



Recommendations from a Research Summary Prepared by the Mathematics Leadership Community of Practice

Teacher Leadership

- ✓ Calderone et al. (2018) suggest that teacher leaders should work towards establishing skills necessary for active listening, facilitating meetings, deciding on a course of action, and monitoring progress. They need to have content, and teaching and learning expertise in their field; as well as skills for facilitating communities of learning throughout their organizations; confronting barriers in the school's culture and structures; translating ideas into sustainable systems of action; and striving for authenticity in their teaching, learning, and assessment practices. In addition, teacher leaders should encourage their colleagues' success.
- ✓ According to Masters (2010), effective leaders need to strive to create cultures of high expectations while providing clarity about what teachers are expected to teach and what students need to learn, and need to establish strong professional communities and lead ongoing efforts to improve teaching practices.
- ✓ Martinovic, Horn-Olivito, and ElKord (2017) establish that effective mathematics leader need to be: (a) knowledgeable of mathematics content, (b) informed about pedagogical practices specific to teaching mathematics, (c) connected with mathematics education community, (d) embedded in educational context (e.g., knowledgeable of the students and the curriculum), (e) experienced with action research (e.g., skilled in monitoring success of their actions), and (f) aware of their school/board change goals.
- ✓ Teacher leaders need to possess attributes of open-mindedness, flexibility, and confidence (Calderone, Kent, & Green, 2018).
- ✓ According to Ontario Ministry of Education (2016), math lead teachers' responsibility is to deepen their own math knowledge through professional learning, apply this learning in the classroom, and share strategies for learning with other teachers in their school.

School-based Leadership

- ✓ Cohron (2009) recommends that schools with high numbers of at-risk students, work on increasing the number of their capable teacher leaders who will help enhance the instructional capacity of their peers.
- ✓ Ontario's Renewed Math Strategy (RMS, 2016), required that elementary schools utilize math lead teachers.
- ✓ Cohron (2009) supports having school-based teacher leader teams, as they diminish the pressure on principals as instructional leaders.
- ✓ Lambert and Harris (2003) suggest that schools who do not have formal teacher leaders use the tenets of teacher leadership in the form of agency, empowering their staff to lead teaching and learning development.
- ✓ Muir et al. (2018) suggest that schools can improve students' numeracy scores on standardized tests through school-wide approaches to the teaching and learning of numeracy, which include: (a) having policies and programs to support numeracy growth, (b) developing strong school and numeracy leadership, (c) using data from several sources to inform future teaching and learning directions, and (d) encouraging teachers not to teach to the test.
- ✓ Masters (2010) recommends that schools work towards creating a school culture where all adults are responsible for student learning and success, where educators jointly analyze samples of student work; co-plan, co-teach, and review efficiency of their teaching; and celebrate and encourage professional learning.
- ✓ Warwas and Helm (2018), and Vescio, Ross, and Adams (2008), imply that teachers need to be convinced to collaborate and to change a likely engrained mind-set rooted in the culture of individualism, autonomy, and independence.

Professional Development (PD)

- ✓ Leaders of mathematics would benefit from developing PD with the mindset that teachers' professional identities and knowledge are part of a process and not an event (Schauer, 2018; Scheiner et al., 2017), while keeping in mind that teachers' knowledge needs to be developed in three fundamental dimensions: content knowledge (CK), pedagogical content knowledge (PCK), and generic pedagogical knowledge (PK) (Shulman, 1986).
- ✓ According to Ball et al. (2008), effective mathematics teachers need specialized content knowledge, a composite of knowledge and skills, because they must be uniquely able to understand how learners develop mathematical concepts and be able to assess their students' understanding, in order to apply effective pedagogical strategies.
- ✓ Charalambous (2016) emphasizes that mathematics PD should focus not only on content knowledge that teachers need to have, but also on teaching practices, most importantly providing explanations and using representations.
- ✓ Scheiner et al. (2017) emphasize that teaching mathematics is not only top-down, but also bottom-up, as it needs to situate knowledge in the knower and make it culturally appropriate.
- ✓ Weiss and Herbst (2015), and Neubrand (2018), stress the importance of theory-building—one aspect lacking in most teachers' professional knowledge.
- ✓ Neubrand (2018) emphasizes that mathematics teachers need to be interested in the personal and intellectual development of the learners, and be “informed about the foundational elements that rule the scholarly domain of teaching” (p. 609). In addition, “the mechanisms of doing mathematics, i.e., the ‘practices, sensibilities, and ways of thinking of mathematics’ (Bass, 2017, p. 229), should also be part of the professional knowledge of teachers” (p. 609).
- ✓ Neubrand (2018) argues that “a significant part of teachers' professional knowledge should be devoted to building up specific mathematical knowledge, not sheer instrumental knowledge, but in direct relation to the educational issues a teacher is faced with during teaching” (p. 610).
- ✓ Neubrand (2018) and Scheiner et al. (2017) advise that PD programs should first aim to tap into teachers' knowledge by using a mixed-methods design in validating teachers' professional knowledge frameworks and approaches; recommending using alternative approaches to multiple choice survey items, including open-ended questionnaires and interviews, or observing and responding to different scenarios portrayed in videotaped or simulated teaching episodes.
- ✓ Martinovic and Manizade (2018) suggest that when assessing teachers' knowledge, it would be more effective to select a small number of commonly taught mathematics topics and to then develop instruments that identify a teacher's competency level in those areas, rather than probing for a broad range of topics.
- ✓ Warwas and Helm (2018) recommend fostering Professional Learning Communities, where education leaders systematically describe and critically evaluate collective professional practice within departments, in light of desirable features of work in a PLC. Such departmental profile analysis can also help teachers in identifying potential deficiencies in their respective departments and to thus plan targeted measures for improvement.
- ✓ Choi and Walker (2018) emphasize that customizing PD provision to perceived reform characteristics should be an on-going process, and should begin with an initial assessment of degrees of ambiguity and conflict surrounding a policy, through surveys or focus group interviews. This would provide insights into what type of PD should be provided, in addition to structural information on the potential problems and legitimacy of the policy itself.
- ✓ Choi and Walker (2018) also recommend bringing both policy makers and practitioners together to analyze and categorize reform from teachers' experiential perspectives, while taking into consideration suggestions from reform initiators and leaders, in order to identify effective PD provision.

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