GATEKEEPING IN MATHEMATICS EDUCATION

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The COVID-19 pandemic has exposed possibilities for change in a world in crisis from both environmental and social violence. As gatekeepers in society, we mathematics educators need to ask which practices and structures we are protecting and which we are challenging. I invite you to reflect with me to consider the role of mathematics, and the role of a researcher, a teacher educator, a citizen, and a leader in the field of mathematics education. I give an overview of the storylines that define the experience of mathematics students in order to question how these storylines might be changed. I conclude with recommendations for action in the field.

INTRODUCTION

Arundhati Roy is a powerful voice from Kerala, India. My first encounter with her writing was her novel *The God of Small Things* (Roy, 2001). She has been watching the impact of the coronavirus pandemic on the people of India and she reminds us that the pandemic is a portal (Roy, 2020). It is a doorway to a new future, a gateway.

She takes a very different stance from what I hear from many government leaders and the people around me, who wish for a return to "normal". Government leaders are designing policy in the pandemic to bring back the normal. They subsidize dying industries to be ready to continue where they left off before the pandemic. Similarly, the people around me are wishing for the time when they can travel again. I feel this urge myself. Due to travel restrictions, I have not visited my children in more than a year except by videoconferencing. I also long to sit together with you, my friends, and colleagues from around the world. I long for the old normal. But the old normal constructed the conditions for this pandemic to happen in the way it has done.

I want to follow Arundhati Roy's vision of the portal. We have this gateway, this opportunity to enter a new space. Many of us have been successful in the world as it was. We may not wish for change. For others it is different. There are powerful forces guarding the gates, trying to turn people around to go back to the old world, a world that so many people experienced as treacherous and broken.

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We mathematics educators may be among the guardians of this gateway to a better future, or maybe not. Maybe we are leading the charge against the guardians. The important question for me to ask myself is what I am doing about the gates—am I guarding the gateway or am I breaking through? I need to identify both the ways I am guarding and the ways I am breaking through. Surely there is a little of both.

The gates that we are guarding or breaking through have existed for a long time. The pandemic is helping us to see the gates that have been there all along. Before I go further with this metaphor, let me acknowledge that the images of gatekeeping and charging the gates are complicated. For example, I think of a photo from the insurrection in Washington DC on January 6, 2021 (Hughes, 2021). A woman stands at the gallows erected at the site. She seems to be crashing the gates with the crowd that broke into the government house to disrupt the rulers of the land. But she has wrapped herself in a flag that says, "Keep America Great". That suggests gatekeeping: the crowd is trying to keep or return to an older social structure and trying to stop the change that was happening in the hall of government. With such complications, the metaphor of gatekeeping and gate crashing is not straightforward. However, the goal is not to fix our labels as gatekeepers or gate crashers. The metaphor allows us to reflect on what we are protecting and what we are pushing or fighting for. The strong imagery reminds us of moral decisions in our roles in managing the gates.

After reflecting on the ways, I stand at the gateways, I will turn our attention to the stories that have defined mathematics and mathematics education until now, and also the stories that have defined mathematics education research. Consideration of these stories may help us focus our actions as gatekeepers and gate crashers.

MATHEMATICS AT THE GATES

Mathematics is often described as a gatekeeper discipline (e.g., Stinson, 2004). It is used to screen people for advancement in education and entry into highprofile, lucrative professions. Here is a strong example: one must excel in school mathematics to become a physician. But I think the weaker examples may be more powerful because they amass literally billions of smaller influences, as mathematics mediates the experience of schooling for almost everyone in the world. To be clear, the gatekeeping function of mathematics is really the social power of a particular approach to mathematics, one that focuses on skills that can be easily assessed in the kinds of examinations that have become the norm—performing algorithms and memory work.

