield (2000), for example, explains, "textbooks do not convey the intent of recent reports and syllabuses, even though they were written in response to these documents" (p. 521). He suggests that whilst it is not possible to replicate everything in syllabus documents, it "should be possible to develop textbook presentations which come much closer than at present" (p. 516). Findings by Remillard (2000) suggest that textbooks need to be designed to *speak* to teachers, not merely *through* them. Whilst textbook authors do not have complete authority over how textbooks are used in classrooms, she concludes by suggesting that writers of textbooks need to talk to teachers about the mathematics and pedagogical ideas underpinning the texts, and make their agendas and perspectives more accessible to teachers and learners.

In this regard, it cannot be assumed that teachers fully understand the influence that textbook use for teaching mathematics has on learning, identity construction, and participation in the activities of a mathematics community. Moreover, if teachers are using textbooks for planning for learning, it cannot be assumed that teachers have complete authority over the content of mathematics classrooms since the mathematics is taught from a text. As a consequence, a degree of authority seems to be invested to textbook writers as

mentioned previously. Furthermore, it cannot be assumed that these writers have covered all aspects of the content of syllabus requirements and conveyed it in such a way that it aligns with recent reports and documents. This aside, internationally teachers are being asked to transform their mathematics teaching (Franke, Fennema & Carpenter, 1997). Such transformations require teachers to examine the assumptions underpinning the way they believe mathematics should be taught and learned. These assumptions have more than likely evolved from a traditional perspective underpinned by behaviourism, which sees the learner as working individually on content delivered in discrete steps and isolated from other aspects of mathematics (Boaler, 2002; Ellerton & Clements, 1998). This process may serve the agenda of textbook authors and teachers rather than the learner of mathematics. Students who struggle to keep pace with content delivery, and the way textbooks are written and applied in mathematics classrooms, are more likely to shape an identity of non-participation based on marginality since their learning needs are not addressed adequately.

The Shaping of an Identity of Participation and Non-participation in Mathematics Learning Communities

From the perspective of a social theory of learning, identity lies at the intersection between learning and practice. Hence, learning in a community is about the formation of identity. However, what constitutes a community of learning, and what are its implications for learning and identity? Any discussion of a community of learning or practice is closely related to the work of Lave and Wenger (see Lave & Wenger, 1991; Lave, 1996; Wenger, 1998, for example). Wenger (1998) for example, describes this type of community as a context where students learn and negotiate meaning through mutual engagement in joint enterprise. Practice in such communities exists because people engage and negotiate meanings with one another. Thus, membership is defined through the negotiation of joint enterprise, and by the participants in the process of pursuing it.

In much the same way, in a community of learning, learning is situated in collaboration, that is, with teachers integrating student ideas and providing opportunities for students to share their understandings and experiences with other students and teachers in a classroom context (Matusov, 1999). Through this process, students and teachers establish supportive relationships, and shape an identity based on participation. In this frame, building an identity of participation consists of understanding the meanings of experiences through membership in social communities (Wenger, 1998). It serves as a "pivot between the social and the individual" (p. 145), thus acknowledging individual experience but recognising its social character (Wenger, 1998). Understanding identity in this context is about the mutual constitution of community and the person, and not a dichotomy between the individual and social where the focus might be on one or the other. It is upon the ways a person relates with another, where the experiences and competencies that are constitutive of an individual are applied in order to identify and be recognised as a member of a community (Wenger, 1998). This form of membership then becomes a "locus of engagement in action, interpersonal relations, shared knowledge, and negotiation of enterprises" (p. 85). Thus, for learners of mathematics, such communities give rise to experiences of meaningfulness, where there is the invitation to engage, share experiences, and incorporate that competence into an identity of participation.

Identities are defined through the practices learners engage in and those they do not. In this regard, learners know who they *are* by what is familiar and who they *are not* by what is unfamiliar (Wenger, 1998). Identity reveals issues of marginality, a form of non-participation that restricts and prevents full participation. For example, a learner can be

maintained in a marginal position in a mathematics classroom through the ingrained practice of using textbooks to teach and learn mathematics. Their use may close opportunities for future learning because it is framed around the content of texts and not student understanding. This practice has the potential to maintain an *identity of non-participation of marginality* (Wenger, 1998) to such an extent that it becomes difficult for young people to consider a different path in the same community (Wenger, 1998). Thus, rather than mathematics learning communities acting as resources for learning as well as contexts for understanding the importance of student contribution (Buysse, Sparkman & Wesley, 2003), learners are rendered hostage to a community's practices (Wenger, 1998).

