Leading school improvement: using Popper’s theory of learning

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ABSTRACT
Leadership is a highly complex activity, as leaders respond to increasing diversity and external accountability. Additionally, there is increased recognition that leadership is deeply contextual, sensitive to macro-politics of systems and micro-politics of individual schools. In Ontario, Canada, the school improvement effort is focused on raising student achievement and ensuring equitable outcomes. The current provincial education policies across Canada require that principals focus on (1) increasing the proportion of students who meet educational expectations and (2) reducing the ‘achievement gaps’ amongst sub-groups of students within the public school system. Despite these efforts, in Ontario, schools continue to encounter difficulty in meeting the needs of all their students. A full pursuit of factors related to differences to students’ backgrounds and abilities is beyond the scope of this article. Rather, this article is concerned with how school can adopt Karl Popper’s theory of learning for school improvement efforts.

Leadership is a highly complex activity as leaders respond to increasing diversity and external accountability (Dinham, Anderson, Caldwell, & Weldon, 2011; Moos, 2011; Mulford, 2012). Additionally, there is increased recognition that leadership is deeply contextual, sensitive to macro-politics of school systems and micro-politics of individual schools (MacBeath & Townsend, 2011). The external goals highlight the need for school improvement efforts to focus on raising student achievement and ensuring equitable outcomes. The current provincial education policies across Canada require that principals focus on (1) increasing the proportion of students who meet educational expectations and (2) reducing the ‘achievement gaps’ amongst sub-groups of students within the public school system (Klinger, DeLuca, & Miller, 2008; Klinger, Maggi, & D’Angiulli, 2011).

Ontario appears to have directed a great amount of effort and resources to support the effective implementation of these policy and accountability frameworks. For example, the Literacy and Numeracy Secretariat (LNS), a branch of the Ontario Ministry of Education, has made extensive use of provincial test results, administered by the Ontario Ministry of Education, Quality and
Accountability Office (EQAO), to direct improvement efforts. More recently, the LNS released the School Effectiveness Framework (SEF), a document intended to guide educators and schools in their improvement efforts, and to use more effectively both the large-scale and locally available data to monitor the effectiveness of leaders’ efforts. As well, the SEF and the EQAO were in part devised to ensure that principals remain committed to, and accountable for, student achievement (Klinger et al., 2011). Despite these efforts in Ontario, schools continue to encounter difficulty in meeting the needs of all their students. Principals are expected to use the data generated by these frameworks to address the achievement gaps, taking into account the unique cultural, socioeconomic and instructional contexts of their schools.

Research points to different levels of student achievement attributed, in large measure, to factors such as age, gender, family, and ethnicity at the student level (e.g. Ma & Klinger, 2000; Willms & Kerr, 1987). Findings also point to the systematic variation in student achievement attributed to differences between schools and their leadership. In fact, Leithwood and Jantzi (2005) observe that the school principal is the largest factor associated with student achievement, after accounting for students’ backgrounds and abilities. A full pursuit of factors related to differences in students’ backgrounds and abilities is beyond the scope of this article. Rather, this article concerns itself with how principals can adopt Karl Popper’s theory of learning for school improvement efforts.

**Popper’s theory of learning**

As a Popperian, I hold the view that one of the responsibilities of the principal is to challenge common assumptions, particularly those views held by teachers and students that learning occurs when students are actively engaged in the learning process by giving a personal interpretation of their experience and the construction of their own knowledge, an assumption widely held by constructivists (Popper, 2009; Swann, 2012). The constructivist approach to educational practice is grounded in the conviction that learners will learn the materials presented to them so long that the learners have some prior knowledge of the materials. The role of the principal is to assist and encourage teachers to lead the students to question, discover, discuss, appreciate, and verbalize the new knowledge generated through students’ activities. This constructivist approach is commonly practiced and considered as the most effective method of teaching and learning in our North American schools (Grennon Brooks & Brooks, 1993), yet the EQAO scores reveal that this approach is only meeting some students’ needs while other students’ needs remain unmet. Why is this? Perhaps, it is time for school leaders to rethink the way children learn if we are to improve student learning.

How can principals assist teachers in improving student learning using the Popperian approach? It is worth mentioning that, regardless of how we view improvement, it is fair to assume that one method might be more effective than another method, given any particular context. First, the Popperian approach requires that school leaders adopt an attitude that welcomes criticism. It also requires a moral commitment to adopt an attitude of reasonableness, which is difficult to put into practice but is nonetheless essential. It is not easy to accept and not dismiss inconvenient truths or biases or arguments that go against one’s beliefs and values (Diller, 2006). An authoritarian principal faced with low performance standardized test scores may say that the low score is due to teachers not
directing and controlling activities, due to the constructivist method of teaching. The method proposed for school improvement is one of trial and the subsequent elimination of errors. It is a method of proposing theories and subjecting them to the test, referred to as Popper’s theory of learning.

