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## Qualities of Respectful Positioning and their Connections to Quality Mathematics

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**ABSTRACT:** Drawing on stories of students making sense of mathematics in relationship to their places in their aboriginal communities on Canada's east coast, we identify qualities of respectful positioning and their connections to quality mathematics. Attention to positioning in our ethnomathematical research conversations prompted and facilitated a shift from a traditional colonialist storyline to one that promoted more respectful research relationships. With this shift, children were invited into authentic conversations with elders and others to examine mathematics in traditional and modern community practices. Using examples of ethnomathematical projects by Mi'kmaw and Maliseet students (from the annual 'Show me your math' event) we characterize quality learning in terms of local values, which we synthesize under the rubric of wholeness, identifying three aspects of wholeness in particular: cultural synthesis, personal holism, and intergenerational interaction. We ask to what extent student samples demonstrated wholeness and consider ways in which fuller wholeness might be achieved.

**KEYWORDS:** aboriginal, culture, holistic, intergenerational, mathematics education, positioning theory, respect

## Qualities of Respectful Positioning and their Connections to Quality Mathematics

In this chapter, we identify qualities of respectful positioning and their connections to quality and equity in mathematics. We consider these qualities in the context of the ‘Show me Your Math’ (SMYM) event, which has run since 2006 and has become increasingly popular amongst Aboriginal communities in Atlantic Canada. Mi’kmaw and Maliseet students are invited to do ethnomathematical investigations to show others the mathematics in the practices of their communities. We draw upon Harré and van Langenhove’s (1999) positioning theory to describe the shifting storylines that are contributing to equity and quality within participating mathematics classrooms. Our sense of quality, equitable mathematical experiences focuses on wholeness.

Using examples of students’ ethnomathematics and our reflections on the nature of the positioning, we will demonstrate ways of seeing quality mathematics learning and relate these qualities to concerns for equity. We characterize quality learning in terms of wholeness. Thus our sense of the word ‘quality’ is underpinned by equity. Quality and equity are inseparable.

Wholeness resists fragmentation, thus quality mathematics experiences require *cultural synthesis* bringing together cultures and values from mathematics and the community, *personal holism* including the child’s experiential, conceptual and spiritual development, and *intergenerational interaction*. Our interest in wholeness is another way of talking about equity. We will analyse student work in terms of values developed for mathematics and local community values.

The chapter is structured around stories of student participation to demonstrate students making sense of mathematics in relationship to their places in their community. Though the stories exemplify aspects of wholeness, we identify ways in which we would hope for more wholeness. Before this, we draw on Aboriginal scholarship relating to the context in Canada to give an account of local Aboriginal views regarding quality education, which we synthesized to develop a multi-dimensional approach to wholeness. We follow this with an overview of the positioning theory that was instrumental in the development of the SMYM event, and an account of the positioning in the event’s development. These sections set up the stories of student participation and our analysis of these stories in terms of the qualities we outline. In our reflection, we consider how the SMYM event might be relevant to other contexts.

### Quality Mathematics Education in Context

Our conception of quality education has arisen mostly from our conversations within the communities and is underpinned by concerns for equity. Nevertheless, we outline our sense of what quality means by drawing mostly on publications that reflect this sense. The relevant publications include scholarship relating to Aboriginal education, especially in Canada, and also professional literature relating to mathematics teaching.

The participant Mi’kmaw schools have a stated goal of developing community-appropriate educational standards that include a focus on language and culture yet, by law, they are required to offer comparable curriculum to the public schools. Recent efforts in school improvement initiatives require the participant schools to write provincial assessments in mathematics and literacy. For these and other reasons, no school would openly choose to move away from mainstream mathematics nor would they say that such achievement in mathematics is unimportant. However, the tension between the often-competing goals of community relevance and performance for external standards presents challenges for mathematics education in Mi’kmaw communities. The provincially developed curriculum is underpinned by the National Council of Teachers of Mathematics’ (NCTM) *Principles and Standards of School Mathematics*

document (NCTM, 2000). Although the NCTM (2009) has stated, “a mathematics curriculum should focus on mathematics content and processes that are important and worth the time and attention of students” (p.1) this assertion appears to be focused on a mainstream view of mathematics. We ask what mathematics content and processes are worth the time and attention of young Mi’kmaq and Maliseet students and, furthermore, we ask who decides. Are the same content and processes most relevant to children in all contexts?

