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Experiences and Impact: The Voices of Teachers on Math Education Reform in Ontario, Canada

Abstract

In Ontario, students' declining math performance is currently cited as a major area of concern (Reid & Reid, 2017). In response to this, Ontario is implementing math education policy changes. However, there is no mention of the role of teachers in this reform process. To address this issue, this paper explores and shares teachers' experiences with math reform. I took a qualitative approach and interviewed eight public school teachers who shared their experiences with math reform based on their teaching trajectories. Three themes emerged from the data: (1) math confidence impacts perception and response to math reform; (2) teachers have little to no active role in the math reform process; (3) there is bidirectional impact between math reform and teachers. These findings delineate significant implications for math reform; the need to reverse firsthand accounts of teacher experiences and insights, treating teachers as change agents, and engaging teachers in math reform processes.

Keywords: math education, math reform, educational change, teacher, curriculum, policy, Ontario, Canada

Introduction

For the past few years, elementary students' math performance in Ontario has been cited as a major area of concern (Reid & Reid, 2017). This is based on student achievement results from the Education Quality and Accountability Office (EQAO) math and language assessments, which students complete in Grade 3 and Grade 6 (Reid & Reid, 2017; Stokke, 2015). EQAO results from 2009 to 2018 exhibit a steady decline in the percentage of students who had achieved at or above the provincial standard for math in Grade 3, decreasing from 71% to 61%, and in Grade 6, dropping from 63% to 49% (EQAO, 2014; EQAO, 2018).

In response to the EQAO scores, the provincial government implemented Ontario's Renewed Mathematics Strategy (ORMS) in 2016, which includes dedicating sixty million dollars over three years to increase student achievement, and a policy mandating that all school boards across the province have to provide three hundred minutes of math instruction per week (Ontario Ministry of Education, 2016a). After the provincial elections in 2018, there was a shift in ideology, with the Progressive Conservative Party of Ontario replacing the Liberal Party of Ontario, who was in power for ten years. As such, the Progressive Conservatives replaced the ORMS with the Focusing on the Fundamentals of Math (FFM) strategy, retaining the funding from the ORMS but placing emphasis on numeracy and number properties, delivering on the election promise of deviating from the Liberal Party's focus on inquiry-based math (Ontario Ministry of Education, 2018).

In the midst of these changes, neither the ORMS nor FFM documents explain whether teachers were and will be involved in these changes and if they will be

consulted on their experiences after these changes. There is only one statement from the ORMS that mentions teachers' input: 'Data from student, teacher and principal questionnaires, are a key source of information for how the strategy was developed and contributed to the funding model (Ontario Ministry of Education, 2016b)'. However, this statement does not explain what the structure of the questionnaire was, how those questionnaires shaped the strategy, and whether the teachers had any other involvement.

Teachers' input has always been underrepresented in the process of education reform and innovation (Bailey, 2000; Cohen & Mehta, 2017; Priestley et al., 2012). It is essential to consider teachers as active agents in change, because they are at the forefront of implementing change in the classroom, and they have an understanding of the problems they face (Bailey, 2000; Charalambos et al., 2010; Clement, 2013). This includes providing teachers a platform to share their experiences, pedagogies, and insights that would be potentially conducive to effective math reform.

To address this issue, this paper will focus on sharing the voices of public school teachers in Ontario and their experiences with math education reform over the course of their career, including mandated changes in the Ontario Mathematics Curriculum and math policies. Mandated changes, also known as external approach or top-down change is defined as changes initiated by the state, transmitted by the government to schools, with the expectation that teachers will implement them (Clement, 2013). In this paper, the word 'teacher' is used instead of 'educator', because teachers are defined as individuals teaching in direct classroom settings, which is the target demographic of this paper.

Research questions

The purpose of this paper is to present an in-depth understanding of teachers' perspectives on math reform, and how it is shaped by their teaching experience. This will be explored through two core questions:

- 1) How do mandated changes in math curriculum and policy impact and shape teachers' experiences teaching math?
- 2) What are teachers' perceptions of their role and representation in math reform?

Method

Sites: I conducted my study in two public elementary schools in Southern Ontario. I chose public schools because unlike private schools, public schools are required to follow curriculum changes mandated by the Ontario Ministry of Education (Ontario Ministry of Education, 2016c).

Participants: I employed a purposeful sampling approach and identified eight teachers from the two schools who have experience teaching math in the classroom.

Data collection: I collected qualitative data through semi-structured interviews. The semi-structured interviews consisted of open-ended questions which were used flexibly, and provided the participants with an opportunity to share detailed descriptions of their distinctive perspectives on teaching math and experiencing changes in math curriculum and policy. Each interview spanned around twenty to

forty minutes in length. Pseudonyms were used throughout, and will be used in this paper in place of participants' real names to maintain confidentiality.

Thematic findings

Three key themes emerged from the data.

Math confidence impacts perception and response to math reform

Teachers' confidence in math knowledge and pedagogy is a key determiner in how they perceive and respond to math reform. James, who reported having confidence in math, stated he would use his own judgment in deciding whether to implement changes or not.