An identity of participation, however, locates learning as a vehicle for the inclusion of newcomers and for the development of identities. Exposing a newcomer to the practices of a community provides opportunities to engage in learning. As newcomers move inbound from *peripheral participation* (Wenger, 1998, p. 100), that is, participation which provides legitimate membership and exposure to the actual practices of a community, to *full legitimate participation* (p. 100), they gain knowledge, and shape a view of themselves as members of that community. In this frame, learners need to be able to invest themselves in a community that provides opportunities to shape an identity based on participation, rather than being held in marginal positions where identities of non-participation are manifested and maintained.

Lifting the Veil

Forty-five young people participated in individual semi-structured interviews and provided their interpretations of their experiences of learning mathematics in school and TAFE. They were participants in a Youth Reconnected Program at a TAFE college. This program was designed to support young people who were early school leavers or non-completers of school[1] by improving their literacy and numeracy skills so they could access further education or enter the workplace (DEST, 2002). The interviews were conducted by the researcher and took place at the college over a period of three weeks. Each student was interviewed once for approximately 20-30 minutes. Semi-structured interview questions focused on students' accounts of learning mathematics. The interviews were audio taped and transcribed by the researcher.

Both quantitative and qualitative methods of data analysis were used in this study. Hence, discourse analysis was applied as a complementary method with content analysis for the reason that content analysis alone can obscure the meaning in texts (Potter, 1997). Selected excerpts are utilised in this paper to demonstrate that shaping of an identity of participation for some students is influenced by the practice of using textbooks in classrooms to teach and learn mathematics. The analysis of the data for this study, was underpinned by the principles of symbolic interactionism, that is, that meaning arises and is constructed in the course of interaction between people (Blumer, 1969; Denzin, 1992; Woods, 1992). The analysis and discussion of textbook use is organised and expressed for the sample group of this study only. By no means does this study argue that what is evident with this group is the same for all students in schools and at TAFE.

[1] In this study, early school leavers are defined as young people who left school before the school leaving age of fifteen or before or on completion of Year 10; non-completers are students who left school before completion of Year 12 (Ball, 2001).

What was Learning Mathematics like for You in School?

Through analysis of the data, a number of themes emerged from the young people's accounts. Of significance, yet not surprising was that the traditional approach to teaching mathematics using textbooks, dominated many of their experiences. This practice reinforces the concern of this paper, that teaching mathematics using this approach is ineffective for learners (Shield & Dole, 2002; Shield, 2000). It was found that learners were restricted to pages of exercises on topics, which did not provide further resources for developing a deeper understanding of the content. Learning rules and formulas without understanding why they work, and where they fit in their daily lives, has not provided opportunities for these students to identify themselves as mathematics learners and participants in a community's practices. Rather, this approach excluded many of these young people because they were required to complete pages of drill and practice exercises, and keep pace with the class. This process is seen as problematic particularly for students who experience difficulty with reading, thus marginalising them even further. Ingrained practices such as these prevent full participation, with non-participation of marginality dominating (Wenger, 1998) mathematics classrooms.

What was surprising in this study was how the young people described their experiences of learning mathematics from a textbook which in turn influenced their mathematics learning and how they identified themselves as participants (or not) in such a community. In considering the students' experiences then, they responded with accounts that described how they felt they did not learn and identify with a community of learners, but rather, identified with a community as failures who felt marginalised. For example, in the following excerpt, Peter tells about his experiences of learning mathematics with the teacher using maths sheets and a book. He states that he found learning this way boring.

> Peter: Um when I was in Kingswood, down in Sydney, they just gave me … the teacher usually just gave me a little maths sheet and I just had to do it or a maths book and we just had to complete the maths book. That is [was] it, and it is the same up here too. [They] just give you a maths book and you just work through it. Pretty boring, you just sit there, looking at the questions and you've got some teachers who don't really care, so they just sit there and so when you ask for help they show you on the board but they don't show you what it does and how to do it. They just show you the answer.

Several characteristics related to textbook use in classrooms are indicated in this excerpt. For example, when learners are expected to learn mathematics in this way, teachers may or may not provide some explanation of the task. When it is provided, it seems to have been done on the blackboard. What is more, the explanation is usually the rule or formula to arrive at the answer. This practice does not allow learners to develop a meaningful understanding of the problem nor negotiate this meaning with the teacher and or other students. In the next excerpt, Michael provides an account of his learning experiences.

> Michael: Oh pretty shocking I suppose. He just, he had a textbook with all the things and that and he would just write it up on the board, give you like minutes, and show you working. Then like because there is the whole class, does not give you much time to show everyone, some people do not learn as quick as the others and that. And then you just lose track, cannot keep up, you are just up to your neck in homework and that…. Oh yeah, like, 'cause like, say you're trying to get something, but then by the time you think you've got it sought of sussed he's already putting something else on there and that. He does not (care), does not (really teach you), does not really show it.

