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At this writing, the news media has been full of stories about the emergence of a new corona virus variant named "omicron," not the least of which has been how to pronounce it. That said, the fact that we are still in a pandemic and things may potentially worsen should certainly eclipse the need to learn how to pronounce omicron. COVID-19 has turned the world sideways impacting almost every person and facet of human activity in multiple ways that were heretofore unimagined by most people. Despite humanity's concerted efforts the virus continues to mutate and infect people at alarming rates across different regions of the world. Certainly, we have become more cognizant of the inequities that persist around the world with access to vaccines, and the significant numbers of folks not getting vaccinated, and the ongoing race to track and analyze new variants. Yet, with all that the virus has done around the world many folks continue to try and aim their actions and life toward some kind of *normal*. But what seems to becoming abundantly clear is that it is not possible to *return* to some perceived normal that was imagined prepandemic; we seem to be decidedly in transition toward a quickly changing new reality.

The academy has not been immune to the impact of the pandemic, in fact the academy has experienced many changes and new positionings from the impact: teaching and how we teach, research and how we research, collaboration and how we collaborate, and even operations and how the university operates. No one or thing has escaped feeling some kind of effect from this pandemic, but all the while many of us have striven to continue our research, our teaching, our collaborations, and community service in the academy and beyond. In this issue you will find many good works that are demonstrative of the commitment to research and learning that scholars continue to try and navigate through the pandemic. The Editorial Board invites you to delve into the varied works across several fields of interest held in this issue as you wind your way toward the end of 2021 and look forward hopefully for 2022.

Take care and keep well,

Patrick Lewis

Editor-in-Chief

in education

A Rationale for the Junior-Senior Secondary Mathematics Curriculum 2.0

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Abstract

This paper proposes a rationale that supports a renewal of our predominantly 19th century curriculum for Grades 7–12, identified as Mathematics 1.0. It was originally established in the mid 1800s to prepare learners mostly from upper-class families to succeed in a post-industrial society. Today's digital revolution has changed society remarkably, and the variety of learners has certainly broadened, but Mathematics 1.0 fundamentally remains the same Plato-based (Platonist) curriculum due to its social-political power, which is documented in the article. The major changes to society's culture and the composition of learners have caused faults in Mathematics 1.0 (e.g., a relevance deficit). For the majority of learners, school mathematics has mostly become an obsolete, inequitable, and harmful rite-of-passage into adulthood, to varying degrees. A renewed curriculum, Mathematics 2.0, is rationalized and specific suggestions are offered. The minority of learners who successfully pursue mathematics to varying degrees would experience small changes in their new Mathematics 1.2.

Keywords*:* school mathematics, humanistic, curriculum differentiation, relevance

A Rationale for the Junior-Senior Secondary Mathematics Curriculum 2.0

In a professional AP/AOL poll conducted by Ipsos (2005) involving 1,000 adults (ages 20 to 39 years), 23% picked mathematics as their "*favourite"* subject, while 37% "*hated*" mathematics. The margin of error was ± 3.1. Public polls are not academic research, but they can alert us to a potentially serious problem that needs researching. In this case, it would seem that junior-senior (Grades 7–12) secondary mathematics is inadequately serving about 37% of learners—a crisis situation (Borovik, 2017). Oesterle (2018) concurred:

> For experienced teachers, it can be difficult to alter the way we have been teaching, especially if it seems to "work" for at least some significant portion of our students [e.g., 23%]. But generations of students who become adults who "hate math" and [the] pervasive avoidance of mathematics in North America, suggest that what we have been doing is not "working" (p. 161).

With each generation, this negativity towards mathematics gets recycled when the 37% pass it along to their children, nieces, and nephews, for elementary teachers to handle.

Oesterle is not alone. Skovsmose and Greer (2012) concluded, "For too many people, their experience of school mathematics is personally, emotionally, and intellectually dehumanizing. It does not have to be like that" (p. 383). This dehumanizing contributes substantially to the crisis surrounding mathematics (Skovsmose, 2019). What we have been doing is certainly not working, and it is not the teachers' fault. Both the content relevance gap between the curriculum content and what learners experience in their lives (Aikenhead, 2021a) must share the blame along with the "historical trend of teaching more math to more students at younger ages" (Furr, 1996, p. 8).

There is extensive evidence that few fundamental changes have occurred to the content and philosophy of school mathematics for Grades 7 to 12 since the inception of public schools about 170 years ago, when learners were taught "arithmetic, algebra, and geometry" (Nikolakaki, 2016; Willoughby, 1967, p. 4) from a curriculum established during the post-industrial revolution of the Victorian era. This first curriculum, designated "Mathematics 1.0" in this article, was taught only to upper-class learners (Andrews, 2016) because "arithmetic was too difficult for the lower class" (Nikolakaki, 2016, p. 277). Learner characteristics have changed dramatically since then, but not the curriculum's Plato-based (Platonist) philosophy. Consequently, "Mathematics 1.0" also refers to our present-day curriculum, while "Mathematics 2.0" is the proposed revised curriculum for the majority of learners. "Mathematics 1.2" is a slightly revised curriculum for the minority. Some of these learners will enrol in both pathways due to the everyday relevance of Mathematics 2.0.

The purpose of this article is three-fold and focuses on the majority of learners' abilities to (a) identify major faults associated with Mathematics 1.0, (b) document the social-political power that sustains Mathematics 1.0 in schools today for all learners, and (c) provide ideas for Mathematics 2.0 based on the mathematics education literature and inferred from Mathematics 1.0's major faults. Mathematics 1.2 is not given much attention due to space limitations.

Learner Diversity

The first major faults associated with Mathematics 1.0 are that it lacks sufficient attention to learner diversity by collapsing it into dichotomies and it stereotypes learners with expectations

that they all could be highly proficient, rather than viewing them in terms of reaching their individual potentials.

The politics of simplistic dichotomies (e.g., STEM—science, technology, engineering, and mathematics—verses non-STEM learners) is avoided here in order to create a continuum that captures nuances in learners' diversities, based on their self-identities with respect to mathematics (Heyd-Metzuyanim, 2017; Nasir, 2002; Nasir et al., 2008). The depth of learning is a function of the degree to which a learner's mathematical self-identity is forged or enhanced (Thomas & Berry, 2019). Darragh and Radovic (2018) defined self-identities as:

> A socially produced way of being, as enacted and recognized in relation to learning mathematics. It involves stories, discourses, actions, decisions, and affiliations that people use to construct who they are in relation to mathematics, but also in interaction with multiple other simultaneously lived identities. (para. 1)

Ruef (2020) wrote, "To be successful in mathematics classes, students must negotiate and navigate the normative identity of the class—what counts as being 'good at math'" (p. 22). A self-concept is an amalgam of many traits, predilections, interests and so forth, of which the dichotomies "like/dislike" and "good/poor" blend into the amalgam.

One of those traits, "learners' values," collaborates with the self-identity-based diversity of learners. In her research into people's typical clusters of values, psychologist Gilligan (1982, as cited in Ernest, 2018,) distinguished between the sciences and humanities. Mathematicians tended to valorize a cluster of "*separated values* [emphasis added]: rules, abstraction, objectification, impersonality, unfeelingness, dispassionate reason and analysis" (p. 194); as opposed to a humanistic stance of living by valuing a cluster of "*connected values* [emphasis added]: relationships, connections, empathy, caring, feelings and intuition" (p. 195).

Aikenhead (2021a) developed a six-category continuum according to the proportions and degrees to which Canadian high school graduates' self-identities harmonize with the mathematical self-identities of mathematicians (see Table 1). The categories range from learners who find mathematics disturbingly difficult to varying degrees (i.e., math-phobic, math-shy, math-disinterested learners). The math-phobic often develop psychological or physiological anxieties when forced to think mathematically, especially when being assessed (Ernest, 2018; Maloney et al., 2017).[1] On the other side of the continuum are the math-interested, math-curious, and math-oriented learners,[2] who see the world to varying degrees like mathematicians do—"through the lens of mathematics" (Ernest, 2019, p. 2).

Table 1

A Student Diversity Continuum of Mathematical Self-Identities

math-phobic (20%)	math-shy (24%)	math-disinterested (26%)	math-interested (20%)	a	b
70%			30%		

a=math-curious (6%)
b=math-oriented (4%)

Note. This table demonstrates a student diversity continuum showing the proportion of Canadian high school graduates' mathematical self-identities, based on a synthesis of three major research studies (approximately to scale). Not for student streaming. (Based on Aikenhead, 2021b, who reported Saskatchewan figures.)

These six categories must be treated flexibly and tentatively because learners' categorization depends on many changeable factors (e.g., "the teacher, topic, grade level, classroom environment, degrees of past success, season," Meyer & Aikenhead, 2021a, p. 104).

The categories are not for streaming learners, but have been proposed for discussing learner diversity more realistically. For example, the 37% of the young adults who hated mathematics (Ipsos, 2005) were likely math-phobic and math-shy learners. I do not make distinctions between the categories in this article. A detailed account of the calculations for Table 1 is found in Meyer and Aikenhead (2021a). Percent data were derived from proportionately integrating the PISA[3] 2018 proficiency data (OECD, 2019, Table I.6.1, p. 105), transformed to Grade 12 graduates according to Frederick's (1991) data, and slightly adjusted to fit Card and Payne's (2017) Ontario 70/30 % figures.

The data create a skewed distribution of learners in favour of the majority who would likely avoid high school mathematics if they could (Holm & Kajander, 2012). Mathematics educators talk about developing a growth mindset (e.g., Boaler, 2013). This implies that a learner moves towards the right in Table 1. It does not necessarily mean that a learner becomes a math-oriented or math-curious, even though the youcubed-at-Stanford-University (2021) website claims: "Everyone can learn to the highest levels" (p. 1)—an instance of Platonists stereotyping learners.

A more nuanced understanding of learners' interests, potentials, and predispositions is required for maximizing an up-to-date, equitable, and successful mathematics education for Grades 7–12; that is, Mathematics 2.0.

OECD's PISA Assessment Project: A Validity Audit

The OECD is an economic body in the highly political field of international investments. Its educational system turns out to be far more political than educational, a rather natural alignment with Platonist mathematics.

Every 3 years, ministries of education, the public media, and organizations such as the Fraser Institute give major attention to learners' mathematics, science, and reading scores reported in the PISA results, a project comprised of questionnaires and tests. This public attention reveals the first invalid aspect of PISA—cherry picking the results by the Ministries and the media by attending to only the learners' scores.

Cherry Picking the Results

The OECD judges the quality of an educational jurisdiction by the following three major criteria that the PISA project investigates: (a) test scores, statistically normalized and given greatest attention; (b) equity, highly valued by Canada's multicultural self-image and related to equity's influence on test scores by a learners' socio-economic status and immigrant identity; and (c) frugality, related to a government's expenditure on education compared to its learners' mean scores. How valid is a judgement concerning a province's or a country's education system if two out of the three major variables are all but ignored? Wikipedia calls this "cherry picking" (2021) the results, meaning, "suppressing evidence." It invalidates an educational judgement. However, for a political judgement, the issue is changed to: Who is blamed for poor test results?—the teachers or the government? The answer is obvious.

When a three-variable combined analysis is actually conducted (Craw, 2015), it makes an enormous difference to the countries' PISA ratings (Aikenhead, 2017): For example, when

"Finland, Estonia, and Canada [were ranked] at 11, 12, and 13 (respectively) on the basis of student performance alone. …the three-factor analysis resulted in Finland, Estonia, and Canada being tied for the *top* [number 1] PISA ranking" (p. 125). Cherry picking destroys validity. PISA does not calculate a combined analysis, as Craw (2015) did.