A dominant theme in the literature is that Aboriginal education should seek “to heal and transcend the effects of colonization” (Cajete, 2000, p.181). Hampton (1995) argued that Aboriginal education cannot ignore the reality of colonization but rather must address the issue directly. Aboriginal education needs to move toward decolonization which can be seen as a process of “deconstruction and reconstruction” (Battiste, 2004) that “engages with imperialism and colonialism at multiple levels” (Smith, 1999, p.20). This demands the critical examination of the hegemonic structures of mainstream education that continue to perpetuate the values of colonialism (Battiste, 2004).

Cappon (2008) argued that Aboriginal education holds the view that learning is holistic, lifelong, experiential, rooted in Aboriginal languages and cultures, and spiritually oriented. He claimed that it is a communal activity with all community members playing a role and that it integrates both western and Aboriginal knowledge. Orr et al. (2002) have shown how this notion of bridging Aboriginal knowledge with mainstream curriculum has been worked at effectively by Mi’kmaq teachers in one of the participant communities. These teachers provided a quality education through the incorporation of cultural practical knowledge along with Indigenous pedagogical, relational, and political consciousness.

Bringing together these articulations of values within Aboriginal communities, we note how they all relate to wholeness in some way. To facilitate analysis, we will use three views of wholeness that we developed through analysis of the data and synthesis of the literature, though we acknowledge that there are not clear boundaries between these three ways of looking. The three views of wholeness relate to cultures, to the person, and to generations.

Firstly, we heard and read a common thread pointing to the importance of connecting mathematical values and community values. When Mi’kmaq and Maliseet children do mathematics they work at the intersection of at least two strong discourses – the mathematics discipline and community tradition. A quality mathematics experience must involve *cultural synthesis*, honouring values and practices from both discourses. Such synthesis addresses the call for de-colonization (transcending colonization) not by ignoring or refuting the accomplishments of the colonizing cultures but by adjudicating them in terms of community values.

Secondly, we noted a common interest in the need to integrate all aspects of the child’s personhood. It is a human violation to separate them as different and independent aspects, but referring to their distinctness helps recognize their integration. The *personal holism* that is a necessary part of quality mathematics experience is demonstrated well in a variety of North American Aboriginal medicine wheels, which embody the connections of the different aspects of the person. We will focus attention on the experiential, conceptual and spiritual development of children, all of which are necessary.

Thirdly, a quality mathematics education experience requires connections among the generations. *Intergenerational interaction* connects elders, children and others. We emphasize the word ‘inter-action,’ which emphasizes the necessity that each generation take action and responsibility in relationships in educational settings.

Our focus on wholeness is in line with current scholarship on equity in mathematics education. Gutiérrez (2007) argued that the conception of equity should include four dimensions: access, achievement, identity and power. Because research related to equity in mathematics has tended to focus on access and achievement, these aspects are placed on the dominant axis in her model with identity and power comprising the equally important critical axis.

Gutiérrez argued for wholeness with her recognition that many students have been marginalized by mathematics because they are asked to deny their identity in order to participate in the dominant view of mathematics. She pointed to the work of ethnomathematicians and scholars who promote culturally relevant mathematics as a source of identity within mathematics education. These streams of scholarship involve what we call cultural synthesis because they connect mathematics' disciplinary values with contextual values from students' cultures.

The window/mirror metaphor Gutiérrez used for describing identity connects to holistic identity: "students need to have opportunities to see themselves in the curriculum (mirror) as well as have a view onto a broader world (window)" (p. 3). Her take on identity is closely related to power. The importance of power becomes very clear with a focus on positioning. The power dimension involves not only questioning who has power in the classroom in terms of who participates, who talks, and so on, but also as it pertains to using mathematics to question power relationships in the world and seeing mathematics as a human endeavour.