Nevertheless, even the other skills that are not assessed very well, such as applying concepts to solve real problems, act as gatekeepers, albeit in a different way. Because mathematics provides a powerful toolbox, these skills and practices can open doors in human responses to significant community challenges, including social and environmental challenges. I think, for example, of developments in teaching the use of mathematics to address social and environmental justice questions, promoted by Renuka Vithal (e.g., 2002), Rico Gutstein (e.g., Gutstein, 2006), Kjellrun Hauge (e.g., Abtahi et al, 2017), Masami Isoda (e.g., Isoda et al., 2017), and others.

Beyond the ways in which we assess our students' mathematical skills, our roles as mathematics educators go further in gatekeeping. When we mathematics educators work in teacher education, we manage the gates that allow entry into mathematics teacher positions. Our research on the teaching and learning of mathematics influences mathematics curriculum and professional learning. Those of us who guard the gates of this research have powerful roles—as journal editors, reviewers, and conference leaders (e.g., Martin, Gholson & Leonard, 2010).

The pandemic shines a bright light on the gates that operate in our world and challenges us to reflect on our choices at these gates. The social disruption and climate cataclysm that are upon us urge us to reconsider what we are doing at the gates. As I engage in this self-reflection, I invite you to reflect along with me. Our situations will probably differ, but the questions are probably much the same for all of us. We can all benefit from listening to each other's self-reflection. I will divide my self-reflection into the following four questions about my positioning at the gates.

What am I protecting or challenging in my service in the field: as a reviewer or an editor?

What am I protecting or challenging as a researcher?

What am I protecting or challenging as a teacher educator?

What am I protecting or challenging as a citizen living within mathematized structures?

Protection and challenge at the gates in the field of mathematics education

A couple of years ago, Vilma Mesa and I interviewed editors and past editors of *Educational Studies in Mathematics* (ESM) and asked what characteristics reviewers to have been emphasizing when judging whether a manuscript is acceptable for publication (Mesa & Wagner, 2019). This question helps us see reviewers as guardians of the gates. Editors are guardians too because we select reviewers and synthesize reviewer concerns. In other words, we decide whose concerns are worthy of attention, and which of their concern's authors need to address.

From the comments of the other editors and from my own experiences reading many reviews of diverse manuscripts, I see that most reviews focus on what is missing. This is a deficit approach to assessment. For example, a paper may lack methodological detail, lack theoretical or conceptual framing, lack consideration of relevant studies in the field, lack sufficient focus on mathematics education, and so on. Scholars who study assessment practices in mathematics classrooms and elsewhere show that deficit-based assessment favours the values of the status quo. Listen to the conclusion of Aditya Adiredja and Nicole Louie following careful study of the impacts of deficit and alternative assessment approaches in mathematics education:

The ultimate function of deficit discourses is always to justify attitudes and behaviours that reproduce systems of domination, to legitimize oppression as the natural and moral consequence of dominant-group merits and subordinate-group deficiencies. To accomplish this, deficit discourses construct differences, frame those differences as evidence of the innate inferiority of subordinate groups, and make invisible the strengths, resources and knowledge that exist in marginalized communities. (Adiredja & Louie, 2020, p. 43)

When I focus on what is missing in a research paper, I am comparing it to some kind of imagined norm that reflects my experiences of the genre, shaped by the people with whom I usually associate. To challenge such a deficit discourse, we can instead focus on strengths. In the context of reviewing and editing in our field, a strengths-based approach would focus on the contributions of a manuscript to the field and appreciate the new perspectives a paper reveals to me. This would be challenging the status quo—gate-crashing. Research can contribute to the field by providing any of these:

- novel empirical results.
- insight into contexts not yet sufficiently considered in the field.
- application or development of new theory or conceptual frames.
- new approaches to methodology in the field.

Notice that the items on my list all point to novelty. I should expect the most promising research from sources that are relatively unfamiliar to me. A research contribution could further entrench or disrupt a powerful discourse in the field. Moves to entrench often use the language of progress (Llewellyn, 2016) because the metaphor suggests a line that we should follow. Moves to disrupt often use language of social justice.