Sampling Invalidity

PISA is essentially a very complex polling project. Data are collected from randomly selected schools within an educational jurisdiction. With these data, inferences are made for the whole educational jurisdiction. Therefore, the ensuing statistics' veracity depends on the sampling validity. However, some schools manipulate their student sample (Sjøberg & Jenkins, 2020, p. 7). For these jurisdictions, PISA is a high-stakes test related to attracting economic investments to their country. They are known to have given low achieving students the day off away from the testing cite. "PISA even claims that low educational performance on its assessment has an economic impact on [underdeveloped countries]" (Sriraman, 2017, p. xi).

At the same time, "PISA is a 'low-stakes' test," (Sjøberg & Jenkins, 2020, p. 8) in more affluent countries where some learners have a tendency to not take it seriously. This decreases both their test scores and the test's validity to some degree, in terms of comparing test scores among provinces or countries. Randomness is undermined and consequently the ensuing statistics produce faulty results.

Invalidities by Associations

Correlations (associations) are not to be identified with causations, but they can signal a potential serious problem for a measurement's validity. Parallel to mathematics scores, high PISA scores are associated with a "strongly negative orientation towards science" (Sjøberg & Jenkins, 2020, pp. 3–4). The negative "side-effects" (p. 4) can easily arise from the enormous pressure on schools to succeed at the highest level. This tends to cause serious physiological and psychological harm to math-phobic and math-shy learners (Ernest, 2018, 2019; Zhao, 2017). Math-curious or math-interested could become math-disinterested or math-shy learners in such a classroom environment. Such negative effects were also evident in learners' "very low self-confidence and self-efficacy related to science and mathematics" (Sjøberg & Jenkins, 2020, p. 4). Countries with the highest test scores "were at the very bottom of the ranking of students' interest" in the subject (Bybee & McCrae, 2011). Simply put, high PISA scores may be harbingers of bad news for learners. Sjøberg and Jenkins (2020) stated, "the PISA science scores correlate negatively with Future science orientation ($r = -0.83$)" (p. 3).

Content and Writing Style Invalidities

The OECD (2013) claims to assess mathematics literacy: "It assists individuals to recognise the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens" (p. 23). Yet this relevant content is not part of the actual PISA test. It was not assessed. This would seem to be either fallacious posturing or a serious flaw in the test's content validity.

What the test seems to assess is the Platonist content chosen by a European-based group of experts with some international consultations. What is the match between that content and someone's local curriculum content? This factor seriously reduces the content validity of PISA scores:

> The available evidence shows that culture may play a more significant role than pedagogy in determining the educational achievements of country, a finding that should be of great concern to anyone with an interest in improving both mathematics teaching and student achievement. (Andrews, 2016, p. 19)

Thus, when comparing one's own province to others, a major compromise to the PISA validity is not being able to control for a major variable: culture. Yet, a senior fellow at the Fraser Institute (Allison, 2021) called PISA "The gold standard for comparing school and student performances around the world" (para. 5)—perhaps an economist who needs to learn more about education assessment.

A measure of the PISA's test's educational validity is the degrees to which the test content and the cultural ways of posing mathematical questions correspond to the curriculum content and cultural context of the learners writing the test. For instance, Québec's culture is much closer to a European culture than Canada's Anglophone provinces are, which might explain Québec's PISA mathematics scores being consistently and significantly higher than all other provinces (Andrews, 2016). This causes PISA's validity to be highly problematic with respect to its content for writing style.

Challenges to Test Validity by a Test Items' Context

The culture of the PISA test developers can affect its validity. For those who are trapped in a Platonist decontextualized test item mode (i.e., a context foreign in varying degrees to math-phobic, shy, and disinterested learners—the 70% group), learners will respond differently compared to a developer who authentically contextualizes the test item in an everyday context familiar to the learners taking the test. Hypothetical contexts similar to a conventional word problem in textbooks are generally irrelevant or non-authentic to the 70% group to varying degrees (Serder & Jakobsson, 2015).

Devlin (2005) compared the arithmetic success rate when children, working as Third World street-stall sellers, solved the "same" arithmetic calculations in three different contexts: (a) in action at their stall, (b) typical textbook formatted word problems in their own language, and (c) decontextualized arithmetic questions. The average scores were 98%, 74%, and 37%, respectively. This is a rather special situation, but it affords insight into the difference that relevant contexts can have on measures of mathematical proficiencies. Procedural mathematics in a workplace differs qualitatively from pure and applied mathematics (Aikenhead, 2021b).

Le Hebel et al. (2017) statistically analyzed the individual PISA items' proficiency with respect to it distinguishing between learners who tended toward high and low achievements on their total PISA test scores. The researchers discovered that PISA test items generally work well among high achievers (i.e., the math-oriented, math-curious and perhaps the math-interested) but not among the low achievers. This suggests that PISA tests should be given to a province's or country's high mathematics achievers in order to increase the validity of individual items, and hence, the entire test.

Conclusion to This Validity Audit

If the OECD targeted the group that will most likely impact a country's GDP, it should focus on the 30% of the proficient mathematics high school learners. Thus, the sampling would be limited to the top mathematical 30% to 35% of a school's 15-year-olds. This would mitigate

only some of PISA's current crisis validity problems. In spite of this, however, it certainly has political power. Canada's Fraser Institute lauds it (Allison, 2021).

Sjøberg and Jenkins (2020) concluded, "PISA scores and rankings are not facts, nor are they objective or neutral outcomes of the project. There is therefore an important task facing the science [and mathematics] education community, namely to give the PISA project the rigorous scholarly examination it deserves" (p. 11).

A plethora of evidence supports the conclusion that PISA is essentially "a political project masquerading as an educational tool" (Aikenhead, 2017, p. 145). When a testing system is educationally broken due to serious problems with its validity (i.e., "validity" generally defined as its trustworthiness at measuring what it claims to measure), is it ethical to continue to use it? The present validity audit would conclude it is not.

The First Public School Curriculum

The source of major faults associated today with Mathematics 1.0 lies in the dynamics crafted by elite university mathematicians when public schools were established during the 19th century. The circumstances of this historical event are mentioned here in order to contrast them with today's more critical historical circumstances: changing our current profit society into a sustainable society, Carney,(2020b) stated: "We've been trading off the planet against profit, living for today and leaving it to others to pay tomorrow" (para. 12). In addition, "Society is beginning to place greater value on sustainability" (para. 5).[4]

In Late Medieval times, the mathematics of commerce became very popular in the schools, all of which were privately owned by entrepreneur instructors (Devlin, 2002). Academic mathematics developed in the fledgling universities in Europe (Daileader, 2020). Both the commercial schools and academic mathematicians supported the Industrial Revolution (late 18th to early 19th centuries). This historical event needed a public school system with a mathematics curriculum to educate workers for the new industries and associated businesses, all encouraged by an expanding open-market philosophy of a profit society at the time.

Ernest (2019) wrote, "Up to the 19th century, the classics (Latin and Greek) were used to occupy the same symbolic role" (p. 5) as mathematics occupies today: a screening device, under the guise of "rigorous standards," to keep fewer learners from graduating from high school and, "A hoop to jump through just to prove you could" (Russell, 2017, p. 25). Ernest (2019) said, "As mathematics professionals and insiders, we are complicit in this over-valuing of mathematics" (p. 6).

Such was the case about 170 years ago. At public debates, the nature of the high school curriculum was hotly contested. On one side were educators and businessmen who wanted practical everyday mathematics to comprise the curriculum, while on the other side were the elite Platonist professors dedicated to Plato's absolutist philosophy (Nikolakaki, 2016) along with some of the general public wishing to emulate the long established private Latin Schools (Willoughby, 1967).

Spurious tactics adopted by the professors are detailed in Aikenhead (2017). For instance, the Platonists vehemently claimed that mathematics was value-free, despite a public repository of mathematics values and ideologies at the time. Ernest (1991) pointed out, "The values of the absolutists [were] smuggled into mathematics, either consciously or unconsciously, through the *definition of the field* [emphasis added]" (p. 259). The Platonists drew on an ancient binary,

logical versus irrational, in order to invent their own theoretical binary: "formal mathematical discourse" versus "informal mathematical discourse" (p. 53). They arbitrarily assigned school mathematics to the formal discourse category that followed Plato's absolutist philosophy of mathematics. The informal discourse category contained all of the features that made mathematics a human endeavour; for example, its commerce and political–societal contexts (Skovsmose, 2016), including its ideologies and values by which it operates (Ernest, 2016a, 2016b). Informal discourses were denigrated by the Platonists as not meeting the academic standards of Plato's purity-of-the-mind axioms. In the end, the elite professors won the debate, and Platonist Mathematics 1.0 became school mathematics.

Pais (2012) pointed out the effect on today's mathematics teaching and research caused by the Platonists' hidden agenda to silence any talk beyond Plato's purity-of-the-mind mathematics:

> This concealment is essential to maintain the role of school as an ideological state apparatus. Seeing school as a place free of ideology disables bringing ideological struggles to school. All enterprises undertaken by teachers to unmask the "invisible" ideology are immediately accused of being ideological acts. In this way, the dominant ideology ensures that no ideology is present in school except, of course, the dominant one. The dominant one is precisely the one that presents itself as ideologically free. (p. 70)

This was how public secondary school mathematics began about 170 years ago: as an ideological screening device and as a cultural rite-of-passage out of high school for all learners.

The Platonists' arbitrary invention of the mathematical formal and informal discourse categories has ensured that no fundamental innovation in secondary mathematics would take place if it conveyed the idea that the knowledge of mathematics is a human, pluralist, cultural endeavour guided by values and ideologies—the essence of Mathematics 2.0.

On the one hand, its Victorian era relevance enhances the 30 % of graduates with the credentials to pursue a STEM related profession. On the one hand as mentioned above, a curriculum deemed relevant by Victorian era mathematicians is experienced as a negative rite-of-passage for many of the 70 % (Ernest, 2018, 2019). As a result, the 19th century, elite mathematicians have been able to reach into our 21st century's digital revolution society and decide what is appropriately relevant for all mathematics learners today.

Professional Influences

In addition to the powerful political forces promoting Platonist mathematics for all learners, two international professional groups influence Canadian mathematics education: the Organization for Economic Cooperation and Development (OECD), and the USA's National Council of Teachers of Mathematics (NCTM). They all subscribe to "a *fallacious argument* [emphasis added] that because of the great utility and power [of mathematics to the needs of society, therefore,] all students must be taught and certified in mathematics to the highest possible level" (Ernest, 2019, p. 4).

Pais (2012) also criticized "the ideological injunction that you really need mathematics to attain [full] citizenship" (p. 65). This untruth tends to be repeated many times by teachers justifying their subject to their learners, many of whom know, however, the claim is an exaggeration: For example, "Really? Think about people you know. Aren't there many who do

not have a solid grounding…in mathematics that are living full and productive lives? Isn't it offensive to tell such people that they are dysfunctional?" (Greer & Mukhopadhyay, 2012, pp. 239–240).

The OECD (2013) provided the following advice: "An understanding of mathematics is central to a young person's preparedness for life in modern society. ...Mathematics is a critical tool for young people as they *confront issues and challenges* [emphasis added] in personal, occupational, societal, and scientific aspects of their lives" (p. 25). As documented above, this rhetoric is contradicted by a validity audit of the OECD's prize project, PISA.

