Affording and Constraining Local Moral Orders in Teacher-Led Ability-Based Mathematics Groups

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How teachers position themselves and their students can influence the development of afforded or constrained local moral orders in ability-based teacher-led mathematics lessons. Local moral orders are the negotiated discursive practices and interactions of participants in the group. In this article, the developing local moral orders of 12 teachers and their highest and lowest mathematics groups are examined with particular attention paid to teacher positioning and the patterns of differentiated positioning between the groups.

Two teachers at the same primary school in New Zealand were teaching their lowest ability-based group of year five students how to apply a compensation strategy to solve multiplication problems. For example: 6 x 9 as (6 x 10) – 6 and 6 x 11 as (6 x 10) + 6. Two students in the first class were arguing about the amount to compensate. One student claimed:

> It's the number at the front.

and another claimed:

> No, it's the number that stays the same.

Other students were following the argument and written recordings and asking questions. At no point did any group member look to the teacher to settle the disagreement. The teacher directed the disagreeing students to use their talk, text, and actions to explain and justify their claims. They were reminded they needed to ensure they were being understood by their group. Others in the group were required to demonstrate their understanding by applying both strategies to solve a different problem and determine which claim was correct. Through the discussion the misconstrued 'front number' strategy was sorted out and the group moved to solving more complex problems using the now named 'same number' compensation strategy. In this example students were expected to explain and justify their thinking, ask and answer questions, settle their own disagreements, understand, and be understood, apply new learning, and remedy their own and others' misconceptions. Disagreeing was a legitimate part of mathematical discussions and the teacher was not the fountain of all knowledge.

Students in the second group were also arguing. In this group the argument was about having to record the equation using a specific strategy when the answer was already known. One student asked:

> Why do I need to write (6 x 10) + 6 = 66 when I just know that 6 x 11 is 66?

The teacher reiterated their expectation:

> I want you to use the compensation strategy to solve 6 x 9 and 6 x 11.

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The first student quietly said:

> 60 – 6 is 54 and 6 x 11 is 66.

Overhearing this, a second student told the first their strategy was wrong:

> No that's not right, 6 x 11 = 66 isn't compensation, you have to use the compensation strategy, aye Miss, you have to use compensation aye?

The teacher provided the required confirmation:

> Yes I want you to use the compensation strategy.

Even more quietly the first student complained:

> That's just dumb, I know 6 x 11 is 66 why do I have to write it down that way? I know 6 x 11 = 66.

A third student tried to explain:

> You are right but being right isn't enough you had to use the right strategy too.

In this second example the expectations appeared to be that specific strategies must be applied, different thinking was not required, and existing knowledge was not valued.

These two examples illustrate how teacher positioning can influence the development of diverse, and potentially detrimental or beneficial, local moral orders. Local moral orders are a construct of positioning theory and are the agreed to patterns of interaction created and developed between participants, in this case teachers and students (Davies & Harré, 1990; Harré & van Langenhove, 1991). They develop from the ways participants view themselves and others, the way they act and interact, how they may feel obliged to act and interact, what can be said or done, who can action the saying or doing, when it can be said or done, and what the reactions to the words and actions can be (Harré & van Langenhove, 1999). There can be more than one developing local moral order within an interaction but all are contextualised to these participants, at this time, telling particular stories, from particular points of view (Harré, 2012).

Local moral orders are similar to Yackel and Cobb's (1996) social and socio-mathematical norms. How things are done become taken-as-shared by the group and what is taken-as-shared has a sense of oughtness (Linehan & McCarthy, 2000). However, there are two key differences. Moral, in the context of norms, refers to moral accountability or honourable behaviour such as in an expected code of conduct. Local moral orders in positioning theory have a moral quality because they are associated with the rights and duties of participants (Harré, 2012). The second difference pertains to how participants are located in the interaction. Local moral orders locate participants in positions whereas norms locate participants in roles. Positions were posited as a more dynamic and fluid notion than role which was perceived to be more static and symbolic (van Langenhove & Harré, 1999).

This article draws on the findings from a larger study (Tait-McCutcheon, 2014) where the key research question addressed was: How do teachers in New Zealand primary schools position themselves and students in their lowest and highest mathematics strategy groups so that mathematical know-how could be shared?

Mathematical know-how was defined according to Pólya (1965) as independence, judgement, and creativity. The focus of this article is the developing local moral orders that afforded or constrained the sharing of teacher and student mathematical know-how. The local moral orders were identified and explained by examining three discursive practices of positioning theory: positions, storylines, and social acts (Harré & van Langenhove, 1999).