We recognize that our focus on wholeness attends more to the critical axis than the dominant axis of her model, but reiterate that leaders in the communities in which we have been having conversations have been unequivocal about the need for promoting mathematics achievement to bring expertise into the communities while valuing wholeness. The students need access to the mathematics that is recognized and valued outside the communities. Access and achievement are valued, but not above community values. Nevertheless, quality mathematics achievement and participation is a condition of equity.

### **Positioning Students as Participants in Community Interaction**

Positioning theory was instrumental in the development of our research choices. This theoretical perspective on positioning follows from an edited book by Rom Harré and Luk van Langenhove (1999) and from Wagner and Herbel-Eisenmann's (2009) elaboration of the theory in the context of mathematics education. In general, 'positioning' is taken to refer to the way people use action and speech to arrange social structures. Words and associated actions evoke images of known storylines and positions within those stories. When one person invokes a storyline, others in the interaction may be complicit in this positioning or resistant to it.

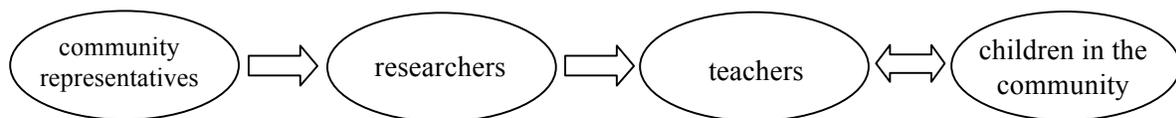
Davies and Harré (1999) explained how positioning theory draws attention to 'immanent' practices, as opposed to 'transcendent' discourse structures (e.g. a student's relationship to the transcendent discipline of mathematics), which Wagner and Herbel-Eisenmann (2009) showed to be a common scholarly focus in mathematics education. With positioning theory's attention to immanent relationships, aspects of human interaction become more noticeable because the larger discourses are ignored, even characterized by Davies and Harré as myths. Wagner and Herbel-Eisenmann, however, maintained the promotion of attention to immanent practice without relegating discourses as inconsequential because people take discourses as being real in their own right and powerful in immanent interactions. In this way so-called mythological disciplines, such as mathematics, are, for example, as real as race, which is said to be a myth (a human construct with no real basis) but which has substantive manifestations in human relationships. Certain people (e.g. teachers) are positioned as mediums or representatives of transcendent influences such as 'mathematics'. Wagner and Herbel-Eisenmann's conclusion is in line with our

view of cultural synthesis, as they argue against stripping mathematics of its power (de-mythologizing it) in favour of inviting new mathematical narratives that recognize mathematics in places that it has often been ignored or marginalized (re-mythologizing mathematics).

We began our research in Mi'kmaq communities by interviewing Aboriginal elders to identify some of their everyday practices (both traditional and current) that could be deemed mathematical. This typical approach to ethnomathematics research (c.f. Powell and Frankenstein, 1997) relies on Bishop's (1988) articulation of activities that are potentially mathematical (practices that involves counting, measuring, locating, designing, playing or explaining) and on the assumption that any mathematics is an artefact of a particular culture.

Although we were excited to hear the stories the elders were sharing with us, in reflection on this research we saw ourselves as mediators, interfering with the intended process of connecting students to the mathematics in their communities. We were careful to orient our conversations with participants around mutual respect, yet we still found connections with colonialist storylines as we observed that some participants were trying to be helpful by telling us what we wanted to know. While we appreciated this spirit of cooperation because it seemed generative for our planned research, it was also a little disturbing to have participants ask us if they were telling us what we wanted to hear. On reflection we recognized two concerns. First, we did not want to be seen as the ultimate audience but we often felt positioned in that way (and we were complicit in this positioning as well). Second, we worried about authenticity because participants were subjecting themselves to our agenda and we talked less about their agenda(s).

The interpersonal relationships appeared to be similar to the diagram in Figure 1. The community experts were responding to our request for them to give us information to pass on to teachers who in turn would pass it on to the children. The children would then do something called 'work' for the teachers.