In their book, *Catalyzing Change,* the NCTM (2018) proposed: "Each and every student should learn the Essential Concepts in order to expand professional opportunities, understand and critique the world, and experience the joy, wonder, and beauty of mathematics" (p. 37). NCTM (2018) defined "mathematically demanding courses as those courses that…maintain the integrity of the mathematical standards" (p. 84). These standards replicate Platonist mathematics.

Largely, these quotations target all learners with similar expectations of meeting "learning standards." This stereotypes learners subtly and ignores their need to be treated as a highly diverse group (in spite of such pronouncements within the quoted documents). The two organizations seem to target the 30% of Grade 12 graduates. Their rhetoric tacitly vacillates between theoretically all learners and realistically the 30% minority of the learners.

By doing so, they have, by and large, implicitly shifted the valid mathematical needs of the 30% minority onto the 70% majority, thereby causing a much higher failure rate in the 70% majority of the learners—even in "foundational" mathematics high school pathways. In what way is that ethical?

My reading of the OECD and NCTM documents discerns a preoccupation with pure or applied mathematics (i.e., Platonist "Essential Concepts") that meets high standards measured by standardized test results. This puts the perennial onus on teachers to improve their pedagogy, even though it is much more likely that the Platonist curriculum content is in crisis due to its relevance gap. The OECD and NCTM are mainly silent on societal, historic, and philosophical issues that adults confront in relation to mathematics authentically contextualized in the everyday world. This silence ensures that the curriculum remains overloaded with Platonist mathematics (formal mathematical discourses), leaving no room in the curriculum for adding innovative content related to mathematics' interactions with, and influences on, individual citizens and society (informal mathematical discourse) (Duchscherer et al., 2019; Meyer & Aikenhead, 2021b).

Enculturated Power Politics of Platonist Mathematics

Platonist Mathematics 1.0's original authority was politically established by its "formal discourse" designation in a theoretical dichotomy. Since then, it has been able to wield massive socio-politico-economic power globally. The continued use of a validity-flawed Platonist PISA test is only a symptom of Platonist mathematics' societal power. The present section explores a deeper cause, thereby clarifying causes for these faults in Mathematics 1.0: the indoctrination or enculturation of citizens.

As mentioned above, Carney (2020a) described the historical transformation that Western societies underwent in the 18th century, from being ruled by values to being societies ruled by financial profit for the purpose of national progress, popularized by Adam Smith's (1776) open-

market theory introduced in his book *Wealth of Nations*. Platonist mathematics played a central role in this transformation (Nikolakaki, 2016). This increased Platonist mathematics' use value considerably, thereby forging a strong relationship between it and the field of economics.

In such a society predicated by profit, "Numbers were considered to be objective…and they were more convincing than opinions or rhetoric. The ability of arithmetic not only to produce progress but also measure it, explains why it held this [privileged] position in the educational system" (Nikolakaki, 2016, p. 279). Platonist mathematics became entrenched in Eurocentric nations' progress, which added to its high status. For instance, it "can operate as a political pacifier by making controversial readings and handlings appear neutral and objective" (Skovsmose, 2019, p 1).

Western cultures' global market economies exercise power pervasively over the investment world, the military-industrial complex, democratic governments, and education (Carney, 2020a). Aikenhead (2017) pointed out:

> Many potential culture-based innovations to school mathematics have been sacrificed on the altar of Platonist mathematical content. Platonist content deserves serious attention, to be sure. But its current excessive emphasis has created (a) myths, (b) beliefs in those myths, (c) social power bestowed upon those beliefs, and (d) privileges gained by that social power. Unless broken, this cycle will repeat itself for generations to come. (p. 119)

This cycle maintains the inequitable "social class structures in society" (Jorgensen, 2016, p. 127), and notably the continued colonization of Canada's Indigenous peoples (Aikenhead, 2017).

School mathematics generally serves as a gatekeeper that often illogically limits the future for many high school graduates. Ernest (2019) wrote, "The assessment system in mathematics provides a social obstacle and a filter fabricating a reduction in life chances" (p. 4). Ernest (2019) made an important distinction: "In modern society the *exchange value* of mathematics far outweighs its *use value* [emphasis added]" (p. 5). An exchange value refers to the socio-political power and privileges gained by scoring high marks and taking more mathematics classes. A use value refers to the degree to which the curriculum content is actually used by most adults.

The inequities caused by Mathematics 1.0 function as a filter for social advancement are made possible by the following:

- The very high value that the elite in society holds for old wives' tales about mathematics in general, such as one's intelligence being indicated mostly by mathematics achievement;
- School mathematics' status over other subjects allows mathematics professors and teachers to avoid justifying their curriculum content and to ignore taking responsibility for its negative ethical consequences, such as with the 37% of young adults hating what they were offered at school; and
- The spurious way mathematics educators established their original 19th century public-school curriculum, Mathematics 1.0, in order to deflect any future fundamental changes being made to it. (Its spurious nature was explained in this article's section: The First Public School Curriculum.)

To sustain its high status, mathematicians issue periodic, half-true, propaganda statements; for example, "The supremacist position maintained by many mathematician educators who regard abstract mathematics as the crowning achievement of the human intellect, and school mathematics as the transmission of its products" (Mukhopadhyay & Greer, 2012, p. 860). As a result, politicians do not seem to take responsibility for the negative ethical consequences due to the social inequities resulting from school mathematics (Andrews, 2016, Ernest, 2018) and the harmful sophisticated algorithms created by mathematicians (O'Neil, 2017).

Simply put, the evidence suggests that much of the social power wielded by Platonist mathematics is born out of myths created and propagated by those who desire economic and social control over others living in a profit society (Carney, 2020a). These myths have been so ensconced in Canadian culture that once any child or learner is enculturated into mainstream culture it will take a major crisis to challenge the myths. One such crisis is upon us. Carney (2020b) noted that another worldwide societal transformation is underway: from a profit society to a sustainable society, this time for the purpose of raw human survival. You cannot make a profit if there is no inhabitable planet. We need a parallel fundamental transformation in Grades 7–12 mathematics curricula for provincial and national leaders and their informed citizens who will be involved in shepherding the transition to a sustainable society. Mathematics 2.0 will harmonize with such a need. Mathematics 1.0 will only continue to retard the transformation.

Humanistic Implications for Mathematics 2.0

Mathematics 2.0 is intended for the math-phobic, math-shy, and math-disinterested learners currently studying the pure and applied Platonist mathematics, also known as "in-school mathematics" (Aikenhead, 2021b, pp. 29–30). It is "the antithesis of human activity—mechanical, detached, emotionless, value-free, and morally neutral" (Fyhn et al., 2011, p. 186). Thus, "*out-of-school* mathematics" (Aikenhead, 2021b, pp. 30-31) has been found to shift learners' categorization in Table 1 toward the right (Aikenhead, 2017; Barta et al., 2014; Boaler, 2015). Out-of-school mathematics is a human endeavour because it is based on humans producing, applying, or using mathematics. This will have rigorous academic standards, but they will be appropriate for people who do not see the world so much as a mathematician does. By incorporating a teaching context drawn from a humanities or cross-cultural perspective, there will be academic standards related to a mathematics literacy (Aikenhead 2021a, 2021c; Barta et al, 2014) that Platonists write about in their propaganda.

Interestingly, the Ipsos (2005) poll recorded the respondents' favourite school subjects (margin of error of ± 3.1). Mathematics was 31% compared to the humanities combination (English, History, Social Studies, Arts, and Religion/Philosophy) of 69%. These figures are a confirmation of Card and Payne's (2017) 30% and 70% results, and a clear indication that the humanities would make an excellent context for learning out-of-school mathematics (Aikenhead, 2021c).

Humanistic mathematics (e.g., Ravn & Skovsmose, 2019; Sriraman, 2017) has promise for being one of three themes for Mathematics 2.0. Aikenhead (2021c) and Hall (2021) exemplified the first them by demonstrating what a historical theme in humanistic mathematics looks like. A second theme is "mainstream culture-based mathematics" (Aikenhead, 2021a), which entails the following three aspects of mathematical interactions in adult life:

- Math-in-use in their workplace, community, home, and personal lives, which become contexts for learning mathematics (Barta et al., 2014);
- Platonist math-in-action, which in society refers to mathematics providing the foundation for the technological, medical, industrial, military, economic, and political systems, along with the ethical interrogation of the makers of mathematics, for example, O'Neil's (2017) Weapons of Math Destruction, taboo content in Mathematics 1.0; and
- Culture and nature of Platonist mathematics, for example, being aware of its axiomatic logical thinking that deduced its false façade that claimed to be value-free, non-ideological, non-cultural, purely objective in its use, and certain in its answers, whereas Platonist mathematics has been shown to be value-laden (e.g., truth, rationalism, universalism objectivism, beauty, ethics, purity, certainty, and objectivism), ideological (e.g., quantificational, universalism, objectivism, foundationalism, and rationalism), and cultural (Larvor, 2016): "As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality" (Einstein, 1921).

A third theme for countries with Indigenous citizens is enhancing mathematics with Indigenous mathematizing (Aikenhead, 2017; Meyer & Aikenhead, 2021b; Nicol et al., 2013).

This triad of themes for Mathematics 2.0 affords unlimited connections to Saskatchewan's four curriculum goals: understanding mathematics as a human endeavour, number sense, logical thinking, and spatial sense (Saskatchewan Ministry of Education, 2008, pp. 7–9).

Because of its pluralistic orientation, Mathematics 2.0 will avoid indoctrinating learners into an absolutist philosophy of mathematics. Thus, it will present Platonism in the context of learning how Canadian culture functions with Platonist mathematics. Mathematics 2.0 will tend to avoid hypothetical contextualizations and applications of pure mathematics because both of these widen the relevance gap.

Mathematician Borovik (2017) identified a crisis regarding the credibility of Mathematics 1.0's content and philosophy in the 21st century. In his chapter, he also pointed out a much different crisis for the 23% who favoured mathematics over all other school subjects (Ipsos, 2005). Some of this group's future as professional mathematicians "will be filling an increasingly small number of jobs, which really require mathematical competence (I call them *mathematical makers*)" (p. 309)—the Silicon Valley crew, for example. Everyone else will be "*end users* of technology saturated by mathematics—which however, will remain invisible to them" (Ipsos, 2005, p. 309).

A group of users also work in areas of education, science, technology, engineering, economics, and architecture. Borovik's (2017) prediction that end users in business and industry will need less advanced mathematics has already occurred: for instance, in the banking, investment and airline industries (Hoyles et al., 2001) and in engineering (Edwards, 2010): "The vast majority of scientists, engineers and actuaries only use Excel and eighth grade level mathematics" (p. 19).

For the majority 70% of Grade 12 graduates could focus on "basic numeracy and awareness" (Borovik, 2017, p. 309) of out-of-school mathematics contextualized by the following:

- How people actually use mathematics (Aikenhead, 2021a): "Mathematics becomes best understood by *how it is used*" (Barta et al., 2014, p. 3);
- Analyzing mathematics-related social issues, for which mathematics has offered helpful solutions or has caused an issue (Ernest, 1991; Ernest et al., 2016); and
- Some aspects of the humanities, discussed above.

Today, teachers are forced to work against a growing relevance gap between what learners experience as mathematics in their everyday world, compared to what textbooks try to get learners to superimpose on their world. The relevance gap becomes wider and wider as our digital revolution evolves at exponential rates (Borovik, 2017). If curriculum developers continue to ignore the digital revolution, then both the Ipsos (2005) 37% crisis of adults who "hate" mathematics will grow, and mathematics educators' concerns will worsen.