Positions, Storylines and Social Acts

Positioning theory, proposed that when people participate in genuine, sequential, naturally occurring talk, text, and actions with others they do so from a position (Davies & Harré, 1990; Harré and van Langenhove, 1991). From a position, participants give and attempt to give, meaning to their own and others' talk, text, and actions by establishing, and attempting to establish their own and others' rights and duties (Harré & Moghaddam, 2003). The rights and duties any person has within a position are influenced by past, present, and future interactions of the group and influence the developing local moral orders of that group (Harré & van Langenhove, 1999). For example, teachers and students have individual and collective rights and duties, but their rights and duties are "interlaced with the expectations and history of the community" (Linehan & McCarthy, 2000, p. 442). Qualitatively different or fixed rights and duties can result in some students having substantially different opportunities to participate (Anderson, 2009; Barnes, 2003; Yamakawa, Forman, & Ansell, 2005).

Storylines make participants past or projected future words and actions meaningful to themselves and others "by telling a kind of story about them" (Slocum-Bradley, 2010, p. 93). The stories participants tell about themselves and others, and how those stories are accepted or rebutted help to define the local moral orders. There are numerous contextualised commentaries, interpretations, and relationships in play as the storyline advances and the exact same words and actions can convey a different storyline to different participants (van Langenhove & Harré, 1999). Storylines are neither complete nor correct because perspectives within any storyline may differ, participants may choose to be complicit or resistant, and the presence or absence of certain positions may alter the storyline. However, storylines do tend to follow already established patterns of development within a cluster of narrative principles and practices (Harré & Moghaddam, 2003). As such, the creation and survival of any storyline is contingent on it being jointly constructed and sustained. Social acts are the talk, text, and actions of participants that become significant to the interaction when they are appropriated by others and given increased, reduced, new, or different meaning (Davies & Harré, 1990). The social force participants have, and their social acts that are appropriated affect the existing and developing local moral order (van Langenhove & Harré, 1999). The relationship between positions, storylines, and social acts and local moral orders is mutually determining. The positions, storylines, and social acts of the group create the local moral orders and the local moral orders shape the positions, storylines, and social acts. Therefore, within any local moral order participants, conversations, expectations, and behaviours are susceptible to change (Harré, 2012).

Method

This study was underpinned by a social constructivist theoretical perspective whereby knowledge was considered from the personal view of an individual and the collective view of a group (Bobis, Mulligan, & Lowrie, 2004). A qualitative research paradigm was used to examine teachers' acts of positioning, to reason about those positionings, and to interpret relationships and consequences between positioning and each groups developing local moral order. The bounded and socially situated nature of this research within the highly subjective social phenomenon of teaching and learning meant a qualitative case study was an appropriate methodological choice. Case study research is exploratory and resonates with the reader's own experiences and existing understandings, provides insights into how things become the way they are, and generates discoveries of new learning. The end product of a qualitative case study is a "rich, thick description of the phenomenon under study" (Merriam, 2009, p. 43).

Two schools, Pacific and Tasman, were purposefully recruited to participate in the larger study because of their commonalities (professional development, lesson organisation, and ability grouping) and differences (static/changing staff, decile rating, and ethnic diversity). Twelve teachers of students in years zero to six (aged 5-11) participated. Years of teaching experience ranged from one to 24 and nine of the 12 teachers had participated in the New Zealand Numeracy Development Project (NDP), (Ministry of Education, 2007) professional development in the past three years either as pre-service or in-service teachers.

Three data sources were used extensively in this research: video and audio recordings, transcriptions, and observations. Each teacher was video and audio recorded for three consecutive lessons teaching their lowest and highest mathematics group, resulting in 72 lessons observed and transcribed. Written observations that included field and personal notes where undertaken for the duration of each lesson and theoretical notes were added after the observations. Qualitative data analysis required a fluid, evolving, dynamic approach that included contrasting, comparing, replicating, cataloguing, and classifying from concrete data toward more conceptual levels (Denzin & Lincoln, 2011). A constant comparative method (Corbin & Strauss, 2008) was chosen as the most appropriate method for data analysis. The analytic approach taken was look, think, look again, think again, through-out the following five phases of analysis:

1. Identify examples of teacher positioning and code as talk, text, or action. Note relationships between codes and group as themes. Develop tentative concepts from themes. Build categories through which theory was being created.
2. Identify mathematical contexts in which the teacher positionings occurred.
3. Plot teachers' positioning acts according to codes and contexts.
4. Identify potential negative instances and conflicts within the data.
5. Establish themes to describe the positioning pattern of each teacher with their lowest and highest strategy group.