I suggest that if we make our reviews focus on the contributions, it will change the face of our field, perhaps slowly, but surely. This does not mean we should discard important standards. Even with a focus on the contribution of a paper, we can suggest to authors ways to shape their writing to satisfy legitimate expectations of the field. For example, I expect authors to identify and justify the theories and concepts they use in their analysis. The problem comes when I expect to see only particular theories and concepts and refuse to consider the validity of theorization from other sources. Often, I see reviewers demand that a paper cite research from the most dominant of contexts, even when that research is only marginally relevant. Reviews and editor decisions are complicated because all the concerns I have identified so far are important. Shortcomings in any of these areas would not be acceptable for publication. However, I suggest that the decision to move a paper forward or reject it in a peer review process is better oriented by its contribution than the bits it may be missing. In other words, if the potential contribution is promising, we can work with the authors to develop the missing bits and hopefully move toward publication. Too often a paper may be rejected early in a process because it does not align with what readers from dominant areas of the field have come to find normal (cf., Niss, 2018).

In our research on editorial practices, Vilma and I also organized statistics on contributions to the journal to understand better the way the research in our field represents the issues of mathematics education around the world. Not surprisingly, there are significant disparities among the regions represented in this journal. We knew in advance about these disparities, and we know that they extend beyond the context of ESM: we were not the first to point them out (e.g., Louie, 2017; Meaney, 2013), but our statistics made the disparity harder to ignore. Vilma and I were concerned about equity in the opportunities of scholars but there is more: "the concerns of scholars in certain countries are more strongly represented than the research and concerns of scholars in other countries" (Mesa & Wagner, 2019, p. 308). The conceptions of what mathematics education looks like and the issues it is concerned with are dominated by particular national contexts. This dominance must be challenged, and it is most appropriately challenged by scholars from outside the dominant regions. Scholars in the dominant regions need to find a way to accept these challenges.

I think the most important step for positive change is to pay attention to research that challenges the status quo from contexts that are underrepresented in the field. Scholars in these contexts will identify different concerns or different approaches to concerns familiar to me, and they can provide valuable critique of my concerns and my way of approaching those concerns. Looking again at my list of ways research can contribute, I see that research from contexts unfamiliar to me can provide tremendous insight. As researchers we should read the research from diverse regions and attend research presentations from scholars representing diverse regions. Further, as a reviewer or editor I can ask and expect authors to look beyond the usual contexts.

Editors of mathematics education journals are trying to do this (e.g., Wagner et al., 2020). We need the cooperation of reviewers to move strongly entrenched views on what qualifies as important work. Yes, reviewers and editors are gatekeepers of the field. I encourage you to accept invitations to serve in these roles but to see yourself as welcoming hosts at the door rather than as guards. Vilma and I named our article on reviewing processes "Behind the door." I am asking myself what I am doing at the door, and I ask you the same question.

Protection and challenge at the gates in mathematics education research

In addition to our roles at the gates of our research field, we also have choices about what to value and what to ignore in our own research. We are always making choices about whose concerns are most important. This question relates to my earlier comments about representation. For example, when a study on affect uses a Western European context, how well does the study represent the way affect works in other parts of the world (Tuohilampi et al., 2015)? Another way of looking at this is to consider how conditions in diverse contexts impact affect and a teacher's actions in relation to affect. These questions highlight the value of research from diverse countries. But even if I remain in my own country (where I am better equipped with local knowledge to do research), I ask whether I should focus on the needs of mathematics students who are already achieving success or on students who struggle with success in their school mathematics. Should I focus on teaching practices that are usual foci of mathematics teachers or should I push the boundaries?

I have recommended that we read the research from diverse contexts. This reading can open our eyes to our own practices because questions and approaches from elsewhere can reveal the familiar as foreign. To illustrate this phenomenon, I think of the two and a half years my family and I lived in eSwatini in the 1990s. We were not surprised to see unfamiliar practices there, but when we returned home to Canada, we saw Canada in a new light. Canada now felt foreign and strange in relation to the different perspectives we developed in eSwatini. In fact, this shift in perspective is what motivated me to research mathematics education. I had taught mathematics in Canada for 5 years before teaching in eSwatini. Within weeks of teaching again in Canada, I was shocked to recognize the cultural nature of mathematics was culturally neutral.