**Popper’s trial and error elimination**

Popper’s theory of learning posits that learning embodies the same process as problem-solving, that is the process of trial and error elimination. The process of trial and error can be summarized in the following schema (Popper, 1979, p. 243).

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P1 \rightarrow TT1 \rightarrow EE1 \rightarrow P2
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$P1$ represents an initial problem, for example, how the principal could improve the school Grade 3 EQAO test scores in math. The TT1 is applied to the problem. Here the TT1 can be concerned with how Grade 3 math teachers can work together to ensure that all students are taught both procedural and conceptual understandings in math. EE is the error elimination, that is, the elimination of the errors that are contained in the TT1. The elimination of the error gives rise to a new problem (P2) as depicted in the above schema. The whole schema can start from a practical problem or from a theoretical problem. The same holds for P2.

I concur with the views of Swann (2012) and Burgess (1977), that a problem needs to be created even though a mismatch between expectation and actual experience is discovered. A mismatch is not of itself a problem. However, Swann (2012) points out that a single mismatch can be turned into a number of different problems, as in the case of complex human problem situations. These problems are nonetheless expectation-laden and value-impregnated. For example, in the context of improving the EQAO scores, ‘The Grade 3 students did not perform as well as the principal expected when completing their math test.’ This statement can be formulated as a problem in terms of ‘How the principal can help their teachers to get the students to be less anxious during test-taking time?’ or ‘How can principals assist teachers in providing a more relaxing environment that is more conducive to test taking?’ or ‘How principals better understand effective processes?’ It is important to note that there are many mismatches between expectations and experiences. Nevertheless, not all of these mismatches should or need to be turned into a problem. In order for the principal to have a problem, she must be dissatisfied with the current state of affairs; in this case, the low EQAO scores of her school and so, by implication, she must try to improve the EQAO test scores of her school.

Although the principal can have several tentative theories, she can only adopt one at a time in response to a problematic situation. For example, if she wishes to improve the Grade 3 EQAO math test scores at her school, she can put her tentative solution to the test (trying to find ways to get her Grade 3 students to be less anxious in taking the test) by providing a quality environment for her students. Of course, there is no way of finding out ahead of time if her tentative solution will be successful or if it is the best solution to her problem. It is important to note that, even though a tentative theory has solved the problem successfully, it does not prove the truth of any expectation embodied in it.
EE refers to the elimination or the modification of a theory, solution or hypothesis. Popper (1979) defines it as:

… new reactions, new forms, new organs, new modes of behaviour, new hypotheses, are tentatively put forward and controlled by error-elimination …. Error elimination may proceed either by the complete elimination of unsuccessful forms (the killing-off of unsuccessful forms by natural selection) or by the (tentative) evolution of controls which modify or suppress unsuccessful organs, or forms of behaviour, or hypotheses. (p. 242)

In the following quote, Popper (1979) further defines error elimination as a feedback mechanism, which is continuous and often unconscious:

If I am standing quietly, without making any movement, then … my muscles are constantly at work, contracting and relaxing in an almost random fashion … but controlled, without my being aware of it, by error-elimination (EE) so that every little deviation from my posture is almost at once corrected. (p. 245)

Even though the process of trial and error follows the same logic, the scale and the nature of problems vary greatly. However, the problem (P2) that emerges from the process of trial and error elimination is different from the initial problem (P1). This is because, once we attempt to solve a problem, a trial solution is applied and, whether the organism has learnt or not, a new state of affairs has been brought about. This new state of affairs brings further challenges for the organism, which may or may not lead to new problems and new trial solutions or theories. This process continues until the organism dies or the problem is solved. For example in her attempt to solve the problem of improving the EQAO math scores of her school, the principal may find that teachers are teaching the ‘how’ something works; that is, the procedural understanding without teaching the understanding of why something works. However, conceptual and procedural understandings reinforce one another. Understanding the ‘why’, or the conceptual knowledge, is important for the development of procedural fluency, while the fluency of the procedural knowledge supports the development of further understanding and learning.

The principal needs to first solve the problem of conceptual understanding before attending to the problem of improving her school EQAO scores. She needs to ensure that her teachers not only teach the students the ‘how’, for instance, how the long division works, or how to add fractions in a mechanical sense but also teach them the ‘why’ it works. For example, she needs to ensure that the teachers are able to provide an explanation as to why the sum of the triangle is 180 degrees and, as students’ conceptual understanding increases, they should be able to explain the relationship between the angles associated with parallel lines and a transversal.