The trustworthiness of this research was tested and affirmed by considering the reliability, credibility, transferability, dependability, and confirmability of the qualitative research methods (Lincoln & Guba, 1985). Triangulation of participant sources, data sources, and data analysis confirmed emerging findings and the reliability of conclusions (Merriam, 2009). Credibility was enhanced through the processes of member checking and peer debriefing (Cohen, Manion, & Morrison, 2007). The thick descriptions used to tell the story of teacher positioning provided transferability for the reader and "accurate explanations and interpretation of the events" to a different setting (Cohen et al., 2007, p. 405). Dependability and confirmability were achieved through the rigour of the data collection, data analysis, and theory generation processes, documenting procedures for checking and rechecking the data, including negative instances, and conducting a data audit trail.

Findings and Discussion

This study identified three key findings where the developing local moral orders afforded the sharing of mathematical know-how from teachers and students and three key findings where the sharing of mathematical know-how was afforded for teachers but constrained for students. These findings are discussed in relation to the literature.

The local moral orders that afforded the sharing of mathematical know-how for both teachers and students emphasised the visibility, fluidity, and contestability of the mathematics; the importance of teachers and students contributions to the teaching and learning; and the expectation teachers and students would take a mathematical stand by agreeing with or challenging the shared know-how. Teachers and students ensured and enabled the visibility, fluidity, and contestability of the mathematics through their suggestions, observations, explanations, questions, and reflections. Teachers further ensured visibility by providing time and space within the lessons for suggestions, observations, explanations, questions, and reflections to be shared and responded to. Teachers and students were able to maintain the discussions around, and the complexity of, the task and the mathematical interest and depth of teachers and students understanding simultaneously developed (Chapin, O'Connor, & Anderson, 2009).

Teachers and students had important know-how to share, observations to make, and questions to ask that benefitted and progressed the teaching and learning (Hunter, 2007). Both were expected to take a mathematical stand and have a mathematical opinion that could be understood by others. They were expected to analyse their thinking, know when they were correct or mistaken, understand why, and know how they could prove they were correct, or fix their error (Chapin & O'Connor, 2007). They also had a duty to know when another group member was correct or incorrect and again know why. Correct and incorrect answers, misconceptions, disagreements, and questions from teachers and students provided resources for targeted teaching and learning (Anthony & Walshaw, 2009). When teachers purposefully listened to students' mathematics they gained knowledge about what students knew and how they were constructing new knowledge. This better positioned teachers to "generate interpretations of what they noticed and to generate conjectures about student thinking that would support the development of their ability to teach for understanding" (Choppin, 2011, p. 195). Teachers positioned themselves as active listeners, observers, and responders who had something mathematically important to learn from students. They then formatively applied what they had learned to question students in ways that shaped and further developed the mathematical talk, text, and actions.

Teacher and student know-how were predominant social acts because both had a voice within the mathematical discussions and both were responsible for the groups progress. Know-how acknowledged as valuable raised the individual and collective status of group members and the intellectual value of their reasoning (Hunter, 2007). The more the group experienced agency within their own and others learning, the more they learned they had control over their own and others successes and failures. Teachers and students had personal latitude within the teaching and learning because both had authority and were considered competent contributors to the mathematics (Wagner & Herbel-Eisenmann, 2013). The local moral order of the teachers whose positioning afforded the sharing of mathematical know-how and their students was collectively and collaboratively evolving.

The local moral orders that afforded the sharing of teacher know-how but constrained the sharing of student know-how emphasised the predominant positioning of the teacher; the teacher as gatekeeper; and the hurried pace of the lessons. The mathematics within predominantly belonged to the teacher and as such, the teacher had a considerably higher profile than students. Teachers were more significant within the group because they positioned themselves to do most of the mathematical talk and tasks within the lesson, often before the students had the same opportunity. They asked and answered questions, modelled and explained correct and incorrect answers, summarised learning for students, and dismissed opportunities to explore incorrect answers or different or advanced explanations. Instead of modelling, reasoning, and reflecting, these teachers tended to make authoritative statements and decisions and give directions that were quick, correct, and one-dimensional. Whilst students were receiving clear messages about "what they need to know and learn" (Ewing, 2011, p. 68), they were positioned as passive recipients of knowledge who had a duty to listen to the teacher and repeat answers and explanation. The request for repetition did not seem to be to be a means for ensuring students were paying attention to what was being said but rather to ensure they had heard correctly (Chapin, et al., 2009). There was limited time or space for students to make decisions or express their own thoughts. The fewer opportunities students had to share their mathematical know-how the fewer opportunities they had to experience reasoning and act purposefully and reflectively with others (Choppin, 2011).