Listening to or reading research from different contexts may not immerse us as deeply as living abroad, but it can still be effectual. In a similar vein, I suggest that it is important to pay attention to the experiences of diverse people in our school mathematics classrooms—students and teachers who identify in diverse ways.

When we think about how we research mathematics education we need to articulate the future we envision for our mathematics learners. Ole Skovsmose (e.g., 1994) has encouraged us to think about students' foregrounds—the futures *they* see before themselves—but I add that it is also important for us to be critically attentive to *our* visions for their futures. These visions shape our research, which in turn impacts what happens for mathematics students. I will say more about this later in this address.

Protection and challenge at the gates in mathematics teacher education

I see my gate-management role as a mathematics teacher educator as being closely related to the questions, I identified about mathematics education research. As a teacher educator, I make choices about what research novice teachers should read and discuss, and which issues we focus on when we read the research. This gatekeeping function is similar to my roles as a reviewer and an editor. With this choice about which research is important, I am choosing which mathematics learners' concerns are most important. This gatekeeping is then boosted by my role in grading novice mathematics teachers' assignments and writing references to support them. As a mathematics teacher educator, I shape the mathematics teaching force. I can position myself as a guardian of the structures that have privileged certain students or as a facilitator for mathematics teachers with new perspectives who will guide a range of mathematics students to the successes, they envision for themselves.

Protection and challenge in active citizenship

When I focus on the usual research and mathematics teaching practices in our field, I am in danger of ignoring other significant mathematics in my life. This has implications for our field. Mathematics permeates my life, but I will focus on one example here and invite us all to think of other examples. Consider the way we vote for representatives in democratic institutions. This is a form of representative sampling.

Consider, for example, the way we elect the International Committee of PME. As I understand it, each year the conference participants vote for four members at large. Each PME member who is present votes for four names. The four contestants who receive the most votes win. Let us say there are 300 participants at the conference and 160 of them share a set of values. All four elected members at large, will be selected by those 160 people. The votes of the remaining 140 participants have no effect. Further, the perspectives of the many who could not afford to come to the conference are not heard. The conference and its consequent leadership role in the field end up being controlled by a mere sliver of the scholars working in that field.

There are alternative structures for voting that use different mathematics and produce more equitable outcomes. I am particularly impressed with the Single Transferable Vote (STV) systems, which have been developed by mathematicians. I like Meek-STV, named after the mathematician who developed it. But the question of who is allowed to vote is the most important.

Until recently, I was blind to the mathematics of voting practices. It took my political engagement in my community at home to shake me out of blindly accepting voting practices I had assumed were normal. I am raising this example of mathematics in action for a couple of reasons. First, again, the leadership of our field is structured by taken-for-granted practices that favour the status quo. Many of these structures are highly mathematized. We should question them. They can be changed.

Second, I ask why I was blind to this problem of representation. One reason is that the structures favour people like me, and thus I may not have been motivated to ask questions. Another reason I was blind to this mathematics is that nothing in my own mathematics education pointed my attention in this direction. We here at PME are a collective of mathematically sophisticated people, capable of complex mathematics and ostensibly aware of the way mathematics works in society, but this structural problem persists, which is a mathematical problem and a problem for our field of study.

There are more examples of mathematized structures that govern our field, including metrics for ranking journals, universities, and scholars (Andrade-Molina et al., 2020). And there are more examples of mathematized structures that govern school life, and thus the life of mathematics students. The taken-for-granted norms can be challenged, and mathematics can play a strong part in that. I see Renuka Vithal's work as a good example of such citizenship (Vithal, 2002). This kind of work can help us reimagine mathematics classrooms. If we are not challenging the status quo, we are protecting it.