The progress made by the principal in solving her problem or, as Popper calls it, the growth of knowledge achieved can be estimated by the distance between P1 and P2 and, thus, she will be able to know if she has made some progress. The principal may have several other tentative theories or solutions that she may want to put to the test in an attempt to fail unworkable theories and to decide which of the competing theories are robust enough to solve her identified problem and which one(s) should be eliminated altogether.

**Popper’s bucket theory of mind**

How does the principal know that the teacher ought to use a variety of assessment tools? According to the bucket theory of mind, one gains knowledge through one’s sensory
organs, such as the eyes, nose, ears, and tongue. It is through these senses that knowledge enters the bucket. How does she acquire knowledge through her senses? Through similarities of situations or repetitions, she begins to make generalizations about the world around her. There are also expectations, which precede similarities and repetitions. For example, the principal may expect that, if teachers provide students with manipulatives, the students will have a better conceptual understanding of fractions because the principal has observed children learning fractions this way. Popper calls this the acquisition of passive knowledge that is utterly false (Popper, 1979, p. 66).

The principal’s passive knowledge comes in the form of dispositions. She knows that, when a teacher is only using one form of assessment to gather information of what the students can do, the teacher is not properly assessing the students’ learning and performance. She has the dispositional knowledge, and can ask that the teacher use a variety of assessment tool to assess her students. Popper also calls dispositional knowledge ‘subjective knowledge’. We are all disposed to react to certain ways in certain situations. Most of our dispositions are inborn and are modified through trial and error elimination (Popper, 1994).

All knowledge is conjectural because our expectations or tentative theories are guesses and, even though they appear to be stronger and epistemically more progressive than others, they may be false. In the principal’s attempt to apply her tentative theory, to ask her teachers to use math manipulatives to improve students’ understanding of the concept of fractions, she may discover that manipulatives work best for some students but that manipulatives do not improve all student learning. Nonetheless, the principal is eliminating the errors or weaknesses in her tentative theory in an effort to improve her school EQAO math test results. Improvement is a regulative ideal that the principal is aiming for. She may have good reasons to accept one theory over another in her school improvement plan. However, neither her reasoning nor her reasons are conclusive (Popper, 1979).

A Popperian account of learning for leading

Using a Popperian account of learning, a school leader’s role would be to encourage her teachers to engage in autonomous, open-ended trial and error elimination. The leader would strive to offer teachers a safe place where they would be permitted and helped to identify mismatches between current expectations (e.g. by the end of Grade 6, students would be able to perform long division with two dividers) and experience (Are all students able to perform/should be able to perform this task?). Actual and anticipated results may vary. The leader would also help the teachers to problematize some of the mismatches that are discovered and, from there, create tentative solutions by subjecting them to critical scrutiny. By using this approach, the leader would include leadership practices that aim at enhancing and supporting professional development and teaching practices while, at the same time, sharing instructional responsibilities (Robinson, Llyod, & Rowe, 2008; Southworth, 2002).

Moreover, the leader’s role would be both facilitatory and critical, and would be undertaken as part of an open-ended commitment for the promotion of learning that is inclusive of leaders, teachers and their students (e.g. Marks & Printy, 2003; Neumerski, 2013; Portin, Atesoglu-Russell, Samuelson, & Knapp, 2013; Printy, Marks, & Bowers, 2009; Sheppard,
1996; Sheppard, Brown, & Dibbon, 2009) with the goal of optimizing student learning outcomes. Suppose the principal wants the teacher to learn something in particular such as, why her students did not do well on their EQAO math test? What then must the principal do?

The principal would engage the teachers in self-initiating trial and error elimination. With a Popperian account of learning, the principals would take into account the prescribed curriculum agenda with the understanding that there is no direct transfer of ideas from the teachers to the students. Hence, principals would provide teachers with opportunities to engage in trial and error elimination and they must have a desire to do so. Teachers would be encouraged to discover the mismatches between expectations prescribed in the Ontario Curriculum and their experiences (the actual student performance) and to adjust the expectations in ways that would encourage trial and error. For example, if a teacher acknowledges her error in teaching only the procedural knowledge to her students without paying much attention to the conceptual knowledge and, hence, the poor EQAO math scores, the teacher would not be reprimanded by the principal for making such an error or any future errors, or revealing her limitations. Instead the principal would use the Popperian account of learning to encourage teachers to dialogue with each other and promote self-reflection and self- and peer-assessment of each other’s teaching. Surprisingly, these initiatives exist to a very small extent in our schools and, yet, they are conducive to the kind of teacher learning that leads to further learning that would maximize student outcomes over the long term (Chitpin, 2015).

When it comes to professional development of teachers, while valuable, school leaders would need to integrate the trial and error approach. If teachers learn that the teaching and learning outcomes are largely predictable, that is, if they use the prescribed expectations in the Ontario Curriculum, they would achieve a desired outcome, then there is no critical or creative process involved. This practice is consistent with the myth that learning comes from without (Chitpin, 2013).