Fundamental Innovations Already Initiated

What is the Saskatchewan Ministry of Education's (2008) position concerning a humanistic mathematics? One of its four goals is understanding "mathematic as a human endeavour" (p. 9). This certainly invites Saskatchewan mathematics educators to organize innovative projects to move in these culture-based or humanistic directions for Mathematics 2.0.

Three recent projects illustrate what can be accomplished. First, Indigenous "Culture-Based School Mathematics for Reconciliation and Professional Development" (Meyer & Aikenhead, 2021a, 2021b) mentored non-Indigenous rural mathematics teachers to learn a few Indigenous mathematizing activities and then develop a lesson plan that taught Indigenous perspectives to learners as they engaged in these activities. According to Duchscherer et al. (2019), "When a teacher makes a clear connection between the Indigenous mathematizing and an analogous idea in the Western mathematics curriculum, this Western content is generally introduced to students who are already motivated to learn" (p. 4).

Secondly, Saskatchewan's Provincial Education Sector (2021), a consortium of Ministry of Education personnel with 28 Boards of Education, recently justified the integration of Indigenous ways of knowing throughout their website "SaskMATH" based on the curriculum's goal: "Mathematics as a human endeavour." Their project organized about 45 chosen mathematics teachers, school division consultants, Division Directors, and mathematics education researchers to develop a website of evidence-based best practices for teaching number sense in Grades 1 to 12. It integrates Indigenous ways of knowing wherever possible throughout the website.

Thirdly, an emerging project creating six teaching modules, "Culture-Based School Mathematics" (Aikenhead, 2021a, p. 26), was initiated but its classroom research delayed due to COVID-19. At the appropriate age level of learners, each module addresses: math-in-use (i.e., procedural mathematics actually used by employers and employees), math-in-action (i.e., the economic, social and political interactions of mathematics in a community or with society), the culture of Platonist mathematics (e.g., its foundational beliefs, values, ideologies, history, type of reasoning, valid arguments, relationship to music and games, etc.; often called the nature of mathematics), and Indigenous perspectives (e.g., involving Indigenous mathematizing, reconciliation, etc.). All the above includes some contexts for learning analogous conventional curriculum content.

Some may say a culture-based or humanistic renewal of Saskatchewan's school mathematics is not feasible for a majority of teachers and learners in Grades 7–12. An honest reply is that it has already been achieved, for the most part, in Saskatchewan's science program for Grades 1–11 (Aikenhead & Elliot, 2010). If Saskatchewan's school science program can do it, why not Saskatchewan's school mathematics?

Conclusion: Mathematics 2.0 and 1.2

In her chapter, "Morality and Mathematics," Muntersbjorn (2016) asked the fundamental question that underscores this article:

> *Why should students be required to take mathematics courses* [emphasis added]? If so few pupils have a taste or talent for mathematics, why are we obligated to teach mathematics to as many of the next generation as possible? Universal mathematical literacy seems a noble (if naïve) goal of any culture…But whence the normative force behind the claim, "all pupils must learn mathematics"? (p. 387)

This article suggests answers to those probing questions by considering the complexity of the faults in Platonist mathematics education—faults that come with a history embedded in its culture while denying it is cultural. Platonist mathematics interacts with a diversity of learners with its ideologies of universalism and quantification while denying it is ideological. It champions an absolutist philosophy, which it defends with nefariously creative dichotomies (e.g., formal and informal discourses) dressed up in inductive reasoning.

The poet T. S. Eliot (1934) captured the essence of Mathematics 1.0's faults when he wrote, "Where is the wisdom we have lost in knowledge?" (line 15). Platonist mathematics became a hegemonic force acquiring social-political power (Bishop, 1990; Greer & Mukhopadhyay, 2016) with its sophisticated intellectual knowledge, defined similarly in every dictionary. A definition of "mathematics" that best represents Mathematics 2.0 is the version distilled from Bishop's (1988)'s humanistic perspective: "Mathematics is a symbolic technology for building relationships between humans and their social and physical environments" (p. 147). This approach is open to a curriculum's inclusion of wise decision making.

Living in the digital revolution, faced with the crisis of climate change, humanity needs a mathematics education that embraces both knowledge and wisdom. Mathematics 2.0 is a prime candidate. Thus, ministries of education need to develop both Mathematics 2.0 for the 70% math-phobic, math-shy, and math-disinterested learners and an updated Platonist mathematics (i.e., Mathematics 1.2) for the 30% math-interested, math-curious, and math-oriented, with a degree of humanistic enrichment balanced off by removing an equal amount of obsolete content from Mathematics 1.0.

I conclude by discussing some directions to take so Mathematics 2.0 becomes a reality. By understanding the full spectrum of learners' mathematical self-identities and their value clusters (i.e., degrees of separated and connected clusters; Table 1), educators can now improve Grades 7–8 and Grades 9–12 mathematics by the following factors:[5]

- Coordinating the diversity of learners in terms of the degree to which their worldviews, self-identities, and values converge with a mathematician's, from highly discordant to highly harmonious;

- Coordinating the diversity of appropriately relevant mathematics content for learners to come to know from highly humanistic or culture-based school mathematics (identified above as math-in-use, math-in-action, Indigenous mathematizing, and the nature of Platonist mathematics), which targets the 70% of learners to mostly Platonist mathematics and the 30 % of learners to enrichment in Grades 7 to 9 (e.g., math clubs), and precalculus courses enhanced with Mathematics 2.0-like projects in Grades 10–12.
- Supporting teacher professional development programs and/or research projects, province wide, to develop a few prototype teaching units for each of the six grades to generate new units every second year over 10 years.
- Always addressing the elimination of teachers' learned or indoctrinated blind spots, such as not being able to distinguish between out-of-school mathematics and applied mathematics (Aikenhead, 2021b). These blind spots can marginalize Saskatchewan's "mathematics as a human endeavour" goal as well as marginalizing math-disinterested, math-shy, and math-phobic learners, thereby adding to Saskatchewan's social inequities (Jorgensen, 2016).
- Maintaining the curriculum's present three-pathway structure, with an eye to:
    a. Slightly updating The Workplace & Apprenticeship's pathway to meet the realities of their math-in-use as advised by on-sight workers, and exploring examples of Indigenous mathematizing, math-in-action, and the nature of mathematics related to their workplace.
    b. Transforming the Foundation of Mathematics 20 and 30 pathway into something like The Culture of Mathematics in the Real World 10, 20, and 30; giving the goal "mathematics as a human endeavour" greater emphasis while highlighting math-in-use; and deleting from the curriculum an equal amount of "dispensable mathematical baggage from the 19th and 20th centuries"—a description that those who have escaped their indoctrination into Platonism might use.
    c. Slightly modifying Precalculus 10, 20 and 30 by deleting content obsolete in today's digital age, including what is no longer applicable to mathematics, science, architecture, technology, engineering, and medicine, etc.; adopting a few International Baccalaureate topics; and replacing some current content with a few enrichment projects per course related to mathematics as a human endeavour; topics chosen individually or by small groups of collaborating learners.
- Giving special attention to learners in Grade 9 mathematics. Get them to recollect their Grades 7–9 mathematics and its implications for their choice of pathways for Grades 10–12. Use some precalculus situations throughout the course as elective material to add to learners' database for their decision. Let learners choose whether their elective material assessment counts toward their final mark.
- Making learner transfers between the pathways explicitly feasible and highly individualized. Monitor each semester on the social and ancestral equity of the pathways and then implement ways to augment equity, such as providing free tutoring for those in need. The current term "intervention" is fueled by the separated values cluster (Gilligan, 1982) that tend to undermine equity agendas.

- Setting aside the notion that Saskatchewan learners must be assessed by written tests that are based largely on a (a) European type of mathematics curriculum, (b) European genre of composing test questions (e.g., PISA mathematics scores in French Québec verses the rest of Canada's), and (c) the fallacy that those test scores represent the quality of the educational jurisdiction (Andrews, 2016; Sjøberg, 2015; Sjøberg & Jenkins, 2020).
- Beginning negotiations with postsecondary institutions.

Ministries of education should embrace the international economic-based movement to sustainability (Carney, 2020b) as part of renewing its Grades 7–12 mathematics program effectively and urgently. For best results, they should follow the "smart money." Our profit society is slowly metamorphizing into a sustainable society (Carney, 2020b). "As climate risks will ultimately affect every sector of the economy…We won't have a financial system if we don't have a planet" (p. 5). Mark Carney captured today's learners' immediate future. It is an urgent crisis.

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[1] "The key concern here is to alleviate boredom and drudgery for mathphobes and those who suffer from math anxiety" (Greer, 2012, p. 115).

[2] In the spirit of full disclosure, I am a math-oriented person.

[3] The PISA (Program for International Student Assessment project "is owned and governed by member states in the Organization for Economic Cooperation and Development (OECD)" (Sjøberg & Jenkins, 2020, p. 1).

[4] Mark Carney is the former governor of the Bank of Canada and then the Bank of England.

[5] Saskatchewan is typical of many provinces, so it is used here as an example.

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Online Remote Proctoring Software in the Neoliberal Institution: Measurement, Accountability, and Testing Culture

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Abstract

As COVID-19 spread in early 2020, a lockdown was implemented across Canadian provinces and territories, resulting in the shuttering of physical post-secondary campuses. Universities quickly pivoted to remote learning, and faculty members adjusted their instructional and assessment approaches to align with virtual environments. Presumably to aid with this process, a number of institutions acquired licenses to remote online proctoring services. This paper examines the research around online remote proctoring, examining the justification offered for the adoption of online remote proctoring, and contemporary research on assessment practices in higher education. Throughout the paper, I demonstrate a lack of research that speaks to the efficacy of this mode of assessment while also acknowledging shifts in the testing environment, and an increase in student anxiety. I argue that online remote proctoring is not only embedded within neoliberalism and audit culture, but supports a continued reliance on testing culture. It concludes with a discussion of assessment culture, offering some alternative assessment approaches that might disrupt the very need for online remote proctoring.

Keywords: Online remote proctoring, assessment, testing

Online Remote Proctoring Software in the Neoliberal Institution: Measurement, Accountability, and Testing Culture

As COVID-19 spread in early 2020, a lockdown was implemented across Canadian provinces and territories, resulting in the shuttering of physical post-secondary campuses. Universities quickly pivoted to remote learning, and faculty members adjusted their instructional and assessment approaches to align with virtual environments. To aid with this process, a number of institutions acquired licenses to remote online proctoring services. Remote online proctoring functions by mimicking in-person proctoring, "(a) verify[ing] test taker identity, (b) observ[ing] test taker behavior to minimize cheating, and (c) secur[ing] test content" (Langenfeld, 2020, p. 24). The goal of online remote proctoring is to reduce instances of academic dishonesty through surveillance.

Several concerns have been raised about remote online proctoring, including the invasiveness of the software (Chin, 2020; Hubler, 2020), lack of transparency regarding data collection and management (Haq et al., 2015; Morrison & Heilweil, 2020), and the potential for algorithmic bias (Hu, 2020). Demonstrating their opposition to the software, students across the country also petitioned to halt its use (Sandlin, 2020; Walsh, 2020). I share these apprehensions while also taking issue with assessment practices that create space for more corporate involvement in higher education (Hébert, 2015, 2017). Though it has been almost 10 years since I have assigned a quiz, test, or final exam in any of the classes I teach, I recognize that the needs of my colleagues, especially those in STEM subject areas, might differ from my own. Though I have never used remote online proctoring, I set out, in writing this paper, to better understand why one might.