**Figure 1: interpersonal positioning in the initial ethnomathematical work**

Attending to positioning opened up new opportunities. We realized that the conversations would be more authentic if the children themselves talked with elders and others to find mathematics in traditional and modern community practices. We needed to remove ourselves from the position of mediums. Also, reflecting on Morgan's (1998) research that underscores the importance of audience in students' mathematical writing, we realized that positioning the children as the ultimate audience in the ethnomathematics conversation affords them no opportunities to address an audience other than their teacher, and certainly no imperative to engage in real problems/issues faced by their community. New storylines were necessary.

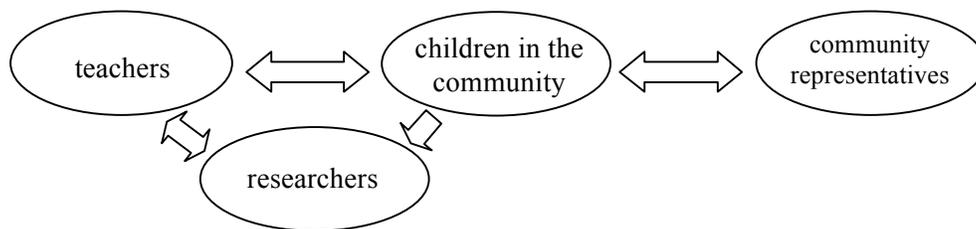
As a result, we initiated a new series of conversations structured to prompt community members to talk and listen to each other about everyday mathematics in traditional and modern community settings. From our dissatisfaction emerged the 'Show me Your Math' (SMYM) event that changed the interpersonal positioning in substantive ways.

We approached some schools with the idea for a SMYM contest in which students would be invited to do projects exploring the mathematics in their everyday lives. We planned to have

students submit their work to a web site that would be hosted by the Atlantic Canada First Nation Help Desk, an existing infrastructure that supports communication amongst communities via the internet. Such ‘contests’ are commonly used in this region to promote community-based education and to develop cultural resources for teachers and students. While this plan was well-received, the teachers in our initial meeting wanted more than a web site. They suggested schools host local mathematics fairs and send selected students to a regional fair where they could share their work with others.

To substantiate the break from the school tradition of students doing work for teachers as audience, we also suggested that instructions for the contest be given in a video. The teachers in the workshop contributed to the structuring of the video, but we produced it. It featured Aboriginal people, including an elder, a middle-aged teacher, and children, all asking the viewer (the student) to “show their math.” We felt that the form of this video helped students see the community as their audience instead of their teachers. In response to this prompt, school children interviewed elders, experts in crafts, and others to explore mathematics done in their communities in historic and modern times. They published their work on the internet site and also presented their work to the region’s communities in a math fair.

The interpersonal relationships structured with the SMYM event are more complex than the relationships in our initial work. Figure 2 represents an attempt to diagram the relationships. The teachers (and some other community representatives, including elders) were and continue to be in conversation with us. They initiate student investigations that involve students in conversation with experts in the community. The students report back to the community, to their teachers and to us at mathematics fairs and also to the outside world because their work is put on the web site (<http://schools.fnhelp.com/math/showmeyourmath/index.htm>).



**Figure 2: interpersonal positioning with the “Show me your Math” event**

We elaborate elsewhere (see Wagner and Lunney Borden, forthcoming) on these shifting positioning structures and associated storylines, and on the power of positioning theory for interrogating relational practice. This chapter has a different focus. We draw upon examples of student work in the SMYM event as examples of quality equitable mathematics education. With students positioned as researchers and disseminators of mathematical knowledge, this project has done what Wagner and Herbel-Eisenmann (2009) called for in their theoretical article on positioning: the SMYM project has given students an opportunity to “identif[y] with storylines that are not traditionally a part of mathematics classroom discourse” (p. 13). These new storylines brought about qualitatively different relationships for students with other community members and with mathematics as a field of study.

## Examining Student Work

We now turn our attention to the work produced by students for the SMYM event to illustrate the different views of wholeness that we see as central to quality mathematics education. We ask to what extent students demonstrated that their experience involved cultural synthesis, personal holism and intergenerational interaction. No one example exemplifies our vision for wholeness perfectly, but each example shows aspects of good relationships and helps point the way to an ideal.