The status of the school, as well as that of the principal, is determined to a large extent by how well the students do in EQAO tests. Doing well equates with grasping the prescribed Ontario Curriculum or, more precisely, scoring a level 3 or higher on reading, writing and mathematics EQAO tests. In such a system, it is easy to see the mismatch between what the teacher taught and what the students have learned. Schools, principals, teachers and, to a lesser extent, parents are being blamed for students not achieving a level 3 on the EQAO tests. This behavior is due to the fact that our education system believes that learners absorb information external to the learner (Popper, 1979; Swann, 2012).

I am not outright rejecting the provincial examinations for children and adolescents. Awarding a school certificate or passing requires that certain competencies or standards be met. When students make errors, be it errors of omission or errors of addition, and when they demonstrate certain limitations, they may be required to re-take the exams. If students are to learn long division or any subject matter, they must be given opportunities to make mistakes or discover errors or limitations. I concur with Swann (2012) that schools and their leaders need to encourage a positive attitude towards the discovery of errors and this can result in a considerable amount of learning of a less prescriptive nature (p. 105). Thus, I am not arguing for a laissez-faire school system where there is no leadership accountability or critical evaluation or to abandon our existing school structure or
standards. Rather, I am advocating a learning environment where principals and teachers, working under a prescribed curriculum, can put their tentative theories to the test in a search for evidence that would refute their theory and, in doing so, allow the teachers to discover errors contained in the tradition approach to teaching and learning in order to maximize outcomes.

Leaders need to take responsibility for the approaches being developed within their schools. Current constructivist approaches to teaching a prescribed curriculum in our schools are designed to encourage greater participation on the part of students. Constructivism recognizes the importance of school leaders and their teachers interacting with students and is of the view that students learn best when they are actively engaged in their learning, while being supported by teachers and their administrators. It appears that constructivists do not exclude the possibility of learning from transmission (Burgess, 1977; Swann, 2012, p. 109). They assume that some learning takes place as the result of the interaction between the teachers and the students, where the latter are passive learners. The Popperian account of learning challenges this form of learning where learners are passive recipients. Learning by instruction can happen insofar that it is done in response to trial and error elimination, where all activities in which both the teachers and students engage can be explained in this way (Swann, 2012). Leaders can ensure this occurs through using the Popperian schema of learning.

The Ontario education system, like many North American systems, operates mostly on a transmission model, partly because it ensures a view of how some learning should take place. This is consistent with how schools, their leaders and policy-makers feel as to how and what students should learn. The use of the Ontario Curriculum and transmission model appears to be cost effective and efficient. But, if we want our students to be critical thinkers, principals need to go beyond the transmission model to provide teachers and students with a place where they could pose problems, test their hypotheses, and solve them through trial and error. This problem-based program has already been tried and tested by T. Burgess, founder and Head of School, for the School of Independent Study in 1974 at, then, the North East London Polytechnic (now the University of East London).

According to Burgess (1975), author of ‘Knowledge is a matter of posing problems, of solving them and testing the solutions’, if we want to develop a problem-based education program:

The first step would be to help a group of pupils to formulate their problems. This is a serious business, and would need to take some time. It would not be enough to have a discussion one morning and think that has settled the matter. People are so unused to formulating problems that they need time to consider and reconsider. Most people do not discuss problems at all, but jump straight to a solution and spend their time worrying about that. What is more, there is a need to be clear about the problems of the individuals, so as to see which of these the whole group, or most of the members of it, has in common. We must avoid imposing problems on people for all the world as if they were a curriculum. (p. 6)

The next task is the proposal of solutions – and these solutions will be the programme of study and activity, which each individual proposes to follow, both on his own and in groups … the role of the group teacher will be crucial. He or she will be a provider – of reference, background and library material; of personal tuition and instruction; of the resources of the rest of the school, both human and material … No specialist will teach unless somebody or some group has asked him to do so. Gone forever is the captive audience, making the best of a bad job under the pre-ordained curriculum. (Burgess, 1975, p. 6)
The final step in all this is the testing of solutions. Pupils, parents and teachers need to know how far the planned programmes have actually met the problems they were designed to solve. They need to be self-conscious, not only about their problems and programmes but also about the status of their own achievements. The question of assessment becomes less the jumping through of externally designed hoops than an essential element in personal responsibility for one’s school life and work. (Burgess, 1975, p. 6)

With respect to the issue of accountability, Burgess (1975) suggests that:

First the whole educational organization of the school can be reported to the governors or managers, and can be approved by them … It would secure the public interest in the plans of individual schools.