In this article, I argue that the adoption of online remote proctoring represents post-secondary institutions' commitments to audit culture and continued reliance on testing culture as grounding for assessment practices. I begin with cheating and online remote proctoring, focusing specifically on a lack of research that demonstrates the efficacy of this mode of assessment, coupled with the impact of shifts in the testing environment, and increased student anxiety. In the second section, I offer an overview of some of the reasons provided in adopting online remote proctoring, linking them to neoliberalism and audit culture. And in the last section, I turn to contemporary research on assessment practices in higher education, advocating for an institutional shift to an assessment culture that prioritizes students and their learning.

Online Proctoring, Cheating, and Student Mental Health

Cheating, typically considered one element of academic dishonesty, involves using unauthorized materials or engaging in unauthorized practices as a means of gaining an advantage, resulting, ideally, in enhanced performance on a test (King et al., 2009; Ranger et al., 2020). In face-to-face environments, a number of measures have been employed to curb cheating during testing. Verifying students' identities against university- or government-issued identification cards is intended to address identity-based cheating, or cheating that occurs when someone other than the registered student completes course work. For access-based cheating—accessing unsanctioned materials, such as notes or other versions of the same test or exam, and the internet, and engaging in unapproved opportunities for collaboration—facilitators closely monitor students while they complete tests, distribute different versions of the test, and limit testing time (Owens, 2015).

In online environments, measures to address access-based cheating have included algorithmic test banks, time limits and windows for completion, and preventing test-takers from returning to completed test pages (Holden et al., 2021), and for identity-based cheating, academic integrity or honour codes, which require students confirm that they will uphold the university's

academic integrity policy (Baron & Crooks, 2005; Tatum et al., 2018). Though honour codes depend upon adherence to ethical conduct that students inclined to cheat may simply disregard, some research has suggested that cheating can be minimized when codes are effectively written, regularly communicated to students, and enforced (Gurung et al., 2012; McCabe et al., 2001). Concerned that these measures do not go far enough to limit cheating online, online remote proctoring was created, which mirrors some elements of the face-to-face testing environment by validating student IDs, establishing time frames for tests, and providing proctors who either monitor students live or later review video recorded footage of students' test taking.

Two factors quite obviously complicate online remote proctoring, both linked to a decrease in control over the testing environment. First, as students take tests from a location of their choosing, proctors both have little command over materials accessed and are unable to view student actions beyond what is visible in the camera screen. These concerns are addressed by adding measures of surveillance, including, most commonly, preventing students from switching between windows during test taking, and closely monitoring their eye, mouth, and hand movements. Second, unlike in face-to-face testing where the proctor is responsible for creating and maintaining the rather stable testing environment, here, responsibility shifts to the student to produce "minimally viable test conditions" (Michel, 2020, p. 29). To complete a test using Proctortrack, for example, students must be in a well-lit and private area, far from potential sources of noise. Students are instructed to remain in "the middle of the webcam's view," ensure that their face is visible during the assessment, and "sit upright in an area where other people won't talk and cannot pass behind [them]" (Verificient Technologies, 2021). Similarly, standard test rules for the platform Examity include "alone in room," "clear desk and area," "no phones or headphones," "no leaving seat" "no talking" and "the proctor must be able to see you for the duration of the test" (Examity, 2019). And for ProctorU, the list of what is prohibited during the exam includes "talking aloud," "being out of camera view," meaning that students' "face, chin to forehead, needs to be in the camera view at all times," having anyone speak directly to the test taker, and any "additional noises," as well as "looking off-screen" (ProctorU, 2020). These policies appear rather incompatible with an unpredictable home environment, where one might need to tend to a pet or knock at the door, and particularly punitive during a global pandemic when schooling and childcare may not always be available. They also are likely to advantage privileged students, who may be more readily able to replicate viable test conditions (e.g. having access to a quiet and solitary place from which to complete exams). And, much like other forms of technology, can reinforce racial bias, with some users reporting that the facial recognition component of online remote proctoring has had difficulties identifying users with darker skin (Swauger, 2020a, 2020b). In many respects, these concerns undercut the argument offered by some university administrators that online remote proctoring helps ensure that remote exams are fair and equitable (Selwyn et al., 2021).

Online remote proctoring is still in its infancy, but to date, research around its effectiveness has been mixed. Some research has shown little difference between non-proctored and proctored online exam scores (Hylton et al., 2016), proctored in person and proctored remote exam scores (Lewis, 2020; Stack, 2015), and in person proctored and online non-proctored exam scores (Hollister & Berenson, 2009). Recent research focusing exclusively on online environments has demonstrated a decrease in test scores when online exams are not proctored compared to those that are remotely proctored, which might suggest to some that cheating is occurring in non-proctored testing environments (Goedl & Malla, 2020; Reisenwitz, 2020). It is also important to note that this research relies almost exclusively on the comparison of scores between tests that were

completed through online remote proctoring and those that relied upon another mode. One might raise concerns about this methodology, specifically, the feasibility of isolating cheating as the cause of differences in scores between modes of delivery, coupled with the potential impact of vastly different testing environments on student performance. Fask et al. (2014) identified a number of issues with this approach, speaking specifically of comparing online and in-person proctored exams:

> The attempt to detect student cheating on online versus proctored exams has been handicapped by the confounding relationships…between student performance and possible differences in the two environments with respect to the level of distractions, student comfort, technical problems related to the use of computer technology and the opportunity to have the content of exam questions clarified. (p. 111)

Other research has called attention to the potential impact of stress on online remote proctored test scores. In a study comparing proctored and non-proctored online exam scores, Alessio et al. (2017) found that students who took a proctored exam that was on lockdown (with students unable to access certain resources on the internet) scored higher than students who completed proctored exams with a video monitor, raising questions about the impact of video surveillance on test taking. Karim et al. (2014) shared concerns about video surveillance during testing, acknowledging that while it "may be marginally effective at decreasing cheating. …effects may be small and the technology may be viewed as more invasive and thus raise feelings of pressure and tension" (p. 566). Similarly, Woldeab and Brothen's (2019) research demonstrated that anxiety had an effect on online proctored test scores, with students with diagnosed anxiety scoring lower on exams overall, but even lower if these exams were proctored remotely online. Wuthisatian (2020) also found that students scored lower on online proctored than in-person proctored exams, citing not only test anxiety, but also lack of support and technological issues.

The potential for technological issues to arise and interfere with the completion of a test has also been reported as a source of stress around computer-based testing (Medina & Castleberry, 2016). Research has indicated that the most commonly reported challenges for students, specifically those who have used and were unsatisfied with online remote proctoring, were technical issues and a resultant loss of testing time (Okada et al., 2019). Students have also identified that meeting physical test conditions (Milone et al., 2017) and more general lack of familiarity with and control during online remote proctoring (Michel, 2020) were causes of concern. Chen et al.'s (2021) student survey of online learning environments highlighted a general sense of student dis-ease around online proctoring. As they noted, "Our students express enormous concern regarding online proctoring technologies….The themes of these student responses include stress and anxiety, privacy and trust, effectiveness, and financial burdens" (Sect. 4, para. 4). Given the nascence of online proctoring, it is possible that student anxiety levels will decrease as they gain familiarity with online remote proctoring platforms (J. W. Lee, 2020). But as Eaton and Turner (2020) emphasized, there is,

> an urgent need to rigorously explore what relationship, if any, exists between e-proctoring services and students' mental health. The proliferation of e-proctoring services has escalated rapidly on a worldwide scale during the COVID-19 crisis, with little empirical evidence about what impact such services, and in particular, the phenomenon of remote surveillance under testing conditions, might be having on students' emotional or physical well-being. (p. 38)

In the next section, I shift to common justifications provided for the adoption of online proctoring software, focusing on institutional integrity and the reliability and validity of assessments.

Audit Culture, Institutional Integrity, and Psychometric Assessments

Online proctoring is typically offered as a response to two central concerns around assessment. The first is maintaining the integrity of both the institution and the degrees it grants, securing public confidence in the quality of education universities provide (Aaron & Roche, 2013; Milliron & Sandoe, 2007). Following this line of reasoning, online remote proctoring instills confidence in a university's ability to safeguard against academic dishonesty in the maintenance of academic integrity.

At a practical level, Canadian universities are required to adhere to certain guidelines about academic integrity in order to become and remain degree granting institutions. Though no pan-Canadian policy on academic integrity exists, in 2007, the Council of Ministers of Education established a Canadian Degree Qualifications Framework (DQF), stipulating that Bachelor's degrees can be granted to students who have engaged in "behaviour consistent with academic integrity" (Council of Ministers of Education, 2007). A number of higher education quality assurance boards (Universities Canada, 2021) have also been established throughout the country, either by individual provinces or external agencies, which audit higher education programs for their alignment with quality assurance standards. A few of these councils have adapted the DQF (e.g. Maritime Provinces Higher Education Commission, n.d.; Ontario Universities Council on Quality Assurance, 2021; Saskatchewan Higher Education Quality Assurance, 2014), while others have developed their own frameworks, which include an element of academic integrity (Campus Alberta Quality Council, 2005). Much like face-to-face proctoring, then, online remote proctoring serves as a demonstrable measure taken by universities to prevent cheating and thus enable them to abide by the academic integrity component of quality assurance frameworks.

Audits of Canadian public universities began in the 1990s when Ontario's auditor general took an interest in "determin[ing] whether funds [in post-secondary institutions] were being appropriately used and whether the province was receiving value for expenditure" (Baker & Miosi, 2010, p. 33). Coupled with cuts in public finding and the privatization of many facets of the post-secondary system, governments looked to eliminate so-called redundancies and streamline services, all in the name of cost-effectiveness, accountability, and transparency (Davidson-Harden & Majhanovich, 2006). Taken together, public cuts and auditing represent "'roll back' (i.e. deregulation) and 'roll out' (i.e. reregulation) processes that structure behavior utilizing varying forms of surveillance, regulation, and competition" (Aikens & Hargis, 2019, p. 24). Under the "academic capitalism" (Schulze-Cleven & Olson, 2017) of neoliberalism, university education becomes a commodity to be bought and sold within an imposed scarcity model; universities compete both for the business of students, now consumers in a free marketplace, and sponsorship of corporations, now funding bodies used to address a capital shortages. Within such systems, reputation is important, including a university's placement in national and international university ranking systems (Lynch, 2015; OECD, 2007). Beyond ensuring institutional integrity then, considering the commodification of higher education, online remote proctoring might be perceived as a defense against the devaluing of particular university degrees in the marketplace, with cheating potentially defacing the university "brand."

The second concern online remote proctoring is said to address is safeguarding the reliability and validity of student test scores (Draaijer et al., 2017; Rios & Liu, 2017; Weiner & Hurtz, 2017).

In psychometrics, reliability centers on test design; a reliable test is one that produces scores that are "precise and free from measurement error" (Mead, 2019). Reliable tests are also consistent over time (i.e. a student should be able to receive the same score if administered at two different points in time) and across contexts (e.g. regardless of whether it is administered online or in person) (Arnold, 2012). Relatedly, validity refers to the "capacity of a test to measure what it is purported to measure" (Truijens et al., 2019, para. 1). This typically includes *construct validity*, or the test's ability to measure a student's performance in that area as well as *content validity*, the test's alignment with the subject it is intended to assess, *face validity*, the test appearing to measure what it purports to measure, and *convergent* and *predictive validity*, being able to build on and speak to past and future test results respectively (Darling-Hammond et al., 2013; Soh, 2016). Applied to online remote proctored tests, scores are said to be unreliable if too much variation exists between tests completed in proctored and non-proctored environments and invalid if students cheat, insofar as what is demonstrated or "measured" is not understanding and/or mastery of course content, at least not according to how the test was designed.