I teach good math. If the changes appear to be better for student learning, such as closing the gaps for university or for high school, then I would do that. If I feel the changes do not benefit them in anyway then I will not incorporate them.

This response reflects the literature on self-efficacy and curriculum changes, how teachers have the self-efficacy to resist changes if they believe the changes do not serve the needs of the students (Charalambos et al., 2010; Gujarati, 2011). Douglas and Shawn also reported having math confidence, but instead of resisting changes, they believed they had the skills to adapt their practices accordingly.

I feel pretty confident in my math pedagogy. I feel pretty confident and I am able to help kids meet with success. So as I mentioned a few minutes ago, if something really radical were to change, I think I'll be able to roll with the punches. You know I really have made a very conscious effort and not just with my math teaching but teaching in general to not get kind of stuck in the mud or mired in a certain way. This is the way I've always done it. I'm always looking to evolve my program.
(Douglas)

I don't think changes impact me in any way. I'm very flexible, I do everything. I have my math specialist, I can do three-part, I can use the math textbook, I could make centers. I use the computers for a group. So yeah, I could do it, teach it in any way.
(Shawn)

These two discrete types of responses indicate that the relationship between teacher confidence and reform response is not necessarily linear. There is however, a common thread between the three teachers with their perceptions of having the agency to respond in accordance to their personal judgment.

Lily reported having lower levels of math confidence. She exhibited uncertainty on how to respond to the prospect of future reform.

... sorry I don't know. I guess it makes me nervous because he's talking about how they don't know times tables but, I don't know, I really don't know.

Uncertainty can stem from dissonance between prior beliefs and current changes, and a dearth of support during change implementation. Teachers who lack math confidence may not be able to respond to uncertainty by using individual judgment or being adaptable. This in turn carries significant implications as teachers who are uncertain are less likely to implement changes, which can lead to reform failure (Charalambos et al., 2010).

In regards to the first research question on how math reform impacts teachers' experiences, the major takeaway is that teachers' confidence in math is a significant

determiner in how math reform impacts their experiences. Hence, teachers' level of math confidence is a factor that is worthy of consideration during the math reform process, as it can help explore and anticipate reform outcomes.

Little to no active role in the math reform process

During the interviews, math reform process was defined as discussing, creating, and transmitting changes to the classroom. All eight participants reported that they were never consulted or invited to actively participate in the math reform process, nor could they recall of any other teachers being involved in it.

Concomitant with the lack of outreach, participants perceived policy implementation as a top-down process, where policies are created and transmitted from the Ministry to the classroom, and teachers have no contribution to this process.

I think it's just top-down, there's no input from the teachers. Sometimes I feel it's more reactive, so the scores are low, whoever's in the Ministry, what changes do we think we need to make. And then pass this to the principals and then to the teachers. I don't think the teachers have a say, and I don't think the Ministry understands exactly what is happening in the classroom. (Shawn)

I think it's a top-down approach for sure because it's like, "Okay so we didn't do well on the EQAO scores, so the board is going to provide you with these math coaches to help, to get math scores back up. And then once they are back up we are going to pull those math coaches." (Sarah)

These responses underscore the participants' perception of the lack of opportunities in being actively involved in creating mandated changes to math curriculum and policy. Douglas expressed his concerns with the top-down approach.

I think at times it could be a bit of a broken telephone situation, and sometimes I think decisions made at the Ministry level may not recognize or understand the realities on the ground. And it does have to filter through a lot of different stages, to go from the Ministry to the boards, from the boards to the superintendents, from the superintendents to the principals, from the principals to the teachers, there are a lot of steps in there. Yeah I don't know I find that by the time it gets to me, that practical level, we're suggested that something be done. Then we figure out how to make that work in a way that that makes sense for teaching our students and the learning environment in our classroom.

Douglas is concerned about the gap between policy and practice, and how policy transmission can get lost in translation by the time it reaches the classroom. This implies that teachers' underrepresentation in reform processes and its transmission is detrimental to the progress of reform implementation.

Bidirectional impact between math reform and teachers

All the participants emphasized the need to consult teachers during reform processes. Below are a few responses in regards to that.

Yes, because they're the ones working directly with the students. I know there was a lot of integration with special education and that was done without direct teacher consultations, so I think talking to people that are actually doing the teaching, that are day-to-day interacting with the students probably know better how they learn and would be the people to consult on this. (James)

I think so. Because, the teachers are the ones that see what's happening and they're the ones that know the children, and what the struggle is. So I think they should have some kind of input to any changes. It shouldn't just be, "We're making a change because of a score". It should be, "Okay yeah the score is low, but what's happening inside the classroom? Let's hear what the teacher has to say, that could help us create something new." So yeah, I think the teachers should have some kind of voice." (Shawn)

These teachers believe that their role as frontline workers is ample reason to be given the opportunity to be actively involved in creating mandated changes to math curriculum and policy. This sentiment is echoed by the literature on treating teachers as change agents (Bailey, 2000; Charalambos et al., 2010; Clement, 2013). Moreover, as indicated by the responses below, participants believe that teachers impact math reform outcomes, as reforms will not be successful if teachers do not implement them.