The second check is the inspectorate … if the inspectors were to inspect – the work of the pupils in formulating problems, the progress of the proposed solutions, the tests employed to measure failure – they would not only be earning their money but would be making a serious educational contribution. (Burgess, 1975, p. 7)

Although the program was first implemented with secondary students, significant studies were undertaken by both Burgess and Adams to document the success of the program (Adams & Burgess, 1992; Burgess & Adams, 1985). The program was also validated both internally and externally by the external examiners and an assessment board, in the same way as other higher education qualifications (Stephenson, 1981). I concur with Swann (2012) that the program can be implemented by principals with their teachers for primary grade students.

Even though Popper worked as a school teacher in Vienna (Hacohen, 2000; Popper 1992), he did not publish a detailed and coherent educational theory. However, he did make reference to educational matters in several of his works: ‘There are no subject matters, no branches of learning – or, rather, of inquiry: there are only problems, and the urge to solve them’ (Popper, 1985). Popper, speaking about the education of children, was critical of the national curriculum in England and pronounced that: ‘What is being taught does not follow the interest of the teacher or the interest of the children. And these, I think are more important than the actual content of what is being taught’ (Popper, quoted in Bailey, 1995, p. 186). He did not speak directly about the student initiated program-based learning, but he drew our attention to ‘what is valuable is that the child learns to interest himself in this or that subject’ (Popper, quoted in Bailey, 1995, p. 186). Nor did he flesh out his ideas as to how he would realize his educational dream; that of founding a school in which young people could learn without boredom, and would be stimulated to pose problems and discuss them; a school in which no unwanted answers to unasked questions would have to be listened to; in which one did not study for the sake of passing examinations. (Popper, 1992)

Burgess’s work presents a conception of curriculum, summative assessment and institutional structures of Popper’s educational dream, which is consistent with his epistemology, and his concept of an open society (Adams & Burgess, 1980; Burgess, 1981, 1985, 1986, 1992, 1999, 2000; Burgess & Adams, 1980; Swann, 2012). Burgess’ prose provides both contextual detail and general educational principles, which any school leader can use for their own context. However, despite the acknowledged success of the School of Independent Study, the school was dismantled in 1991 by the inception of central...
government control of education in England and Wales, as made statutory in the Education Reform Act (ERA).

Similarly, the Government of Ontario in Canada has created the EQAO in response to the recommendations made by the Royal Commission on Learning in 1995. The data generated from the EQAO Grades 3, 6, and 9 tests are to assist principals in establishing learning goals for their schools. While the Ontario Ministry of Education (OME) has professed positive impacts of its improvement efforts, these efforts are not without controversy. One of the challenges that principals face relates to the school community concerns about too much emphasis on student achievement, as measured by standardized assessment tools (EQAO) and the narrowed definitions of student achievement and the standardized assessment practices that might constraint students from developing independence of thought and judgment and/or from reflecting critically on established social norms and currently accepted ideas (Swann, 2012). Moreover, the experience of students at the elementary and secondary levels are based on their success with these EQAO tests instead of their success in solving individual or collaborative problems, thus repressing their creativity and imagination. Despite the best efforts of many principals and other school leaders, the system treats students and teachers alike as means to various ends:

Classroom activities that foster creativity take time to plan, and require allowance for reflection time and the potential for activities that have unknown learning consequences. If time to prepare for a test is at a premium, the most time-intensive and least predictable learning activities will be removed from the classroom in favour of activities that are expected to lead to better test-taking skills.

Even though activities are aimed at better results are valorized over activities that have unknown learning consequences, the school principals might wish to support their teachers in developing various types of activities through judicious use of Popper’s method of learning.

The Ontario mandated curricula

With the Ontario mandated curricula, it is often assumed that principals and teachers know best what students should learn at each stage, including the amount of time teachers should devote to teaching the curricula. According to Swann (2012), there are five generalized consequences of mandated curriculum that inhibit learning in the long term. They are:

1. Learnt dependency: As an academic for over a decade, I have supervised pre-service teacher placements in elementary and secondary schools and have also taught curriculum and assessment courses to pre-service teachers. Students quickly learned to be dependent on the direction and content laid out in the course outline. They frequently rely on samples of lesson plans and assessment tools instead of developing their own to meet their individual contexts;

2. The marginalization of student preference: For example, my pre-service students’ preference would be to choose an activity or an assignment that is suggested in the course of study, instead of coming up with an inquiry that personally interests them, for fear that their inquiry would not conform or meet the expected predefined standards.
(3) Inadequate and inappropriate criticism: My pre-service teachers become competent in designing lessons, assessment tools, and in using circle time (when it was adopted in primary grades). Though criticism is given to them in the spirit of improving student learning, often students perceive this as inappropriate, as criticism is often perceived by students to be attacks on them instead of their ideas.