THEORY FOR GATEWAY INTERACTIONS: STORYLINES

So far, my reflection on gatekeeping and gate crashing in mathematics education has been quite general. To investigate the way, I manage my roles at the relevant portals, I draw on theories of human interaction. I think in particular of the work on storylines and positioning by Bronwyn Davies, who has become a prominent feminist scholar. For decades she has worked at understanding how people are drawn into particular forms of action and interaction. Her collaboration with Rom Harré has been the stem of a theory Harré and others call Positioning Theory. Here is a diagram that shows how positioning works (Figure 1). This diagram comes from my work with Beth Herbel-Eisenmann, Kate Johnson, Heejoo Suh, and Hanna Figueras.

All communication is guided by stories that we know, which we use to interpret each of our interactions. When I meet someone, I have to decide what kind of interaction it is. That is the storyline. And I have to decide on the part I play in the story. That is the positioning. These decisions guide my choice of words and my actions.

For example, imagine some children meeting you in a school. Perhaps you are in the school to do research, but the children do not really know much about what research looks like. You greet the children. They have to decide how to talk with you. Do they think of you as a teacher, a school administrator, a parent of another child, or perhaps in some other role? They have to identify a storyline—a story of students being interrogated by a head teacher, or a story of a parent interested in her children's friends, or something else. The decision the children make about what sort of interaction this will be impacts how they respond to your greeting and later to your questions and comments? Each child in the interaction and you yourself are all active in shaping the possibilities for the storyline and the possibilities for how you all position yourselves. A child might see her positioning as an informant on classroom dynamics, or as a skilled performer of mathematics, or as one who explains the ideas of her peers. And there are more possibilities. The children and you constantly adjust to each other and to the many choices about how to talk, what to say, what gestures to use, what kinds of communications are valued, and who should speak at any given moment.



Figure 1: Positioning and storylines in human interaction (Herbel-Eisenmann et al., 2015, p. 194)

The theory reminds us that we are constantly negotiating our positioning and storylines because one person's storyline and positioning choices have an impact on the other people. Figure 1 tells us that the positioning and storylines impact our choices of what to say and do, and that these choices in turn shape the storylines and the related positioning. Our choices determine the positioning and storylines that are available to others, and they also shape what these storylines look like for our future interactions.

Here are two important questions for us all to consider: Where do these commonly known storylines come from? And What are the dominant stories in mathematics education? In short, they come from interactions we have had, the stories we have read, heard, and watched in books, conversations, and other media. An implication of this theory is that we can only interact along the lines of stories we know. Thus, an important way to change the possibilities for a person is to make them familiar with different stories, different ways of interacting. For this to work, both an individual and the people with whom the individual interacts need to get to know a new set of stories. This theory implies that part of our agenda as mathematics educators is to generate good stories and disseminate them so that they become widely known. These stories can feature good mathematical action done by people with diverse identities.

To realize this agenda in mathematics education, we need to know what stories are currently known and thus what is possible for mathematics teachers and students. And we need to ask what positions we play in those stories. Some stories are much more deeply engrained than others and thus harder to disrupt. Some stories emerge within a specific classroom. These more local stories can have a different kind of power.

Here is a non-mathematical example of a story that impacts many stories. In Canada it is an emerging custom to begin meetings and gatherings with a land acknowledgment: I state that I live and work on the unceded territory of the Wolastoqiyik people. In saying this, I remind myself and others that I am aware that everything I take for granted rests on a colonialist history in which foreigners stole land from the Indigenous people here. I want to take seriously the fact that there is a long history of violence underneath the structures and norms that dominate my life, my work, mathematics, mathematics education, everything. And the violations continue, not just in Canada but around the globe. I hope my address helps us all confront this violence.

Ideas of cultural superiority abound. At a macro level, various forms of nationalism and racism are rooted in some people thinking their backgrounds entitle them to more wealth and privilege than others—perhaps more scholarly status than others. At micro levels, we see people believing that their values and conceptions of quality are superior. I hope you recognize that these cultures of superiority are what I have been talking about this whole time. I recognize the complexity. I myself think that I have a pretty good understanding of what is important in mathematics and mathematics education. My question today is how open I am to the knowledge, values, and experiences of others who aren't like me? This question implies a question for action: how do I deliberately open myself to valuing the knowledge, values, and experiences of others?