### *Authorities on Efficient Shapes*

A unit in *Mathematical Modeling – Book 1* (Barry et al, 2000), the current grade 10 text in Nova Scotia, prompts engagement in a series of investigations and exercises that would have students examine the geometry of packaging. The unit includes a lesson on ‘the economy rate’ – the ratio of the volume to the surface area of a shape. Through investigations students discover that a cylinder with its height equal to its diameter is the most economical cylindrical container for a given volume. In 2009, a group of Grade 10 students from one of the participant schools brought this textbook knowledge to the community practice of basket making.

They invited two community elders to come to class and teach them how to make baskets. They were surprised to discover these elders already knew about efficient containers: the elders could identify the baskets that needed the least material for their capacities. A student remarked, “They already knew which [basket] was the most economical. They didn’t have to do all the math that we did. We had to do the math to find out which ones it was.” We were not present to see “all the math” the students did, but it is clear that they were using formulas to explore a geometry problem and that the presence of the elders prompted them to explain and justify their work more than they would have with only their teacher as an audience. Explaining to a teacher is less natural because the teacher is assumed to already know and understand. Thus there is evidence of multiple processes promoted by the NCTM (2000): problem solving, communication, connections, and reasoning.

The cultural synthesis is particularly strong in this example, as traditional community knowledge is explicitly set alongside textbook knowledge. This synthesis was especially powerful because students were aware of the juxtaposition and central to arranging it. The textbook was repositioned in that its typical position of dominance in classroom authority structuring was challenged by revelations that there were more local authorities. This challenge of textbook authority could be seen as an attempt to de-mythologize the powerful discipline of mathematics, but it also could be seen as a re-mythologizing. Is mathematics diminished when academic authorities are brought alongside local, cultural authorities? No, the sources of authority corroborate each other: both would garner more respect from the students, whose sense of authority also increased as they arranged and interpreted the connection.

The intergenerational aspects of this cultural synthesis are also evident. The complicated mathematics of the students’ textbook is re-mythologized as common sense often used by the elders. No textbook author was needed to tell these elders, or the many generations of basket makers they learned from, which container was the most economical. In the student’s observation of this elder knowledge, we see that students see this knowledge as part of their own cultural traditions, a piece of their identity as Mi’kmaq people.

The shift in positioning contributes to the development of personal holism because it relates to the students’ identity. Furthermore, the hands-on experience of building the baskets, added to the usual task of observing/measuring capacities provided students with a more

concrete experience of the concept in the textbook, helping to build conceptual understanding: their bodies were involved in the development of their understanding.

We also note that aspects of wholeness were not evident to us in this example. Regarding personal holism, we note the absence of spiritual development. We wonder how this aspect could have been addressed in the classroom experience. Was there a space provided for elders to share stories associated with basket making such as those that provide insight into the proper way to select the tree, gather the wood, make the strips, and so on? We were not present in the classroom during this interaction and we did not explicitly ask questions about spirituality at the math fair so we are unaware of the degree to which this aspect of personal holism was reached. Nevertheless, the intergenerational conversation about basket making opened the possibility for future interaction that may include more spiritual dimensions.

### *Drum Making*

In a project from the 2007 math fair A Grade 4 class brought community knowledge to the forefront in mathematics class as they made hand drums and prepared a PowerPoint presentation to submit for the website documenting their experience. This project differs from the example described above because it started with a community practice rather than from school-based mathematics practices.

The presentation opens with a photograph of three wooden frames sitting on the table and saying, “We started our drums with a 12 sided pine frame. The wood burned turtle you see is a starting point for threading our drums.” On the next slide there is a frame placed on a deer hide with the text: “When making a drum we need to focus on balance and centring. In Mathematics we focus on Symmetry.” The next few slides show pictures of a community member teaching the students how to make the drums. One photograph shows her demonstrating to the children how to measure the sinew using arm lengths, and another shows four children standing at the front of the classroom, each about a metre apart, holding parts of the outstretched sinew. Next, a slide draws attention to mathematical connections with these statements: “We learned the importance of measurement in preparing our materials” and “We measured the diameter and compared our new shape to a circle.” A series of photographs showing the children making their drums explain, “As we thread the sinew through we first go across the diameter of the drum frame starting at the sign of the turtle” and “It is important that we bring everything to the centre to maintain the balance of our drums.” The concluding text, accompanied by an image of the entire class proudly showing their drums, proclaimed, “We learned many things when making our drums. The most important is to maintain balance and centre in our lives.” Throughout the slide show, the Mi’kmaq Honour song plays in the background.