Michael describes in some detail how he felt as a learner. He indicates several issues found to be inherent with textbook use, that of teaching the same content to the whole class, the

pace of the lesson, and homework as a consequence of not keeping pace with the class. It would seem from these two excerpts that the ingrained practice of textbook use is influential in shaping an identity of non-participation, whereby learners are marginalised from their learner community. Furthermore, this practice displaces a teacher's ability to shape in their learners an identity of participation whereby they move from peripheral participation to full participation in a learning community (Wenger, 1998). This point is elaborated further in the next excerpt with Angelique.

> Angelique: Okay, yeh, we would just walk in and sit down with our textbooks. He would write up all this stuff on the board to go to. You would have to go to the page that he has written. It is like page 236 blah, blah, blah. You would just go to that, he says work from your book, and then he gives you, writes all the answers on the board. That is all you do in high school, work from your textbook. And it was pretty difficult stuff, not easy… . It was hard, because I did not know the basics, as I said. I did not know the basics so coming to do all this was hard, so I just blocked off. Like I would just sit there and that is how I got bad grades and stuff cause I would just sit there and would not pay attention.

Angelique's account indicates teaching practices evident from a past era but are current in classroom teaching practice (see Boaler, 2002, for example). When learners are told to turn to a page and then expected *do it,* little wonder Angelique, and others like her found learning mathematics difficult and boring. Learners in this context are more likely to opt for excluding themselves because they simply cannot keep up as a consequence of their difficulties with learning mathematics from a textbook. Andrew tells of his experience and not belonging to his class group.

> Andrew: Well, normal learning, the teacher just would stand up and explain the maths, how to do the maths and then you got maths textbooks and they tell you what page to go to, and then you would go to there and start working through. The people that [who] didn't, who didn't understand it the first time would be told and he would walk around trying to tell everyone but he sought of, I can't remember him ever coming to help me. He did occasionally, and then it's like time ran out and he was too busy with all the people, so he didn't have enough time to teach everyone the first time, and then go around and double check that everyone knew it sought of… . I didn't really get involved in the conversations, like when they were talking about it, I didn't involve, just get involved with it all because I don't know, I'd get it wrong or something, so I just really, no I didn't feel like I was a part of the class really.

Andrew and Angelique's accounts highlight the barriers that some students are confronted with in their mathematics learning communities. When their experiences are restricted to a textbook and explanations by way of the chalkboard, it is not surprising that they do not participate, but rather withdraw or marginalise themselves from mathematics learning communities or worse, school.

Discussion and Final Remarks

On the basis of the interview data, several observations can be made about the influence of textbooks on identity and participation in mathematics classrooms. For example, when textbooks are used in such a way that students are told simply to turn to a page and "just do it" opportunities to engage learners in understanding mathematics are largely ignored. This is particularly evident in Angelique's account when she explains that she just "blocked off." When the content and pace of lessons is framed around a textbook, some students are experiencing difficulties learning this way and thus, are less likely to engage in their learning. Michael provides an account of his difficulties with textbooks, and the pace of

lessons, and as a consequence he "lost track" and was "up to your [his] neck in homework." When students do not engage, they are more likely to be excluded, or exclude themselves from their learning community. When this form of participation is maintained through such an ingrained practice, it is not surprising that some students like those referred to in this paper, feel they do not belong and opt out of the subject or worse, school. This situation is unfortunate, given that mathematics teacher have the potential to engage and support learners in the process of learning mathematics, thus transforming students, and what they can do in mathematics.

As teachers, they already identify and belong to a mathematics community of educators and therefore, are in *familiar territory* where they have opportunities to share their repertoire, their experiences, and their competencies. Learners however, are the newcomers and, as such, through engagement in interaction with teachers, develop a shared repertoire over time which creates resources for negotiating meaning and future learning. Thus, opportunities to move inbound from *peripheral participation* to *full legitimate participation* are more likely to occur rather than *non-participation of marginality.* For such communities then, learning is about refining their practice and ensuring and welcoming new generations of members (Wenger, 1998). In mathematics classrooms, such members shape new identities from their new perspective. As new (learners) and old members (teachers) interact, some of the history of the practice remains "embodied in the generational relations that structure the community" (Wenger, 1998, p. 90). Thus, it is through shared histories of learning that identities are shaped and practices develop and learning occurs.

Wenger's idea of identity of participation and non-participation provides a useful framework for generalising about the influence of textbooks on learners in mathematics learning communities. In this frame, and based on the interview data, this paper suggests that textbooks influence identities of participation and non-participation in mathematics classrooms. Hence, it proposes that teachers create opportunities for identity formation, membership, and negotiating meaning with their learners. This process provides students with the support necessary for shaping what they can do, who they are, and how they understand what they do. Mathematics learning communities then become resources for learning as well as contexts for manifesting learning through an identity of participation; moving inbound from the *peripherals* of classroom contexts to full membership in that community. This is instead of a community of learners who do not participate, and therefore are marginalised because they experience difficulty with learning mathematics from textbooks.