When the sharing of mathematical know-how was constrained for students the teacher was positioned as the gatekeeper of the mathematics (Wagner & Herbel-Eisenmann, 2013). Teachers led, students followed, and there was little demarcation between these positions. Teacher knowledge and authority limited positions made available to students and teacher's personal mathematical beliefs and values were dominant within the discussions and developing mathematics (Davies & Hunt, 1994). The know-how shared, by whom, and when was determined by teachers. They gave themselves the right to provide correct answers and explanations, target specific strategy use, and ask closed and known answer questions. Teacher know-how was shared as self-enclosed messages to be understood. Steering students toward particular solutions and strategies and smoothing that path for them did not enable know-how to be experienced or grappled with (Chapin & O'Connor, 2007). Students were positioned by teachers as passive onlookers whose duty it was to behave appropriately, watch, listen, and mimic. These duties appeared to take precedence over mathematical thinking. The know-how of the teacher became the predominant social act because theirs was the voice most heard. Other significant social acts were the words and actions of students who endorsed the teacher positioning, provided correct answers, and applied designated strategies.

Conclusions and Implications

This article contributes new knowledge to understanding the teaching and learning of mathematics by employing the lens of local moral orders and the discursive practices of positions, storylines, and social acts for analysis. The mathematical opportunities of the 24 groups of students in this study were qualitatively different because of the developing local moral orders in which their learning occurred. The positions of teachers and students, the storylines being told, and the social-acts being valued reiterated and reinforced that qualitative difference. When teachers or students limited themselves or were limited by others to constrained positions, their rights and duties within that position become restricted (Davis & Hunt, 1994; Yamakawa et al., 2005). The longer the teacher or student is constrained by the positioning, the less likely the positioning could be altered or disrupted (Anderson, 2009; Barnes, 2003). The danger for some teachers and students is that they may become entrenched in an exponential pattern of constrained teaching and learning.

One such pattern was identified across the afforded and constrained local moral orders. This pattern was that more teachers afforded the sharing of mathematical know-how with their highest group than their lowest. Ten of the twelve teachers created local moral orders with their highest group that promoted and expected active participation, authentic involvement, and reflection from themselves and their students. Six of the 12 teachers created similar local moral orders with their lowest group. Therefore eight groups of students did not have the same opportunities to engage with their own and peers' know-how. They did participate in their teacher's know-how but access was narrow and restrictive. Students in these eight groups were marginalised from mathematical engagement because of their corresponding imitative, procedural, and simplified duties. Interactions occurred mainly between the teacher and an individual student and the goal appeared to be to follow specific strategies and determine correct answers. By positioning themselves as the dominant participant in the mathematical discussions, these teachers were limiting their opportunities for their students' to connect in mathematically meaningful ways and for them to connect in mathematically meaningful ways with their students (Boaler, 2014). Teachers and students opportunities for successful mathematics teaching and learning were marginalised and unlikely to alter levels of achievement.

It is important to note that situating the study within the NDP mathematics programme and numeracy strand may have predetermined the mathematical pedagogies teachers selected and simultaneously predetermined the positionings they would take and give. The NDP could be considered a more structuralist approach to teaching and learning mathematics and as such teachers could have promoted the "direct instruction of explicit mathematical representations and procedures" (Murphy, 2013, p. 108). When teachers' positionings constrained the sharing of mathematical know-how the goal appeared to be to push students toward the recommended strategy and correct answer. An adherence to the NDP teaching materials may have substantiated or exacerbated that goal. However, the evidence remains that for eight groups of students the developing local moral orders in which their mathematical learning occurred constrained their opportunities to share their mathematical know-how. These students mathematical know-how was not positioned as a valuable teaching and learning tool. It would be of value to these findings and to the international mathematics community to extend this research to include mathematics programmes less structured than the NDP. Increased understanding of the affording local moral orders in particular could assist all teachers to further define and explore effective teaching positions.

References

Anderson, K. T. (2009). Applying positioning theory to the analysis of classroom interactions: Mediating micro-identities, macro-kinds, and ideologies of knowing. *Linguistics and Education, 20*, 291-310.

Anthony, G., & Walshaw, M. (2009). *Effective pedagogy in mathematics: Educational practices series, 19*. International Academy of Education, International Bureau of Education & UNESCO.

Barnes, M. (2003). Patterns of participation in small-group collaborative work. Paper presented as part of the symposium *Patterns of participation in the classroom* at the Annual Meeting of the American Educational Research Association, Chicago.