There are significant storylines in this example that differ from typical classroom mathematics storylines. Again, there is intergenerational interaction as the children learned from a community member known for her expertise in drum making as well as her significant traditional spiritual knowledge, which is a shift from the usual storyline of learning from the teacher. We note that there could be a greater connection made between the community knowledge and the school mathematics as it is unclear how explicitly the connections were made. Nevertheless, there is a degree of cultural synthesis with the recognition that the drum making values align with mathematical obsessions, namely symmetry, and working from a point of origin. The drum making seems to be the dominant aspect of learning with the mathematics added in. We wonder to what extent the students recognized the importance of the mathematical connections. We can imagine them seeing the connection as a glib assertion. This shift to privileging the community knowledge to eclipse mathematics may be completely appropriate in

this instance because the typical classroom experience is just the opposite, but leaves open questions about the depth of the cultural synthesis.

Personal holism is evident in the ways that the children were positioned as active agents using their hands (and eyes), discovering both mathematical and cultural knowledge in a way that is rooted in spiritual traditions, consistent with Cappon's (2008) vision of Aboriginal learning. They were learning from doing, which develops their experiential knowledge, yet we wonder what mathematics they learned. There was ample opportunity for strong connections with mathematics in the students' curriculum (symmetry) and beyond (the significance of an arbitrary origin) but in our conversation with students, they told us mostly about the physical and spiritual aspects of the drum making. Perhaps this is to be expected of children this age.

We chose this example because it exemplified the spiritual development of the child, which is an aspect we have seen lacking in many other projects. Relating to Doolittle's (2006) concerns, the students are not being lead away from the culture, rather they are being led toward important cultural and spiritual lessons that honour the drum making and this experience 'pulls in' mathematics. The more usual direction of cultural synthesis seems to be a focus on some mathematics followed by a look at community practices that might be pulled into the mathematics. Doolittle called this pushing the mathematics into the culture. The spirituality is especially evident in the students' concluding statement that the most important thing they learned was a lesson about living a balanced and centred life. This was reaffirmed at the math fair where one of the students was excited to tell us about what his class had done (the student is "T", the interviewer is Lunney Borden, "LLB"):

T: This one that I made, it has twelve sides so that's a dodecahedron, right. While I was making it we took time because usually people take like twelve days but we took an hour and a half. (*He turns the drum over to show the back*). So we used um, I think it was red deer or red moose, I don't know actually but right here it tells you how to make it. (*He leans forward to point out the sheet of instructions posted in front of their drum display*.) We put a sponge in the drumsticks. We took our time with these. (*He pauses for a bit hitting the drum a couple times with his drum stick, then turns the drum over again revealing the back*). The turtle represents the day. The twelve sides is like twelve in the head so that's like an Indian drum so if you hit at the turtle (*He turns the drum over and hits the drum at the turtle [12:00] position*) that's um, you're going to the spirit world. If you hit over here you're praying for the boys (*He moves the drumstick counter-clockwise to the west position*) down here (*south position*) you are praying for the girls and over here (*the east position*) is for the ones that are coming.

LLB: Cool, so did you ever think that was math? Building a drum?

T: Yeah, I think it was because we asked a lot of questions, we learned about it and we ended up learning and um...she's going to come back and teach us a little bit of singing.

For this boy, the cultural and spiritual components eclipsed the mathematics learning.

### **Reflection**

As demonstrated in the projects described above, intergenerational interaction in the form of learning from community members was often present in the SMYM projects and this interaction seemed to contribute to the promotion of cultural synthesis and personal holism. This storyline is consistent with traditional educational practices in pre-contact society and continues in many aspects of informal learning to date.