The language of reliability and validity, however, is largely misapplied to online remote proctoring employed in post-secondary educational contexts to support classroom-based assessment. In face-to-face environments many faculty do not adhere to psychometric principles, instead designing tests by "choosing questions from a publisher's text bank with very little, if any, background in test theory and design" (Maxwell & Gleason, 2019, p. 216); this might then, for some, raise questions about the reliability and validity of post-secondary assessments as a whole. But more importantly, devoid of a standardized measurement system, cross-contextual analyses of student test scores make little sense when students are not only assessed differently, but when variability exists between instruction and classroom environments (Markus & Borsboom, 2013; Moss, 2003). Under audit culture, a focus on measurement also often signals a desire to quantify student learning, with test scores taken up as a means for both comparing students, faculty, courses, and programs, and holding them accountable (Williamson & Piattoeva, 2019). "Assessment and evaluation," Saunders and Blanco Ramirez (2017) explained,

> increasingly involve technologies that commensurate all teaching without regard to content into a single metric, which take the curricular form of course evaluations, student exam scores, ratings and other static quantitative expressions of the necessarily creative and dynamic educational processes. (p. 397)

At the present time at least, faculty members' academic freedom guarantees incommensurability across contexts, as faculty have the right to use their professional judgment in creating, administering, and grading subject-specific assessments within their classes (Canadian Association of University Teachers, 2015).

Psychometric approaches to assessment that value measurement are a far cry from so-called best practices in assessment in higher education (Pereira et al., 2016). In the next section, I discuss testing and assessment culture and offer a number of alternative forms of assessment to tests that might be utilized in STEM classes.

From Testing to Assessment Culture in Higher Education

Within a metrics-based culture, assessment is often reduced to testing, treated as a "discrete activity" divorced from teaching and learning. Under testing culture, content is delivered by faculty; learning is measured through high-stakes tests and exams completed in a solitary manner; and assessments are constructed and scored exclusively by professors, who may also view

assessment as a form of accountability (Birenbaum, 2016; Moss, 2003). In contrast, assessment culture is student-centered, aimed at the development of metacognition around learning processes (Veenman et al., 2006). Learning is conceptualized as an ongoing process, a "constructive, cumulative, self-regulated, goal-directed, situated, collaborative and individually different process of meaning construction and knowledge building" (Hoidn, 2017, p. 3). Concordantly, the role of faculty shifts under assessment culture from administrator to guide or facilitator. Under this model, faculty offer multiple opportunities for self- and peer-assessment (Adachi et al., 2018; Ashenafi, 2017), while engaging in formative assessment and offering feedback (Hamp-Lyons, 2007).

Though definitions vary, formative assessment essentially involves producing targeted information about student performance in order to direct both learning and instruction (Yorke, 2003). Informal formative assessments might include observations and conversations with students, and more formal approaches, any type of scaffolding toward a summative task, such as commenting on a draft or allowing students to revise and resubmit an assignment based on feedback provided. Feedback is also considered an integral part of the formative process, but only when used appropriately. Within a testing culture, feedback might be employed exclusively to justify a grade awarded, an instructor-driven practice rather than a dialogue between faculty and students (Nicol, 2010). In contrast, under assessment culture, feedback is carried forward and used to inform student learning in the context of the course (often referred to as "feedforward") (Reimann et al., 2019). Feedback provides students with rich, "high-quality" and timely information (Nicol & MacFarlane-Dick, 2006) that can be used to inform next steps. Nicol and Milligan (2006), writing specifically about feedback-rich online environments, outline a number of strategies that include providing opportunities for students to ask questions, gain clarity on what is being asked of them (e.g. using exemplars), and complete practice assessments that align with summative tasks.

This shift from testing to assessment culture, in many respects, requires not only a massive overhaul of assessment practices in higher education, but also a decreased reliance on traditional assessment tasks, like summative tests and exams, that tend to necessitate proctoring. In their place, faculty might turn to more authentic assessment tasks that require knowledge application in a new context (e.g. case studies) or link assessment to the "real-world" outside of the classroom (e.g. a semester-long multi-disciplinary project) (Frey et al., 2012; Gikandi et al., 2011). Authentic assessments are sometimes discussed alongside performance assessments (Barrett & Moore, 2011; Cummings et al., 2008), which ask students to demonstrate their understanding by performing a task (e.g. video recording the creation of a small machine for a robotics class) and project-based or problem-based learning wherein students complete a rather extensive project or solve a complicated problem (e.g. students solve the university's garbage disposal problem in an environmental sciences course) (Barrett & Moore, 2011; J. S. Lee et al., 2014).

Examples of authentic assessment, currently in use in a wide range of STEM subjects, abound. In a statistics course, students locate examples of "real data" in the world, analyze it, and present findings to the class (Onquegbuzie & Leech, 2003). Chemistry students create concept maps based on their laboratory experience (Kaya, 2008); astronomy students construct a virtual solar system (Barab et al., 2000); and physics students produce physical representations of their learning (Boud, 2009). In any subject area, final exams might be replaced by oral exams or video responses where students demonstrate understanding by responding to questions—a specific prompt that asks them to explain their thinking around a concept, or a more open-ended query, requiring students to articulate what they have learned throughout the course—either individually

or in conversation with another student. Faculty who may be a bit reluctant to move away from traditional forms of assessment, or who might need some time to make the requisite shift to assessment culture, can consider collaborative exams, where students work with others to respond to questions (either initially or as part of a two-step process, in the latter instance, first completing the exam individually and later with peers) (Efu, 2019), or exam wrappers, reflective questions that require students think through the relationship between exam preparation and performance based on feedback, to foster metacognition and support self-assessment (Lovett, 2013). Here, exams are framed as learning tools rather than strictly as means for demonstrating mastery. All of these assessments methods can quite easily be supported in remote/virtual environments with the assistance of video conferencing and collaborative digital platforms.

More broadly, this approach to assessment represents a rather extensive re-imagining of instruction in higher education classrooms. As assessment is integrally linked to and informed by instruction, the traditional sage on the stage approach to content delivery is, in many ways, antithetical to assessment culture, as it upholds traditional power structures while disempowering students. When student learning becomes the focus of the course, this shift can have a fundamental impact on how content is conceptualized from the perspective of faculty. Wright (2011), drawing on Weimer's (2002) work, explained that

> the need to "cover" the content of the course has lead…to a neglect of ensuring that the course objectives are being met. It has also led to erroneously equating a good course with a rigorous course, rather than a course in which students learn. (p. 93)

Embracing student-centered classrooms might necessitate re-thinking how class time is spent, leaning into active learning (Matsushita, 2018) and flipped classroom models of instruction (Reidsema et al., 2017), where students come to class to work through ideas and concepts, engage in analysis and problem solving, and have small-group discussions with peers, rather than sitting in dark lecture halls being "filled" with knowledge. In online environments, this approach might involve synchronous sessions and/or asynchronous contexts where faculty and students are provided space to do the work of learning together.

In shifting to a student-centered assessment culture that prioritizes learning, online remote proctoring software becomes largely unnecessary, both practically and conceptually. Cheating is largely confined to testing-based culture, where assessment takes place outside of the learning process and individual students are limited in the materials they can have access to during knowledge-retention tasks. When no discrete testing period exists, access-based cheating has limited application. Similarly, identity-based cheating becomes increasingly difficult in classrooms where faculty and tutorial leaders have developed relationships with students, and where assessment is a largely personal process. For example, as a faculty member, I get to know my students at the beginning of the course when they introduce themselves on Flipgrid and again through weekly synchronous discussions. Students also lead live class discussions of the readings and complete a short argumentative "paper" via video. Given such opportunities, it would be difficult for students to pose as someone else as they complete assessment tasks. Conceptually, the very language used to describe the functioning of online remote proctoring software becomes inappropriate. When assessment is student-centered, students need not be monitored as they complete assessments, but rather, supported. The Latin verb *assidere*, from which assessment derives its meaning, means to sit beside, suggestive of a collaborative rather than authoritative approach.

Final Thoughts and Steps Forward

At face value, online remote proctoring might appear to be a rather innocuous solution to a practical problem exacerbated by a rapid shift to remote learning during a global pandemic: How do faculty ensure that students are not cheating while taking remote tests/exams? Though research around the usefulness of online remote proctoring is largely inconclusive, relying on comparisons between drastically different testing conditions, the costs of online remote proctoring as a widespread experiment, of sorts, are being offloaded to students, both figuratively and, in some instances, literally. As has been argued in this paper, some students have reported that online remote proctoring has negatively impacted their mental health, owing to surveillance measures and the requirement to create and maintain an adequate testing environment that remains largely beyond students' control. Financially, at a number of institutions, students are being charged approximately $30 to write each exam facilitated through one of these remote proctoring companies (Athabasca University, 2021; University of Alberta, 2021). At an institutional level, universities would do well to take pause, making data-informed decisions centered on the efficacy and effects of online remote proctoring.

In many ways, online remote proctoring has been offered as a solution to a problem that we have created, mainly, a continued reliance on poorly constructed assessments that tell us little about what students understand and that are far removed from the teaching and learning process. As I have aimed to demonstrate in this article, research around best practices for assessment in higher education has pivoted sharply away from the types of tests and exams that online remote proctoring might support. At an institutional level, rather than investing in simple yet costly solutions to address cheating, universities might finance centers for teaching and learning, led by pedagogical experts. At the University of Michigan-Dearborn, for example, after making a collective decision not to use online remote proctoring, the administration invested instead in instructional designers to aid faculty in the creation of authentic, or "people-centered," assessments for their remote classes (Silverman et al., 2021). Though faculty are highly valued subject-area specialists, by and large, most receive little to no training around assessment and instruction (Blouin & Moss, 2015). Many need support to cultivate assessment literacy, deepening their understanding of assessment practices and the principles that underlie them (Deluca & Klinger, 2010). Devoid of any guidance on how to create a learner-centered assessment environment, well-intentioned faculty may continue to design assessments that lean into testing culture.

With cuts to higher education funding in provinces like Alberta, coupled with the implementation of performance-based funding models in Ontario, Alberta, and soon Manitoba, and uncertainty about the long-term impacts of COVID-19 on higher education, it is likely that faculty will face increasing pressure in the coming years to do more with less. With growing class sizes, myriad demands on faculty time, and a rise in reliance on contingent faculty, multiple-choice and short answer question exams that are invigilated through online remote proctoring may, for many, be the most efficient way to attain information about what students know. But at what and whose expense? Continued dependence on tools and technologies that support neoliberalism and the facilitation of audit culture within post-secondary institutions can result in a sort of complacency with reform. Shore (2008) argued that audit culture is particularly insidious in the way that it shapes subjectivities, acknowledging the "subtle and seductive manner in which managerial concepts and terminologies have become integrated into the everyday language of academia" (p. 283). One means of explicit resistance is re-affirming our commitment to universities as spaces for thoughtful scholarship, the exchange of ideas, and pursuit of knowledge,

while also being careful not to romanticize the halcyon days of higher education that have traditionally valorized physically and emotionally taxing forms of testing as gatekeeping practices and rites of passage. Viewing students as learners, and not consumers, at the center of this process, might be a good place to start.