Reference

Askew, M. (2001). Policy, practice and principles in teaching numeracy: What makes a difference? In P. Gates (Ed.), *Issues in Mathematics Teaching* (pp. 105-20). London: Routledge/Falmer.

Ball, K., & Lamb, S. (2001). *Participation and achievement in VET of non-completers of school: Longitudinal surveys of Australian youth* (Research Report No. 20). Melbourne: Australian Council for Educational Research.

Blumer, H. (1969). *Symbolic interactionism*. London: Prentice Hall International Inc.

Boaler, J. (2002). *Experiencing school mathematics: Traditional and reform approaches to teaching and their impact on student learning*. New Jersey: Lawrence Erlbaum Associates Inc.

Brown, M. (1998). The paradigm of modeling by iterative conceptualization in mathematics education research. In A. Sierpinska, & J. Kilpatrick (Eds), *Mathematics education as a research domain: A search for identity* (Vol. 2, pp. 263-76). Dordrecht: Kluwer Academic Publishers.

Buysse, V., Sparkman, K., & Wesley, P. (2003). Communities of practice: Connecting what we know with what we do. *Council for exceptional children, 69*(3), 263-77.

Denzin, N. K. (1992). *Symbolic interactionism and cultural studies: The politics of interpretation*. Oxford UK: Blackwell.

DEST. (2002). *Language, Literacy and Numeracy Programme*. Canberra: Department of Education, Science and Training.

Ellerton, N., & Clements, M. A. (1998). Transforming the International Mathematics Education Research Agenda. In A. Sierpinska, & J. Kilpatrick (Eds), *Mathematics Education as a Research Domain: A Search for Identity* (Vol. 1, pp. 153-76). Dordrecht: Kluwer Academic Publishers.

Franke, M., Fennema, E., & Carpenter, T. (1997). Teachers creating change: Examining evolving beliefs and classroom practice. In E. Fennema, & B. Nelson Scott (Eds), *Mathematics teachers in transition* (pp. 255-82). Mahwah New Jersey: Lawrence Erlbaum Associates.

Harries, T., & Sutherland, R. (1999). Primary school mathematics textbooks: an international comparison. In I. Thompson (Ed.), *Issues in teaching numeracy in primary schools* (pp. 49-50). Buckingham: Open university press.

Lave, J. (1996). The practice of learning. In S. Chaiklin, & J. Lave (Eds), *Understanding practice: Perspectives on activity and context* (pp. 3-34). Cambridge: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated Learning Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Lubinski, C., & Jaberg, P. (1997). Teacher change and mathematics K-4: Developing a theoretical perspective. In E. Fennema, & B. Nelson Scott (Eds), *Mathematics teachers in transition* (pp. 223-54). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Matusov, E. (1999). How does a community of learners maintain itself? Ecology of an innovative school. *Anthropology and education quarterly, 30*(2), 161-87.

Nickson, M. (2002). Social and critical mathematics education. In L. Haggarty (Ed.), *Teaching mathematics in secondary schools* (pp. 229-42). London: Routledge/falmer.

Potter, J. (1997). Discourse analysis as a way of analysing naturally occurring talk. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 144-60). London: Sage publications.

Romberg, T., & Kaput, J. (1997). Mathematics in context: Impact on teachers. In E. Fennema, & B. Nelson Scott (Eds), *Mathematics teachers in transition* (pp. 357-80). Mahwah, New jersey: Lawrence Erlbaum Associates.

Shield, M. (2000). Mathematics textbooks: Messages to students and teachers. In J. Bana, & A. Chapman (Eds), *Mathematics education beyond 2000 (Proceedings of the 23rd Annual Conference of the Mathematics Education Research Group of Australasia, Fremantle, pp. 516-522)*. Sydney: MERGA.

Shield, M., & Dole, S. (2002). Investigating textbook presentations of ratio and proportion. In B. Barton, K. Irwin, M. Pfannkuch, & M. Thomas (Eds), *Mathematics Education in the South Pacific. (Proceedings of the 25th Annual Conference of the Mathematics Education Research Group of Australasia, Auckland, pp. 608-616).* Sydney: MERGA.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

Woods, P. (1992). Symbolic interactionism: Theory and method. In M. D. LeCompte, W. L. Millroy, & J. Preissle (Eds), *The Handbook of qualitative research in education* (pp. 337-404). New York: Academic Press, Inc.

Zevenbergen, R. (2001). Mathematics, social class, and linguistic capital: An analysis of mathematics classroom interactions. In B. Atweh, H. Forgasz, & B. Nebres (Eds), *Sociocultural research on mathematics education: An international perspective* (pp. 201-15). New Jersey: Lawrence Erlbaum Associates.