Joanne, a principal in one of the schools, described to us an experience of working with her 6-year-old daughter on her SMYM project. She explained how in helping her daughter think

about a project idea, she remembered a game her mother and aunts had played when she was a child. The game, *kunte'jl* (little stones) is quite simple but involves counting and coordination. Play involves flipping one's hand and catching the stones in the palm, on the back of the hand, and continuing back and forth. Joanne explained that her daughter was intrigued by the game and immediately began playing it with her sister. Though Joanne is an educator who values academic knowledge and achievement, the most significant aspect of this experience for her seemed to be the opportunity to tell the story to her daughter. Joanne told us that she had almost forgotten about this game that she had played with her mother. The SMYM project prompted three generations of Mi'kmaw women to share a family story. This kind of sharing is highly valued in the Mi'kmaw communities, especially because, as Joanne noted, if her daughter hadn't asked her about the game, it could well have been forgotten and forever lost to the community. Knowledge remains alive as it is engaged in intergenerational experiences.

We claim that the kind of learning we describe here, in which students connect hands-on experiences, mathematical abstraction, and community cultural traditions through intergenerational interactions, exemplifies quality and equity in mathematics education. In addition to drawing on community ideas of quality, we see these projects as connecting to NCTM standards and principles, in particular those relating to communication, connections and equity. Students make connections between mathematics and their own community contexts and in turn communicate this learning using the language of mathematics, and the language of their community in some instances. The accounts we have given do not demonstrate the effect of wholeness on student achievement but they do show an engagement that embraces cultural identity. We are confident that such engagement translates into qualities that express themselves in achievement and educational choices that improve measures of participation. With mathematical experiences that demonstrate wholeness, students' mathematical reasoning is not positioned as belonging outside of the community. Instead it is positioned as a part of (or at least connected to) community knowledge and practice. Thus, we believe that such an approach promotes equity by addressing the critical questions of identity and power while also supporting increased access and achievement. The qualities of achievement and participation are a condition of equity, and are meaningless (perhaps destructive) without wholeness and its implications for identity and power.

Ole Skovsmose commented from the floor in a plenary discussion at the Symposium on the Occasion of the 100th Anniversary of ICMI in Rome, 2008 that he would like to see research from Aboriginal or developing world contexts not advertise these contexts in their titles because identifying these contexts suggests that the children in the majority cultures of developed countries are the only normal children. Research from majority cultures is not typically identified by its context: there is no article title like "American students' conceptions of their identity in mathematics" or "European boys and their mathematical positioning." Our title does not locate the research described here in its context, because we want to argue that quality education demands wholeness in any ethnic or socio-economic context.

In our reflections, we are compelled to ask how our experience in an Aboriginal context might speak to other contexts. Is it reasonable to aim for wholeness elsewhere? And, how might our experiences with the SMYM event guide others interested in aiming for wholeness in other contexts? Disengagement from mathematics is not an issue that is exclusive to Aboriginal communities; on the contrary, we see that it is a pervasive concern for many communities. Recalling the NCTM's (2009) claim that mathematics "must be taught and learned in an equitable manner in a setting that ensures that problem solving, reasoning, connections,

communication, and conceptual understanding are all developed simultaneously along with procedural fluency” (p.2), we note how the SMYM event fulfils many aspects of this demand.

We acknowledge that in any mathematics classroom multiple and perhaps competing discourses may be at play. We see the ethnomathematical approach used in the SMYM event as providing a path for any student to investigate the intersection of competing discourses from their own cultural view and to examine the role of school-based mathematics through a critical lens. We have demonstrated above that this approach can enable cultural authorities to corroborate mathematical authorities, promoting greater cultural synthesis. The kinds of interactions and the wholeness they embrace can come from Aboriginal students working with baskets, drums and games, but they can just as well come from Anglo-Canadians working with their grandmas’ dishes (as suggested by Doolittle in his 2006 plenary address to the Canadian Mathematics Education Study Group). Cultural synthesis, bringing mathematical and local knowledge together with intergenerational experiences that value the whole person, can be valuable in any context. In such an environment quality mathematics is inseparable from equitable experience.

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