

Improving Math Outcomes for Students – The Leader’s Role

Leadership is “**the exercise of influence** on organization members and diverse stakeholders toward the identification and achievement of the organization’s visions and goals. This influence may have many sources (e.g. administrators, parents, teachers and trustees), is typically reciprocal rather than unidirectional, and is exercised through relationships between and among individuals, groups, and the settings in which they find themselves. Leadership, defined in this way, is “successful” to the extent that it makes significant, positive, and ethically defensible contributions to progress in achieving the organization’s vision and goals.”(Leithwood, 2012, p.1).

The Challenge

Based on comparative assessments of student achievement on international tests, Ontario was ranked in 2007 as one of the top ten high-performing school systems in the world (Mourshed et al, 2007). A follow-up study in 2010 showed that Ontario, along with four other jurisdictions, was able to sustain the gains it had made, leading to its ranking as a “great system” (Mourshed et al, 2010). As a result of precisely targeted supports, resources and programming, Ontario students have enjoyed growing success. Ontario educators continue to work together to ensure that this success extends across all subject areas, K–12.

Yet, within the province, an essential area stands out as needing more attention – mathematics (Ontario Ministry of Education, 2011).

Three Big Ideas About Leading Improvement in Mathematics

1. The task for school and system leaders is to **create the conditions** to influence others to want to know, learn and engage in what works in the teaching and learning of mathematics.
2. Leader **self-efficacy is the key** to success in leading school improvement work in mathematics.
3. Teachers and leaders need to adopt a “**growth mind-set**” for teaching, learning and leading mathematics.

1. Create the Conditions

One of eight “personal leadership resources” (PLRs) in the Ontario Leadership Framework 2012 is “knowledge about school and classroom conditions with direct effects on student learning” (Leithwood, 2012, p. 46). These are categorized as:

- **technical/rational conditions** – knowing and supporting the implementation of powerful teaching strategies;
- **emotional conditions** – paying attention to teacher emotions and their consequences for classroom practice;
- **organizational conditions** – building school infrastructure (culture, policies and operating procedures) that magnify teacher capacity; and
- **family conditions** – knowing and intervening positively in the impact of family dynamics on student learning.

Megan Tschannen-Moran argues that taking a strengths-based focus to teaching and learning improves school climate and leads to “upward spirals of aspiration, possibility and collective efficacy for transformational changes”. Linking to another of the PLRs, optimism, she says, “positive anticipation of the future is a forward look that makes the future palpable and imbues the present with both hope and guidance. Such anticipation takes more than just vague confidence that things will improve; it takes specific positive images of the future to shift the realities of the present moment” (Tschannen-Moran, 2011, p.423-424).

The importance of building trust is highlighted by an Ontario principal as a key to creating the conditions for success:

Without a high level of distributed leadership in the school, building the level of trust required for true collaboration would be difficult. Building capacity in the school honours the staff as equals and promotes honest and challenging dialogue that ultimately supports teacher engagement in the teaching and learning taking place, all focused on improving student achievement (Ontario Ministry of Education, 2012, p.15).

2. Develop Self-Efficacy

Another of the PLRs in the OLF 2012 is self-efficacy, believing in your own ability to perform a task or achieve a goal. With self-efficacy, you take responsible risks, expend substantial effort and persist in the face of initial failure (Leithwood, 2012).

“A robust sense of self-efficacy is necessary to sustain the productive attentional focus and persistent effort needed to succeed at organizational goals.”

Wood and Bandura
as cited in Tschannen-Moran and Gareis, p. 91

Tschannen-Moran and Gareis studied the antecedents to principal self-efficacy and their findings included the following:

- School setting, school socioeconomic status and school level were unrelated to principals' self-efficacy. So even schools thought to be more challenging to lead did not co-relate differently than less challenging schools to principal self-efficacy.
- Having positive role models similar to oneself can provide vicarious experiences that influence self-efficacy beliefs.
- There was no significant relationship between years of experience and principals' self-efficacy – experience alone was not the best teacher. It matters more that principals shape and process experiences in ways that lead to more effective strategies.
- District-level support made a significant contribution to principals' self-efficacy.
- Bottom-up support from those whom the principal leads (teachers and support staff) and whom the principal serves (students and parents) matters. It is speculated that efficacious principals demonstrate persistence, humour, flexibility and effective problem solving that influences the beliefs and behaviours of teachers, support staff, students and parents thereby contributing to their constructive actions within the school setting (Tschannen-Moran & Gareis, 2007). This is an example of the reciprocal nature of influence described in Leithwood's definition of leadership.