(4) The perpetuation of negative values: Students respond not only to what they are told and shown, but also what they experience and observe. Students may be told about the importance of respecting each other and the diversity of opinions. They may learn to espouse similar values. But, if what they experience in person or otherwise exemplifies a lack of respect, and if the practices in which these values are embedded are not challenged, then for many of these students these values will viewed as taken-for-granted aspects of human condition.

(5) Loss of faith in formal education: In schools, we often hear from students or their parents that they are bored and confused. There is no doubt that some things students ought to learn and schools ought to stimulate them to consider ideas beyond their experiences. However, students become bored or disinterested when teachers introduce concepts or ideas that students cannot relate to or have no interest in learning.

Principal, teachers, and policy-makers have acknowledged and discussed the above points, even though they might not hold a Popperian view of learning. However, a Popperian view of learning may shed a different light on sociological and psychological issues pointing towards making piecemeal but fundamental changes in the way decisions are made with respect to curriculum content (Swann, 2012). In other words, Popperian evolutionary epistemology favors the idea that formal teaching and learning should be based on problem-solving instead of being subject-based.

Principals and policy-makers who defend the Ontario mandated curricula do so by presenting arguments that the provincial curricula provide equal opportunity. In doing so, they are overlooking the significance of students’ preferences and expectations. But if they acknowledge that the central role of the students is learning, then it becomes apparent that the provincial curricula, in fact, works against equality of opportunity because of varied students’ preferences, expectation, and values. The practice of offering the same curricula to all students means that the curricula may suit some students more than others (Swann, 2000).

In Ontario, provincial curricula are used to hold schools, principals, and teachers accountable and to move students from one year to the next, as well as to ease the transfer of students from one part of the province to another. http://www.edu.gov.on.ca/eng/curriculum/


discussions

The Ontario Curricula were introduced by the Government with the explicit purpose of raising standards. All Ontario students are expected to reach a level 3, and principals urge teachers and students to work towards that outcome. The OME may claim that education provision has risen with schools whose students achieve a level 3 in reading,
writing, and math. However, in working towards specific standards, the principals may find that the overall levels of achievement are more likely to be lowered because specific standards cause students and teachers to aim for the standards and not go beyond in the broad sense.

Furthermore, it is unlikely that a mandated curriculum can be tested properly as to its effectiveness, as those who are responsible for its design have a high vested interest in its apparent success and, also, by applying it provincially, the scope for empirical comparisons between different curricula is limited. By imposing a mandated curriculum, it restricts the opportunity to develop and test other alternative approaches in our public school system (Chitpin, 2013; Swann, 2012).

Popper’s philosophy of learning is being emphasized differently by different Popperians. But, when it comes to learning, Popper made reference to stimulating the interests of the child: ‘So what you should do, beyond the 3Rs is do your best to stimulate the interest of the child’ (Popper quoted in Bailey, 2001, p. 27) as opposed to the mandated curriculum, that of giving ‘unwanted answers to unasked questions’ (Popper, 1992, p. 40). Popper went on to describe the best principals are those who can allow for the different interests of their teachers (Popper quoted in Bailey, 2001, p. 27).

The type of curriculum advocated for in this article is one where principals provide both students and teachers an opportunity to find ways of putting their hypotheses to the test. When adopting a curriculum, it is easier to find evidence to support the views of those who have vested interest in it, especially if principals, teachers, and parents are told of its effectiveness in raising standards and are asked to adopt the curriculum. However, if principals are committed to genuinely improving their practice, Swann (2009) suggests that it is beneficial to become critical and ask, ‘What are the unintended and undesirable consequences of doing things this way’ (p. 8)? A curriculum where critical discussion is a crucial element is desirable, where students are encouraged to critique the ideas/concepts presented to them. By the same token, when principals are initiated into the practice of critical discussion, they become better equipped to assess the issues and make better informed decisions.

In order for our students to be competitive, confident, critical, and autonomous learners, schools, principals, and teachers have a responsibility to provide learners with the opportunity to make decisions and to be responsible for the outcomes. I ask that principals consider the following questions:

- How does the Ontario Curriculum challenge our students, facilitate their development as individuals and influence them daily?
- How does the Ontario Curriculum deal with students’ learning problems; for instance, what students want to learn (especially those who are intellectually gifted) but cannot learn or have difficulty learning (those with some sort of learning disabilities) without the support that teachers or schools can provide?
- How does our curriculum encourage our students to become lifelong learners?

It appears that, if the Ontario Curriculum does not address the above questions, it ought to be re-evaluated.
Conclusion

Popper’s philosophy of learning can serve to challenge many of the taken-for-granted assumptions prescribed in our Ontario Curriculum. For example, principals should view schools as places where students are provided with opportunities to discover errors and inadequacies. Principals should provide a conducive learning environment where students can reveal their inadequacies without receiving a penalty of some kind, such as the need to pay the penalty of writing on a topic suggested by the teacher who is following the expected outcome in the curriculum. Principals should not feel that they must pressure teachers to produce individuals who are able to perform tasks according to narrowly conceived standards because, under the circumstance, there is a tendency to penalize students who fail to understand, to give the prescribed answer, or to agree and conform (Swann, 2009).