STORYLINES IN MATHEMATICS EDUCATION

Now that I have established the significant power that we as mathematics educators have at gateways that impact the lives of so many people, I want to give an overview of some of the storylines at work. These are the stories that are taken as norms and impact how students, teachers, and others work through and around mathematics learning. There is a growing body of scholarship in our field addressing *storylines*. Most of these studies identify such stories in mass media. Sheree Rodney, Annette Rouleau, and Nathalie Sinclair looked at Canadian newspaper articles and found pervasive metaphors—one metaphor sees mathematics as an economic commodity and another sees mathematics

educators at war (Rodney et al., 2016). The war metaphor aligns with a storyline found by a group who looked at storylines in North American media: "There are two dichotomous ways of teaching mathematics [...] the 'basic' way and the 'discovery learning' way" (Herbel-Eisenmann et al., 2016, p. 104).

For any storyline it is important to ask what positions it makes available to mathematics students, mathematics teachers, and mathematics educators. I think the storyline about math wars influences mathematics teachers most directly. It oversimplifies the complexities of mathematics learning by focusing on certain issues. In so doing, it obscures other things worthy of attention—for example, the specificity of learning contexts, or questions about what mathematics is the most important to learn. While this war storyline has direct impact on teachers, there are spinoff impacts on students. Are they positioned as automatons developing procedural skill through repetition? Are they positioned as people who should demonstrate that they understand mathematical concepts? And if understanding is the focus, what is the impact on their interactions? What do they do with their understanding? With whom do they interact mathematically? A focus on storylines and positioning should always lead us to identify the implications for human interaction.

When I consider any storyline, it is important to remember that it too may be culturally specific. There may be different conflicts among mathematics educators in different places—different wars, if we use the language of the metaphor. For example, I understand there has been a conflict regarding the pace of education in Japan, with some educators pushing for fewer concepts to be investigated with greater depth. Any conflict in mathematics education seems to be an invitation for politicians to position themselves as champions for one side or another. The fact that mathematics education is often used as a talking point for politicians reminds us again about the importance society places on mathematics and the significance of the gates we manage.

Sean Chorney, Oi-Lam Ng, and David Pimm (2016), who looked at the same set of articles as the Rodney group, found a different conflict, which positions individuals and countries in competition. Individual students are ranked and compared. Countries are also ranked in massive comparison studies like PISA and TIMMS. We should think about what country comparisons do to classroom interactions. They could position some students as champions for their country, while other students become liabilities. This positioning can put a lot of pressure on some students and leave other students feeling worthless. While there are far-reaching implications for international comparisons, I think the competition storylines at the more local level have even deeper implications for the way students interact. Consider, for example, what group work looks like when students feel like they should be trying to outdo each other. The study of media is not the only way to identify storylines. Another way is to look at interactions in mathematics classrooms. I thank Beth Herbel-Eisenmann for her collaboration in various studies in which we have identified positioning in mathematics classrooms. For example, when we analysed transcripts from 148 classes we found that a dominant positioning has students doing things because their teacher tells them what to do (Herbel-Eisenmann & Wagner, 2010). We called this *personal authority*. This positioning may seem quite natural: is this not the expectation of teachers, to guide students? The fact that this relationship seems natural underscores the power of storylines. Beth and I noted that mathematics is often said to be logical and free of culture and power relationships, and so we wondered why mathematics students' choices for action are not led more by the *mathematics* and less by their *teachers*. This question allows us to envision different forms of mathematics class interaction—activity that is organized around true inquiry rather than teacherguided exercises.

Research on classroom interaction highlights another important aspect of storylines and positioning. A student's experience of mathematics learning is strongly impacted by the kinds of interaction offered in the classroom. The theory of positioning reminds us that students could try to have different sorts of interactions, including interactions that are not imagined by the teacher. But there are power relations at work. The teacher has a position of authority. Furthermore, the whole group, including the teacher and other students, are guided by the stories about mathematics that dominate society. Thus it is not easy for a single mathematics student to change the form of their interactions.