Boaler, J. (2014). Ability Grouping in Mathematics Classrooms. *Encyclopaedia of Mathematics Education, 1-5.*

Bobis, J., Mulligan, J. T., & Lowrie, T. (2004). *Mathematics for children: Challenging children to think mathematically* (2nd ed.). Frenchs Forest, NSW: Pearson Education Australia.

Chapin, S. H., & O'Connor, C. (2007). Academically productive talk: Supporting students' learning in mathematics. In W. G. Martin & M. E. Strutchens (Eds.), *The learning of mathematics* (pp. 113-128). Reston, VA: The National Council of Teachers of Mathematics.

Chapin, S. H., O'Connor, C., & Anderson, N. C. (2009). *Classroom discussions: Using math talk to help students learn* (2nd ed.). Sausalito, CA: Math Solutions.

Choppin, J. (2011). The impact of professional noticing on teachers' adaptations of challenging tasks. *Mathematical Thinking and Learning, 13*(3), 175-197.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge.

Corbin, J., & Strauss, A. (2008). *The basics of qualitative research* (3rd ed.). Los Angeles, CA: Sage.

Davies, B., & Harré, R. (1990). Positioning: The discursive production of selves. *Journal for the Theory of Social Behaviour, 20*(1), 43–63.

Davies, B., & Hunt, R. (1994). Classroom competencies and marginal positioning. *British Journal of Sociology of Education, 15*(3), 389-408.

Denzin, N. K., & Lincoln, Y. S. (Eds.). (2011). *The sage handbook of qualitative research* (4th ed.). Thousand Oaks: Sage.

Ewing, B. (2011). Direct instruction in mathematics: Issues for schools with high indigenous enrolments: A literature review. *Australian Journal of Teacher Education, 36*(5), 63-91.

Harré, R. (2012). Positioning theory: Moral dimensions of social-cultural psychology. In J. Valsiner (Ed.), *The Oxford handbook of culture and psychology* (pp. 191–206). NY: Oxford University Press.

Harré, R., & Moghaddam, F. M. (2003). Introduction: The self and others in traditional psychology and in positioning theory. In R. Harré & F. M. Moghaddam (Eds.), *The self and others: Positioning individuals and groups in personal, political, and cultural contexts* (pp. 65-78). Westport: Praeger.

Harré, R., & van Langenhove, L. (1991). Varieties of positioning. *Journal for the Theory of Social Behaviour, 21*(4), 393-407.

Harré, R., & van Langenhove, L. (1999). The dynamics of social episodes. In R. Harré & L. van Langenhove (Eds.), *Positioning theory: Moral contexts of intentional action* (pp. 1-14). Oxford: Blackwell.

Hunter, R. (2007). *Teachers developing communities of mathematical inquiry.* (PhD Thesis). Massey University, Auckland, New Zealand.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

Linehan, C., & McCarthy, J. (2000). Positioning in practice: Understanding participation in the social world. *Journal for the Theory of Social Behaviour, 30*, 435-453.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (2nd ed.). San Francisco, CA: Jossey-Bass.

Ministry of Education. (2007). *Numeracy Professional Development Projects Book 1: The number framework*. Wellington, New Zealand: Author.

Murphy, C. (2013). Making space for mathematics learning to happen in group work: Is this really possible? *Teachers and Curriculum, 13*, 108-111.

Pólya, G. (1965). *Mathematical discovery: On understanding, learning, and teaching problem solving* (Volume II). New York: John Wiley.

Slocum-Bradley, N. (2010). The positioning diamond: A trans-disciplinary framework for discourse analysis. *Journal for the Theory of Social Behaviour, 40*(1), 79-107.

Tait-McCutcheon, S. L. (2014). *Teacher practice in primary mathematics classrooms: A story of positioning*. Unpublished doctoral thesis retrieved http://researcharchive.vuw.ac.nz

van Langenhove, L., & Harré, R. (1999). Introducing positioning theory. In R. Harré & L. van Langenhove (Eds.), *Positioning theory: Moral contexts of intentional action* (pp. 14-31). Oxford: Blackwell.

Wagner, D., & Herbel-Eisenmann, B. (2013). Disbursing authority among mathematics students. *Proceedings of the Seventh International Mathematics Education and Society Conference* (pp. 483-491), Cape Town, South Africa.

Yackel, E., & Cobb, P. (1996). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for Research in Mathematics Education, 27*(4), 458-477.

Yamakawa, Y., Forman, E., & Ansell, E. (2005). Role of positioning in constructing an identity in a third grade mathematics classroom. In K. Kumpulainen, C. E. Hmelo-Silver, & M. Cesar (Eds.), *Investigating classroom interaction: Methodologies in action* (pp. 179-202). Rotterdam: Sense.