There are potential risks involved in experimenting, but leaving things as they are may also be risky. Many of the assumptions that influence the adoption of the Ontario Curriculum may have not been critically tested. It should be noted that, although Ontario Curriculum may have a long history of acceptance, it does not mean that attention has been paid to its unintended consequences, nor does it mean that there is no better alternative. The need for principals to experiment with means of learning and other curricula is warranted when the existing curricula appear not to be meeting the needs of all students. In doing so, one may discover that the Popperian theory of learning can meet the needs of most students and that it has no undesirable unforeseen consequences.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Stephanie Chitpin is an Associate Professor of Leadership, Evaluation and Curriculum Policy at the Faculty of Education, University of Ottawa, Canada. Her research focuses on how practitioners construct the requisite professional knowledge and skills to do their work competently. Her studies (funded by The Social Sciences Humanities Research Council of Canada (SSHRC) and The Ontario Ministry of Education, Canada) are international in scope. Her research initiative on The Knowledge Network for Applied Education Research (KNAER) – funded by the Tri council – Ontario Ministry of Education/University of Toronto/University of Western Ontario – is the first of its kind to explore how principals across Canada and in different parts of the globe (especially Australia) cope with and respond to high-stakes demands – that is, demands that affect diverse stakeholders and require wise and astute decision-making. Her latest 2016 book Popper’s approach to education: A cornerstone of teaching and learning (published by Routledge) is concerned with presenting a Popperian approach towards advancing teacher knowledge, particularly in the context of teaching a multi-cultural student population and meeting their diverse needs. Her book, in collaboration with Colin Evers, Decision-making in educational leadership: Principles, policies and practices (published by Routledge, New York) reflects how different sorts of decisions can require different types of decision-making.

References

Adams, E., & Burgess, T. (1980). Conclusion and proposals. In T. Burgess, & E. Adams (Eds.), Outcomes of education (pp. 163–176). London: Macmillan Education.
Adams, E., & Burgess, T. (1992). Recognizing achievement. In H. Berlak, F. M. Newmann, E. Adams, D. A. Archbald, T. Burgess, J. Raven, & T. A. Romberg (Eds.), Toward a new science of educational testing and assessment (pp. 117–37). New York: State University of New York Press.

Bailey, R. (1995). Karl Popper as educator. Interchange, 26(2), 185–191.

Bailey, R. (2001). Never answer an unasked question. Interviews with Karl Popper on education. Research Intelligence, 75, 24–27.

Burgess, T. (1975). Choice is not enough – Go for responsibility. Where, the Education Magazine for Parents, 100, 5–7.

Burgess, T. (1977). Education after school. London: Victor Gollancz.

Burgess, T. (1981). Bias is of the essence. In D. W. Piper (Ed.), Is higher education fair? (pp. 1–16). Guildford: Society for Research into Higher Education.

Burgess, T. (1985). New laws for post school education. Higher Education Review, 18(10), 25–42.

Burgess, T. (1986). Education for capability. Windsor: NFER-NELSON.

Burgess, T. (1992). Accountability with confidence. In T. Burgess (Ed.), Accountability in schools (pp. 3–14). Harlow: Longman.

Burgess, T. (1999). Inquiry for ‘taught’ masters. In J. Swann & J. Pratt (Eds.), Improving education realism approaches to method and research (pp. 156–163). London: Cassell Education.

Burgess, T. (2000). The logic of learning and its implications for higher education. Higher Education Review, 32(2), 53–65.

Burgess, T., & Adams, E. (1980). The present inadequacy. In T. Burgess & E. Adams (Eds.), Outcomes of education (pp. 3–14). Basingstoke: Macmillan Education.

Burgess, T., & Adams, E. (1985). Records of achievement at 16. Windsor: NFER-NELSON.

Chitpin, S. (2013). Should Popper’s view of rationality be used for promoting teacher knowledge? Educational Philosophy and Theory, 45(8), 833–844.

Chitpin, S. (2015). Advancing pedagogy through counter-inductivity. Scholar Practitioner Quarterly, 9(1), 8–23.

Diller, A. (2006). Constructing a comprehensively anti-justificationist position. In I. Jarvie, K. Milford, & D. Miller (Eds.), Metaphysics and epistemology (pp. 119–129). Aldershot: Ashgate.

Dinhnam, S., Anderson, M., Caldwell, B., & Weldon, P. (2011). Breakthroughs in school leadership development in Australia. School Leadership & Management, 31(2), 139–154. doi:10.1080/13632434.2011.560602

Grennon Brooks, J., & Brooks, M. G. (1993). In search of understanding: The case for constructivist classrooms. Alexandria, VA: ASCD.