A recognition of the power of these stories guides some research being done by Annica Andersson in Norway along with Hilja Huru, Beth Herbel-Eisenmann, and myself. We are investigating the storylines available to Indigenous and new immigrant students. We want to work with their mathematics teachers to make more positive storylines available. Our analysis of Norwegian newspapers and public media has found some storylines that are particular to students who are seen by others as minorities. These storylines include "mathematics is languageand culture-neutral" and "extraordinary measures are needed to teach mathematics to students from minoritized groups" among others (e.g., Andersson et al., 2021). Interviews with students and teachers about their mathematics classroom experiences will help us identify other storylines and explore the way the storylines in the general public impact these students' experiences.

There is more research in our field that tells us about important storylines. We can look at work on myths (e.g., Anderson et al., 2018), discourses (e.g., Valoyes-Chávez, 2019), and identities. Identity work is especially prevalent among feminist scholars because storylines (or myths) are typically gendered. For example, Heather Mendick (2005) identified 15 binary oppositions common

in mathematics education discourse, and she showed how they are gendered. In addition to the big myth that boys are better than girls at mathematics, each of these binaries positions boys more with one extreme and girls more with the other. As I list some of these binaries, ask yourself which side you associate with girls and which one with boys. Next, we should ask ourselves how we have come to see these associations as natural. Here are some of the binaries she illustrated: fast vs. slow, competitive vs. collaborative, independent vs. dependent, active vs. passive, natural ability vs. hard work, real understanding vs. rote learning, and reason vs. calculation. The damage these binaries and their stories can do in mathematics classrooms is obvious. They shape expectations students have for themselves and expectations teachers have for them. And these expectations shape the stories and positioning they can and do choose for their interactions. We should remember that these gendered stories will be different in different parts of the world.

I have given overviews of some storylines, but there are others. Research on these formative stories can help us denormalize them. In other words, the research gives us strategies for questioning our sense of what seems natural or normal. External disruptions to the normal, such as the COVID-19 pandemic, can also expose storylines (e.g., Bakker et al., 2021). The research submitted to the ESM special issue on the pandemic points to some such storylines and reemphasizes others. Many of the 161 papers submitted for the special issue pointed to the need to change mathematics curriculum. These researchers are questioning the storyline in which school curriculum dictates what happens in mathematics classrooms. The pandemic has shown us that some of the mathematics taught in schools has been very useful to citizens for understanding the pandemic, but it also exposes how current curricula are insufficient (e.g., Kwon et al., 2021). Contributors to this special issue noted how the pandemic underscores storylines of inequalities (e.g., Yılmaz, 2021) and storylines about the way technology can mediate mathematics education (e.g., Borba, 2021). I add a storyline that has not been addressed in the articles in the special issue, but which I see the pandemic has exposed: the stories about assessing mathematics. In many cases, I have heard mathematics teachers say they are unable to use digital technology at a distance to assess students in the way they think assessment must be done. I hope to see this phenomenon researched.

RESPONSES TO STORYLINES IN MATHEMATICS EDUCATION

Once we recognize significant storylines in mathematics education and the way they shape the experiences of mathematics students and teachers, I think we researchers are compelled to ask ourselves how we ought to respond to these myths. Which storylines drive our work and which storylines do we ignore? What and whom we are protecting with these choices? I think most of the research in mathematics education is in some way a response to a dominant perception—a storyline or myth. Our research can resist a dominant perception, ignore it, or support it.

Our research addresses the storylines that are in action in mathematics learning environments, but research is also action in itself. In conducting our research and in the way we report our research we are enacting storylines. We position ourselves in relation to each other. Often, I see reviewers asking authors to position their research in relation to the field. They do not always use the word 'position' but the intent is to ask authors to be more aware of their work's status in the field. What are they contributing?