3. Adopt a Growth Mind-Set

Carol Dweck advises, that “teachers and administrators should send messages that intelligence is fluid, and they need to hear such messages too. They need to keep growing, especially in these challenging and changing times. Thus, they, too, need permission to learn – the freedom to stretch themselves, make mistakes, and try again. Only in growth mind-set cultures, where teachers and administrators are encouraged to fulfill their potential, will they be able to help their students fulfill their potential in schools that are free of bias.” Her messages about promoting a growth mind-set apply to everyone in the school from students to teachers to principals:

- *We believe in your potential and are committed to helping everyone get smarter.*
- *We value (and praise) taking on challenges, exerting effort, and surmounting obstacles more than we value (and praise) “natural” talent and easy success.*
- *Working hard to learn new things makes you smarter – it makes your brain grow new connections.*
- *School is not a place that judges you. It is a place where people help your brain grow new connections (Dweck, p. 28).*
- The concept of holding a growth mind-set for *all* learners resonates with the OLF practice of “creating high expectations” especially for those who “have traditionally struggled to be successful”.

The Debate – How Much knowledge of Math Content and Pedagogy do Principals Need?

Some school and system leaders lack confidence in their capacity to lead the improvement work in mathematics. Sometimes they latch onto a strategy that they have been told will work without really understanding the learning needs of the students in their school or in what ways they might “intentionally interrupt” (Katz and Dack, 2012) the current practice of the teachers to lead to better outcomes for students.

We also know there are many examples of principals who, by their own admission, are not math experts yet they have successfully brought about significant improvements in math outcomes for their students (see [Leadership in Math videos](#)). These principals have demonstrated the ability to distribute leadership in their schools; they value and foster teacher leadership; and they commit to learning what they need to know to support their teachers in math improvements. They have created the conditions for learning, they have demonstrated self-efficacy without having expert math backgrounds and they have adopted a growth mind-set for themselves as well as their teachers and students.

What the math videos also demonstrate is that each situation is different and successful principals lead according to their own strengths, the capacity of their teachers, and the size, culture and demographics of the school. Ken Leithwood describes leadership as contingent. He says, “while practices included in the OLF are what most successful leaders do in many different contexts, their practical value depends on leaders enacting them in ways that are sensitive to the specific features of the circumstances and setting in which they work and the people with whom they are working” (Leithwood, 2012, p.13). At the same time they are shaping the school climate and creating the conditions to be the most conducive to achieving the goals they have set with their staff for improvements in mathematics.

“I am not a math teacher by trade. Taking on the math curriculum was very much a learning experience for myself. Having the opportunity to sit around the table with grade 9 and 10 applied teachers and learning with them allowed me to play a very different role in their development than in a subject area that I was more comfortable in. As a result we have learned together. I have learned as much from them as they have from me. We all come to work with different mandates; we each contribute from a different perspective but we all contribute to the same goals.”

Secondary principal in the Leading in Mathematics Video

References

- Dweck, C. Mind-sets and Equitable Education, *Principal Leadership*, 20, 26-29.
- Leithwood, K. (2012). [The Ontario Leadership Framework 2012, with a Discussion of the Research Foundations](#) Toronto: Institute for Education Leadership.
- Katz, S. & Dack, L. (2012). *Intentional interruption: Breaking down learning barriers to transform professional practice*. Thousand Oaks: Corwin Press.
- Mourshed, M., Chijioke, C. & Barber, M. (2007). *How the world's best-performing school systems come out on top*. McKinsey & Company. Retrieved at www.mckinsey.com on January 17, 2013.
- _____. (2010). *How the world's most improved school systems keep getting better*. McKinsey & Company. Retrieved at www.mckinsey.com on January 18, 2013.
- Ontario Ministry of Education. (2012). [Closing the Achievement Gap: Advice from Expert Ontario Principals](#) Toronto: Author.
- Ontario Ministry of Education (2011). *Paying Attention to Mathematics*. Toronto: Author.
- Tschannen-Moran, M. and Tschannen-Moran, B. Taking a Strengths-Based Focus Improves School Climate. *Journal of School Leadership*. 21, 422-448.
- Tschannen-Moran, M. and Gareis, C. Cultivating Principals' Self-Efficacy: Supports that Matter. *Journal of School Leadership*. 17, 89-114.