Hacohen, M. H. (2000). Karl Popper – the formative years, 1902–1945; Politics and Philosophy in Interwar Vienna. Cambridge: Cambridge University Press.

Klinger, D. A., DeLuca, C., & Miller, T. (2008). The evolving culture of large-scale assessments in Canadian education. Canadian Journal of Educational Administration and Policy, 1(76), 1–34. Retrieved from http://www.umanitoba.ca/publications/cjeap/articles/klinger.html

Klinger, D. A., Maggi, S., & D’Angiulli, A. (2011). School accountability and assessment: Should we put the roof up first? The Educational Forum, 75(2), 114–128. doi:10.1080/00131725.2011.552671

Leithwood, K., & Jantzi, D. (2005). A review of transformational school leader research: 1996–2005. Leadership and Policy in Schools, 4, 177–199.

Ma, X., & Klinger, D. (2000). Hierarchical linear modelling of student and school effects on academic achievement. Canadian Journal of Education, 25(1), 41–55.

MacBeath, J., & Townsend, T. (2011). Thinking and acting both locally and globally: What do we know now and how do we continue to improve? In T. Townsend & J. MacBeath (Eds.), International handbook of leadership for learning (pp. 1237–1254). Dordrecht: Springer.

Marks, H. M., & Prinny, S. M. (2003). Principal leadership and school performance: Integrating transformational and instructional leadership. Educational Administration Quarterly, 39(3), 370–397.

Moos, L. (2011). Educating Danish school leaders to meet new expectations? School Leadership & Management, 31(2), 155–164. doi:10.1080/13632434.2011.560600

Mulford, B. (2012). Tinkering towards utopia: Trying to make sense of my contribution to the field. Journal of Educational Administration, 50(1), 98–124. doi:10.1108/09578231211196087
Neumerski, C. (2013). Rethinking instructional leadership, a review: What do we know about principal, teacher, and coach instructional leadership, and where should we go from here? *Educational Administration Quarterly, 49*, 310–347.

Popper, K. (1979). *Objective knowledge: An evolutionary approach*. Oxford: Oxford University Press.

Popper, K. (1985). *Realism and the aim of science*. London: Routledge. [First edition in 1983. From the postscript to the Logic of Scientific Discovery, written mainly during the years 1951–1956 ed. by W.W. Bartley, Ill.]

Popper, K. (1992). *Unended quest: An intellectual autobiography*. London: Routledge. [First published as: Autobiography of Karl Popper, in P.A. Schilpp (ed.) (1974), *The philosophy of Karl Popper*, Book 1. (pp. 3–181). La Salle, IL: Open Court Publishing.]

Popper, K. (1994). *The myth of the framework: In defense of science and rationality*. London: Routledge.

Popper, K. (2009). *All life is problem solving* (some chapters translated by P. Camiller). London: Routledge.

Portin, B. S., Atesoglu-Russell, F., Samuelson, C., & Knapp, M. S. (2013). Leading learning-focused teacher leadership in urban high schools. *Journal of School Leadership, 23*(2), 220–252.

Printy, S., Marks, H., & Bowers, A. (2009). Integrated leadership: How principals and teachers share transformation and instructional leadership. *Journal of School Leadership, 19*(5), 504–532.

Robinson, V. M., Llyod, C. A., & Rowe, K. J. (2008). The impact of leadership on student outcomes: An analysis of the differential effects of leadership types. *Educational Administration Quarterly, 44*(5), 635–674.

Sheppard, B. (1996). Exploring the transformational nature of instructional leadership. *Alberta Journal of Educational Research, 42*(4), 325–344.

Sheppard, B., Brown, J., & Dibbon, D. (2009). *School district leadership matters*. New York, NY: Springer Science+Business Media B.V.

Southworth, G. (2002). Instructional leadership in schools: Reflections and empirical evidence. *School Leadership & Management, 22*(1), 73–91.

Stephenson, J. (1981). Student planned learning. In D. Boud (Ed.), *Developing student autonomy in learning* (pp. 145–159). London: Kogan Page.

Swann, J. (2000). Be prepared: A checklist of arguments against a national curriculum. *Education Now, 27*, 2.

Swann, J. (2009). Popperian epistemology and the curriculum: The legacy of Tyrrell Burgess. *Higher Education Review, 42*(1), 9–16.

Swann, J. (2012). *Learning, teaching and education research in the 21st century: An evolutionary analysis of the role of teachers*. New York, NY: Continuum International Publishing Group.

Willms, J. D., & Kerr, P. (1987). Changes in sex differences in Scottish examination results since 1975. *The Journal of Early Adolescence, 7*(1), 85–105. doi:10.1177/0272431687071008