It is a challenge to try to document the storylines in mathematics education research. I have tried to pay attention to the stories people tell about what they are doing. However, it is hard to find the stories in typical research articles because in our scholarly traditions researchers usually do not tell the stories that motivate and drive their research. I think this is because we value objectivity, which is a value that lives in stories told about mathematics. Even research approaches that are inescapably subjective seem bound by this writing convention that tries to mask obvious subjectivity.

To try to hear some of the motivational stories behind the research, I distributed an informal survey among my professional networks. I asked, "What was one of the first mathematics education articles/chapters/books you liked?" and "Why did you like it?" The responses gave me some insight into the kinds of publications that were influential both to other researchers and to mathematics teachers. The results addressed both situations because many of the respondents described a publication that motivated them to become active researchers. I will share some highlights here in the hope of motivating us all to recognize important work when we read and review the work of others. The responses came from scholars in 17 countries on six continents.

First, in looking at the publications my colleagues identified, 26 were theoretical articles, 15 were books (also mostly theoretical), five were empirical articles, two were the full body of someone's work, one was a mathematical work, and one was a curriculum document. Given that theoretical works are published much less frequently than empirical works, it is notable that in my survey they strongly outnumber the empirical works. The respondents identified memorable publications that:

- (1) opened their eyes to aspects of mathematics they had not previously recognized:
 e.g., "how the context plays a role in the way we as educators envision/implement mathematical concepts".
- (2) provided frameworks for research and interpreting mathematics learning experiences: e.g., "emphasized a difference between mathematical process and nomenclature," "how school achievement in mathematics and mathematical

thinking are not the same," "it theorised the relationships within the mathematics classroom".

(3) provided language for experiences that readers were beginning to notice e.g., "putting words to ideas that were still vague but deeply rooted," "resonated with things that were already interesting to me in my practice".

Many of the responses pointed to phenomena that readers had not noticed in their experiences (category 1). Most of the responses enabled readers to understand their experiences in new or clearer ways (categories 2 and 3). These formative publications were powerful because they connected readers to their experiences. Returning to my earlier suggestion to read research from contexts different from our own, specifically I see that readers may have difficulty finding value in research reporting from contexts that do not resonate with their own experiences. Thus, I see the need for us to be more careful in our research reporting to identify the specific context, and for us to do more cross-context work in which we experience each other's contexts and identify what we learned.

I also see the tremendous potential for critiques of dominant frameworks in our field that come from scholars in contexts not represented in those frameworks. For example, Lihua Xu and David Clarke (2019) drew attention to significantly different cultural norms in Asian and English-speaking contexts to problematize assumptions and conceptualizations in research relating to what kind of communication is valued in mathematics classrooms. The next step will come in the way English-speaking scholars respond to their critique. Another good example was a symposium convened by Aldo Parra, Arindam Bose, Jehad Alshwaikh, Monica González, Renato Marcone, and Rossi D'Souza (2017) that theorized crisis from the perspectives of scholars from so-called "developing" countries. Again, scholars from the so-called "developed" countries need to take seriously the theories discussed and developed in this symposium and other such fora.

RECOMMENDATIONS FOR ACTION

Many of us, including me, have been successful scholars in a world in which humanity has produced widespread catastrophes—encroaching climate change, social inequities, and a pandemic born from these conditions. As mathematics educators we stand at the gates to the new normal that will emerge in these times. I have promoted actions that we can take as researchers and educators in the interest of justice. Like Edward Said (1994/2012), I see this as a responsibility of public intellectuals: "There is no question in my mind that the intellectual belongs on the same side with the weak and unrepresented" (p. 22). I see this as a human responsibility.

I close with some specific recommendations for immediate action:

• At this and other conferences,

- expand your perspectives by attending some sessions that you would not normally choose, and
- actively seek out and develop relationships with scholars outside your usual/comfortable networks.
- Read scholarship from regions outside your comfortable contexts.
- Volunteer to be a reviewer. Commit yourself to identifying the contribution of the work you review and to give helpful suggestions to the authors to help them realize their potential contributions.

If you are a scholar from an underrepresented region or group, be bold in sharing your research and in developing theories that emerge from your contexts. Scholars around the world look forward to learning from you.

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