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Investigating the Reading Strategies Used by French Immersion Pupils as They Engage With Dual-Language Children's Books: A Multiple Case Study

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Abstract

As dual-language children's books are becoming increasingly popular in language and literacy education, scholars are starting to zero in on how students construct meaning as they read these books. In this paper, in light of the previously mentioned body of literature, we present a qualitative study focusing on the reading strategies that three Grade 3 French immersion pupils schooled in Saskatchewan deployed when they read two types of dual-language books: translated, where the entire text appears in both English and French, and integrated, where passages in French organically complete those in English without providing the exact same information. This multiple case study highlights three distinct reading profiles, and shows how monolingual and cross-linguistic reading strategies can be used by the same student as they read a dual-language book. It also shows that some students were able to adapt their reading strategies as they engaged with different types of dual-language books, whereas others more frequently utilized the same strategies.

Keywords: dual-language children's books, reading strategies, French immersion

Résumé

Alors que les livres bilingues deviennent de plus en plus populaires en didactique des langues, la recherche commence à s'intéresser aux comportements cognitifs de l'élève qui s'engage dans la lecture de ces œuvres. Dans cet article, à la lumière de ces études, nous relatons les résultats d'une recherche qualitative visant à décrire les stratégies de lecture que trois élèves de 3e année scolarisés en Saskatchewan en immersion française déploient lorsqu'ils lisent deux types de livres bilingues : le livre traduit, dans lequel tout le texte apparait en français et en anglais, et le livre intégré, dans lequel le texte en français complète celui en anglais, sans toutefois offrir au lecteur la même information. Cette étude de cas multiple relève donc trois profils distincts de lecteur et, par son entremise, nous montrons comment des stratégies de lecture monolingues et translinguistiques peuvent être utilisées par un même élève lorsqu'il lit un livre bilingue. Nous révélons en outre que certains élèves sont à même d'adapter leurs stratégies de lecture selon le type de livre bilingue lu, tandis que d'autres font fréquemment usage des mêmes stratégies.

Mots-clés : livres bilingues, stratégies de lecture, immersion française

Investigating the Reading Strategies Used by French Immersion Pupils as They Engage With Dual-Language Children's Books: A Multiple Case Study

Reading is a fundamental component of education systems. Through reading instruction, students not only acquire the skills and attitudes to make meaning out of text, they also develop the capacity to construct knowledge related to literacy and other disciplines. In French immersion programming, pupils simultaneously learn how to read in both French and English, and the abilities they develop transfer from one language to the other. As this program is becoming increasingly popular throughout Canada, scholars have started to zero in on the acquisition of reading skills by French immersion students, and have looked to identify teaching methods and approaches that reflect their characteristics. In this perspective, for this paper, we aim to explore French immersion students' use of reading strategies while they read a type of text that is gaining traction in language and literacy education research: dual-language books.

Theoretical Framework and Literature Review

Research on reading acquisition has notably highlighted that dynamic thinking—active and conscious decision-making on how to effectively build meaning from a particular text—is a quality of good reading (Matheson & MacCormack, 2021; Paris & Jacobs, 1984). It should, therefore, come as no surprise that such dynamic thinking is recognized as being effective in both monolingual and bilingual reading contexts. In fact, readers who actively use their first language (L1) as a tool for making sense of text in their second language (L2) usually gain more success in reading (Cisco & Padrón, 2012; Jiménez et al., 1996). In other words, readers who acknowledge that cognitive transfers between L1 and L2 provide them with powerful opportunities to make meaning out of text can rely on a wider variety of skills and knowledge to do so.

Whereas research in immersion is starting to recognize that we should teach for transfer (Cummins, 2008), there seems to be a culture of monolingualism that prevails in French immersion contexts (Cormier, 2018). To make sure that students can benefit from the program, teachers seem to emphasize and prioritize a complete exposure to the students' second language. If a predominately francophone environment remains one of the underlying traits of French immersion classrooms, Swain and Lapkin (2013) contend that teachers can draw upon their students' knowledge of English to enhance their linguistic repertoire and teach them how to strategically use it when they are learning French. Ballinger (2013), through the implementation of a biliteracy project in French immersion, further noted that students who took part in this biliteracy initiative were able to reciprocally employ strategies that could be used in both English and French as they were completing different language tasks.

This body of literature encouraged us to consider the resources that teachers can utilize in order to support students as they transfer their knowledge and skills from one language to the other in French immersion contexts. One promising approach for L2 learning using the learner's L1 is through the use of dual-language children's books. These books, which contain different languages, can therefore allow for active and conscious decision making about how to use one language for reading and learning in the other (Armand et al., 2016; Simoncini et al., 2019). While some research has begun to examine how readers engage with dual-language texts (e.g., Sneddon, 2009), Thibeault and Matheson (2020) identified a paucity of studies focused more specifically on French immersion.

Second Language Reading

Reading comprehension is built through the use of goal-oriented cognitive or physical actions focused on decoding text and constructing meaning—these actions, which represent a fundamental part of the dynamic thinking mentioned in the previous section, are known as reading strategies (Aydinbek, 2021; Turcotte et al., 2015). Research on reading strategies notably distinguishes between effective and ineffective reading behaviours; good readers would use reading strategies both more often and more effectively than poor readers (Anastasiou & Griva, 2009; Lau, 2006). It is noteworthy, moreover, that effective readers make adjustments to their application of strategies in response to the demands of the text (Mokhtari & Sheorey, 2002). This information also reflects the findings of researchers who focused on second language readers. These scholars, moreover, have highlighted the role of the languages known by the reader as they engage in a second language reading task. Effective bilingual readers would therefore shift among their L1 and L2, translating from one language to the other, and using specific features of the L2 text to signal specific strategy use, such as drawing on cognate vocabulary (Alsheikh, 2011; Jiménez et al., 1996).

In the specific context of French immersion, Bourgoin (2015) found that elementary-aged French immersion students that were effective readers transferred strategies across their L1 and L2. In other words, students who understand that certain strategies (e.g., predicting, rereading) can be used in both French and English would tend to be more effective readers. Frid (2018) further showed that French immersion readers deployed different types of strategies when they read an English or a French text. In French, they more frequently recruit text-based strategies such as necessary inferencing and summarizing. On the other hand, strategies such as predicting and references to background knowledge, which may enable the student to consolidate the text to memory, were utilized more often in English.

Research focusing on the reading strategies deployed by French immersion learners thus shows that efficient readers transfer strategies from one language to the other as they engage in a reading task and that the same reader may use a different set of strategies depending on the language in which the text is written. In light of this, we can wonder whether the use of dual-language books can allow the reader to use their entire repertoire of strategies as they read the text and, more broadly, whether the presence of two languages in the book can provide opportunities for them to easily make cross-linguistic connections when they read.

Dual-Language Books

Dual-language books are text in which two languages cohabit to a certain degree, and both languages are intended to be read simultaneously by the reader. Perregaux (2009), alongside Ernst-Slavit and Mulhern (2003), also distinguished between different types of dual-language texts. One type, which we refer to as a "translated text," includes equal representation of both languages throughout the entire text. Alternatively, a type we refer to as "integrated texts" contains both languages, though not as equivalent passages. These passages may work together to forward the text narrative in an embedded and organic way, such as with two characters that speak different languages.

Dual-language books are increasingly being examined by researchers due to their potential for leveraging skills in one language in order to scaffold learning and reading in the other (Simoncini et al., 2019; Taylor et al., 2008). Scholars have praised these texts for their potential for legitimizing cultural and linguistic diversity, and constructing a sense of community

(Fleuret & Sabatier, 2019; Moore & Sabatier, 2014), let alone the literacy benefits related to vocabulary development (Gosselin-Lavoie, 2016; Read et al., 2021), metalinguistic awareness (Robertson, 2006; Thibeault & Quevillon-Lacasse, 2019), and graphophemic knowledge (Naqvi et al., 2012).

Sneddon (2009) appears to have been one of the first authors to examine reading strategy use specifically with dual-language texts; according to her findings, the strategies that helped readers the most with constructing meaning varied according to their language background and competence with the languages at play, as well as how closely related the languages in the book were on a linguistic level. More recently, Domke (2019) described the reading strategies that Grade 3 and Grade 5 bilingual Spanish-English students schooled in the United States used as they read a translated text. She focused on the strategies used to translate words and retell passages. Results show that younger students used strategies which tended to focus on text features (e.g., position of words on the page), while older students more frequently used strategies that are connected to the languages they knew (e.g., grammatical inference).

In our previous research (Thibeault & Matheson, 2020), we also documented the cross-linguistic strategy use of elementary-aged French immersion students as they read dual-language texts. Cross-linguistic strategies are behaviours that rely on the interaction of the languages found in the book, unlike their monolingual counterparts, which rely exclusively on one language. We identified that readers collectively used equivalent passages in one language to assist with passages in the other, used potential cognates to indicate what a particular word might mean, and used context within one language to assist with meaning construction in another language. Some readers also identified structural features of the dual-language text in order to determine how they should read it; these students determined whether or not French and English passages were direct translations of each other, or altogether separate passages that worked together to tell the story. We further discovered that the use of these cross-linguistic strategies varied for some participants according to what type of dual-language text they were reading. Some of our participants did not adjust their reading strategies when reading the integrated text—they would, for example, look for a direct translation and, as a result, experience comprehension gaps as they read.

Despite the identified value of using dual-language texts as educational tools, there is still much to learn about how bilingual children engage with dual-language books. While we are beginning to understand the repertoire of strategies that students use while reading (Domke, 2019; Sneddon, 2009), and with particular types of text (Thibeault & Matheson, 2020), we need to further examine how these strategies are being used with dual-language children's books, specifically in French immersion contexts. In this paper, we therefore aim to build on our previous work, which focused exclusively on cross-linguistic strategies, to examine how elementary-aged French immersion students use reading strategies—both monolingual and cross-linguistic. To do so, we will also focus on two types of dual-language books: translated and integrated. More specifically, we wish to answer the following two questions:

1. What are the reading strategies that elementary students in French immersion use while reading different types of dual-language French/English children's books (i.e., translated and integrated texts)?
2. How do these students use reading strategies when they engage with each type of dual-language children's book (i.e., translated and integrated texts)?

Methodology

In order to thoroughly describe the strategies that elementary students used when they read two types of dual-language books, we opted for an exploratory and descriptive multiple case study approach (Duff, 2008). The initial study was composed of 16 Grade 3 and 4 students who were schooled in a Saskatchewan city centre in two different split classrooms. These classrooms were located in two schools within relatively affluent neighborhoods. Students predominantly spoke English with their parents and siblings, but some of them declared French and Urdu as languages used at home.

From the larger sample, we identified three students in Grade 3—Kaya, Maria, and Karly—as rich cases. As part of a larger study focused on understanding the strategies, thoughts, and behaviours of elementary-aged French Immersion students as they read dual-language children's books (Thibeault & Matheson, 2020), these cases were selected because the students, through data collection, provided clear insight into their varied strategy use and reading behaviours, as well as their intentions. As can be seen in the results section, these three participants also obtained different scores at the comprehension tests they had to complete after reading the integrated and translated dual-language book.

Figure 1

Cover of *Enchantée!/Pleased to meet you!* (Brunelle & Tondino, 2017)

Data collection took place during class time; participants were met individually by a member of the research team in a meeting room near their classroom. They were asked to read passages of two books for this study: one translated dual-language book, the other integrated. The translated text style used in this research is characterized by parallel French and English text; the story is told in both languages word for word, and our participants read this text first. We chose a book entitled *Enchantée! Pleased to Meet You!* (Brunelle & Tondino, 2017; see Figures 1 and 2), because it was the appropriate reading level for the participants. In this particular book, the French text appears in pink on the left side of the page above the same text in English, and an image always appears on the right page. The story depicted the relationship of a pet Chihuahua named Soso and a mouse named Frieda. Contrastingly, the integrated text style is characterized by non-equivalent French and English text; each language is used to tell a different part of the story, and our participants read this text second. Our participants read *Chez Betty & Cat at Home* (Jacobs & Duvernois, 2016; see Figure 3), again selected for its age-appropriateness. Both the French text and the English text appear on the same page again, and images accompany each page of text. The story focuses on the coexistence of an English-

speaking cat named Cat and a French-speaking dog named Betty, who each tell the same story using their own unique perspective of the events.