If the teacher doesn't implement it, then it's not going to be a successful addition to the curriculum. So I kind of think of the sexual education curriculum change, and if teachers don't implement the change, then it's not going to be the way the government designs it to be. (James)

And so when teachers feel like they don't have a voice, when they feel like something is foisted upon them, like a lot of Kindergarten teachers feel, they don't deliver the program. So if people don't feel they have been represented in the curriculum then they're not going to do it. (Lily)

Even though these teachers have not been given the opportunities to participate in the math reform process, they believe they are still being active participants through their roles as frontline workers, by implementing these changes in the classroom, which impacts reform outcomes. In regards to the second research question on how math reform impacts teacher experiences, the participants believe there is bidirectional impact; not only does math reform impact their teaching experiences, but their roles as teachers impacts math reform as well.

Conclusion: implications for future math reform

The thematic findings from the interview data indicate significant implications for future math reform. Firstly, the firsthand accounts of teachers and their experiences need to be revered. The findings from this paper provide an in-depth outlook on teacher confidence and how they perceive their positions in the policy implementation landscape. It was possible to garner such rich data only because I interviewed the teachers directly. Kyle even mentioned how this method was an effective way of consulting teachers.

I would say yes they should be consulted. The format of how the consultation happens should be up for debate. I don't know if I need to be called into a town hall to offer my thinking on things. People should be doing research projects, like yourself, getting feedback from teachers that way.

Secondly, it is essential for education stakeholders, including policymakers, and researchers, to treat teachers as change agents. Teachers are the frontline workers who implement education changes into practice, gauge its effectiveness in the classroom, and impact the outcomes of those changes.

Lastly, it is essential to actively engage teachers in math reform processes. As the participants indicated, if the mandated changes or implementation methods are discordant with teachers' personal beliefs and experiences, then they will not be implemented. Teacher engagement is both an inclusive and lucrative effort, as stakeholders would be lessening the chances of reform failure, because teachers would be providing input on which ideas might not translate effectively into practice and vice versa. Their insight and feedback are imperative in monitoring the progress of reform.

As education stakeholders in Ontario continue to tread through the journey of math reform, it is necessary for them to consider the voices of teachers in that process as well.

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References

- Bailey, B. (2000): The Impact of Mandated Change on Teachers. In N. Bascia & A. Hargreaves (Eds.) *The sharp edge of educational change: Teaching, leading and the realities of reform* (pp. 112-128). London, United Kingdom: RoutledgeFalmer.
- Charalambos, Y. C. & George, N. P. (2010): Teachers' concerns and efficacy beliefs about implementing a mathematics curriculum reform: Integrating two lines of inquiry. *Educational Studies in Mathematics*, 75(1), 1-21.
- Clement, J. (2014): Managing mandated educational change. *School Leadership & Management*, 34(1), 39-51.
- Cohen, D. & Mehta, J. (2017): Why reform sometimes succeeds: Understanding the conditions that produce reforms that last. *American Educational Research Journal*, 54(4), 644-690.
- Education Quality and Accountability Office (2014): *Highlights of the Provincial Results*. <http://www.eqao.com/en/assessments/results/communication-docs/provincial-report-highlights-elementary-2014.pdf> (Accessed 14 February 2019).
- Education Quality and Accountability Office (2018): *Highlights of the Provincial Results: Mathematics*. <http://www.eqao.com/en/assessments/results/communication-docs/provincial-report-highlights-mathematics-2018.pdf> (Accessed 14 February 2019).
- Gujarati, J. (2011): From curriculum guides to classroom enactment: Examining early career elementary teachers' orientations toward standards based mathematics curriculum implementation. *Journal of Mathematics Education at Teachers College*, 2, 40-46.
- Ontario Ministry of Education (2016a): *A Renewed Math Strategy for Ontario*. http://www.edu.gov.on.ca/eng/policyfunding/memos/april2016/min_math_strategy.html (Accessed 10 February 2019).
- Ontario Ministry of Education (2016b): *Funding for the Renewed Mathematics Strategy*. http://www.edu.gov.on.ca/eng/policyfunding/memos/april2016/epo_append1.html (Accessed 14 February 2019).

- Ontario Ministry of Education (2016c): *Ontario Schools Kindergarten to Grade 12: Policy and Program Requirements, 2016*. <http://www.edu.gov.on.ca/eng/document/policy/os/index.html> (Accessed 10 February 2019).
- Ontario Ministry of Education (2018): *Focusing on the Fundamentals of Math, Grades 1-8*. http://www.edu.gov.on.ca/eng/parents/min_math_strategy.html (Accessed 14 February 2019).
- Priestley, M., Edwards, R., Priestley, A. & Miller, K. (2012): Teacher agency in curriculum making: Agents of change and spaces for manoeuvre. *Curriculum Inquiry*, 42(2), 191-214.
- Reid, M. & Reid, S. (2017): Learning to be a math teacher: What knowledge is essential? *International Electronic Journal of Elementary Education*, 9(4), 851-872.
- Stokke, A. (2015): *What to do about Canada's declining math scores*. Toronto, Ontario: C.D. Howe Institute.

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