Figure 2

Passage of *Enchantée!/Pleased to meet you!* (Brunelle & Tondino, 2017)

Figure 3

Cover and passage of *Chez Betty & Cat at home* (Jacobs & Duvernois, 2016)

In each case, participants read aloud from parts of both books. We selected the first eight pages of each text in order for participants to provide us with an example of their reading of each text type, and to allow them to begin to follow the emerging story. After every page, we asked each participant to share with us what they had done to make sense of the text, and provided a clarifying prompt where needed to understand what students had done if there were parts of the text that they did not understand. Following each text, we asked readers to complete a set of multiple-choice questions. Each set included a mix of two types of questions; one type could be answered by identifying direct information within the text, while the other type required readers to make inferences about information within the text. The integrated text was followed by seven

questions, and the translated text was followed by eight. Lastly, after they completed the comprehension questions for each text, we asked in a retrospective portion of the interview to provide general comments about what they had done to make sense of each text through general questions about the books as a whole, rather than specific passages within them.

We audio-recorded each session (read-aloud and retrospective interview) in order to produce verbatim transcriptions as data sources for our analysis. In order to identify reading strategies, we used a moderate inductive approach (Anadón & Savoie-Zajc, 2009). Our analysis thus relied on both a classification of reading strategies used with monolingual text (Jiménez et al., 1996), and a set of cross-linguistic reading strategies that emerged from our previous work on dual-language books (Thibeault & Matheson, 2020). We also allowed for the emergence of codes and themes from the data as we were coding.

For each of the three cases selected for this study, we began our deductive analysis by first noting every instance where the participants used a reading strategy according to our classifications (Jiménez et al., 1996; Thibeault & Matheson, 2020). Next, we engaged in our inductive analysis by noting every instance where participants had provided a strategy that had yet to be incorporated in our typology. We used this approach in this order across both the read aloud sessions and retrospective interviews, for all three cases. After agreeing on our approach to coding the data, the two researchers independently recoded each of the transcripts across the three cases, which resulted in a 91% interrater agreement, with any disagreements being resolved through discussion. The complete list of reading strategies, as well as definitions, can be seen in Table 1.

Table 1

Definitions of Reading Strategies

Reading Strategy	Definition
Monolingual Strategies	
Focusing on vocabulary – French	Referring to specific French words in the text
Focusing on vocabulary – English	Referring to specific English words in the text
Decoding – French	Applying knowledge of letter-sound relationships to read French words
Decoding – English	Applying knowledge of letter-sound relationships to read English words
Demonstrating awareness	Recognizing instances of comprehension or miscomprehension
Invoking prior knowledge	Referring to knowledge constructed prior to reading the text
Affective response	Providing an affective response to the text
Making inferences	Drawing a conclusion based on textual evidence and reasoning
Using context (within same language)	Using a passage from the text to understand

	another passage written in the same language
Re-reading	Reading a passage an additional time in order to better understand it
Asking questions	Interrogating oneself or the interviewer about an element in the text
Use of pictures	Referring to pictures to make meaning of the text
Predicting/confirming	Constructing meaning from the text by making informed predictions and verifying their accuracy
Skipping words or passages – French	Moving ahead in the text in order to avoid a specific French word or words
Skipping words or passages – English	Moving ahead in the text in order to avoid a specific English word or words
Cross-Linguistic Strategies	
Using passages in other language	Using passages in one language to make meaning of passages written in the other
Using cognates	Using cognates that are not found in the text to make meaning of an unknown word
Using context (cross-linguistically)	Using contextual clues found in the other language to make meaning of passages in one language
Using structure	Relying on the structural features of the dual-language text to understand how languages interact in the text
Paraphrasing through translation	Translating passages from the text in the other language

Results

To present the results, we will showcase the strategies that each of our three focal readers deployed as they read dual-language books. To do so, we will first provide the number of times each strategy was used. This quantitative presentation of strategies, for each student, will be followed with the presentation of different verbatim excerpts, which we deem pertinent and representative of the strategies most deployed by each reader.

Kaya's Profile

Our first focal reader, Kaya, was 8 years old and in Grade 3 at the time of data collection. She predominantly speaks English at home, though she practices her French from time to time when she speaks with her mother. She has been enrolled in French immersion since Kindergarten. Following readings, Kaya scored 6/8 on the translated text comprehension questions, and 2/7 on the integrated text comprehension questions, for a total of 8/15. In Table 2,

we have inserted the reading strategies that Kaya deployed as she read both the translated and integrated texts.

Table 2

Kaya's Reading Strategies

Monolingual Strategies	TT	IT	Cross-Linguistic Strategies	TT	IT
Focusing on vocabulary – French	6	3	Using passages in other language	4	2
Focusing on vocabulary – English	3	-	Using cognates	1	-
Decoding – French	2	1	Using context (cross-linguistically)	-	-
Decoding – English	2	1	Using structure	-	-
Demonstrating awareness	12	7	Paraphrasing through translation	-	-
Invoking prior knowledge	-	1			
Affective response	-	1			
Making inferences	-	-			
Using context (within same language)	-	-			
Re-reading	-	-			
Asking questions	-	-			
Use of pictures	-	-			
Predicting/confirming	-	-			
Skipping words or passages – French	-	-			
Skipping words or passages – English	-	-			

Note. (-) indicates strategy was never used by the participant. TT = translated text. IT = integrated text.

For the translated text, we identified seven different strategies that Kaya used. *Demonstrating awareness* was the most commonly used strategy; throughout her interview regarding the translated text, Kaya reported about her awareness of her gaps in comprehension (e.g., "I don't know what these two words mean") and where she understood the words she read (e.g., "I didn't have any problems with any words"). As she engaged with the book, she thus seemed to frequently *focus on vocabulary*, whether in French or in English. The following excerpt is a relevant example of her focus on vocabulary.

Excerpt 1

Kaya I'm not sure what this one means.

Researcher	Okay. Which one? Can you read it?
Kaya	"*Craintive*."
Researcher	Okay. Is there anything that helped you?
Kaya	I think it might be the same thing as this.
Researcher	Okay, which is?
Kaya	"Alarmed"
(…)	
Researcher	What makes you think they are the same ones?
Kaya	Because they are both the start of the sentence.

In this dialogue, three codes were used. As we can see, Kaya first *demonstrates awareness* when she states that she does not understand the word "*craintive*." By so doing, she *focuses on French vocabulary* and, to understand the unknown word, she relies on the *equivalent English passage*. She further noticed that "*craintive*" and "alarmed" were both positioned at the beginning of sentences; she was therefore able to match the words according to their position in the sentence.

As far as the integrated text is concerned, we also identified seven different strategies that Kaya used. Again, the *demonstration of awareness* is the most notable one; Kaya often mentioned which words she did or not did understand (e.g., "I understand everything and I didn't know what was '*sympa*'"). She once *invoked prior knowledge* ("It doesn't really sound like a word and I just thought it was a name after I read it") and manifested an *affective response* ("I really like the drawings"). Overall, the strategies she deployed seem quite similar for the integrated text and the translated text. The following excerpt is taken from the interview conducted after she read the integrated text; just as she did for the translated text, she mentions the use of equivalent passages in one language to make meaning of unknown words in the other.

Excerpt 2

> "It's the words and when I didn't understand the English or the French ones I just looked at the English and when I didn't understand the English and compare it, and then if I didn't understand a French then I just looked at the English."

Maria's Profile

Our second focal reader, Maria, was an 8-year-old, Grade 3 student when she took part in our study. She predominantly speaks English at home, though she mentioned that she sporadically practices her French with her parents. Since kindergarten, she has been schooled in French immersion, in Saskatchewan. Maria scored 7/8 on the translated text comprehension questions, and 6/7 on the integrated text comprehension questions, for a total score of 13/15. Table 3 highlights the strategies that she mentioned using as she was reading both the translated and integrated texts.

Table 3

Maria's Reading Strategies

Monolingual Strategies	TT	IT	Cross-Linguistic Strategies	TT	IT
Focusing on vocabulary – French	2	-	Using passages in other language	2	-
Focusing on vocabulary – English	2	-	Using cognates	-	-
Decoding – French	-	6	Using context (cross-linguistically)	-	-
Decoding – English	1	-	Using structure	-	1
Demonstrating awareness	3	3	Paraphrasing through translation	-	-
Invoking prior knowledge	-	-			
Affective response	-	-			
Making inferences	1	1			
Using context (within same language)	-	-			
Re-reading	2	-			
Asking questions	2	1			
Use of pictures	3	7			
Predicting/confirming	-	1			
Skipping words or passages – French	-	-			
Skipping words or passages – English	5	1			

Note. (-) indicates strategy was never used by the participant. TT = translated text. IT = integrated text.

In her reading of the translated text, we identified 10 different strategies that Maria used. Her most recurrently used strategy was *skipping words or passages in English*. This was somewhat surprising considering that English was her dominant language and that she never used the equivalent strategy for words or passages in French. In fact, at the beginning of the reading session, she faced difficulties as she was reading the English noun *chihuahua*, and relied on the strategy *asking questions* to pose the researcher "Can I skip it?" After the interviewer told her to "do what you would do if you were reading on your own," she skipped the word. She went on using the strategy four more times, always with English words, and mentioned that she was doing so because some of these words were "very long."

Though Maria only seemed to *use passages in the other language* twice when she read the translated text, she explicitly talked about this particular strategy in the post-interview.

Excerpt 1

Researcher	Is there anything else you did to make you understand better?
(…)	
Maria	Using the English words to translate in French or the opposite of that.
Researcher	So you did both of this?
Maria	Yeah.
Researcher	How did the English help you with the French?
Maria	Eum…If I knew the English word…If I knew the English word in English but not in French it will help me.
Researcher	And how did the French help you with the English?
Maria	Eum…If I knew what it was in French but not in English.

Interestingly enough, in this excerpt, she mentions that she uses both English and French vocabulary to make meaning of unknown words in the other language. As such, on the one hand, she skipped a few words when she read passages in English and, on the other, she mentions that both French and English can be used to understand passages of the book. Though we cannot conclude that she uses her knowledge of the French words to specifically understand the English words that she skipped, we can nonetheless contend that Maria comprehends the scaffolding potential of English and French passages in the translated text. This, at the very least, provides her with a cognitive tool that she can utilize when she skips an unknown English word.

We identified eight distinct reading strategies that Maria used for the integrated text. This time, the most predominant strategy was the *use of pictures*, followed with decoding French words. In fact, throughout the reading session of the integrated text, these two strategies seemed to be consistently employed by Maria, who often relied on one of them or both concurrently. She furthermore deployed a low number of cross-linguistic strategies; she only *noticed the integrated structure* once when she said "The cat is English, but the dog is French." In the post-interview, she developed her thoughts in regard to this particular textual structure.

Excerpt 2

Researcher	Did the presence of two languages in this book help you understand what you were reading?
Maria	Eum… No, not really because it's two different sentences […]. Like this one is like different. It's like one of them is the dog and one of them is the cat. And so, they will be different on the same sentences in English and French.
Researcher	And so that, you don't think that the English could help you with the French, and vise versa?
Maria	With this one, no. Not really.
Researcher	Okay.
Maria	But kind of because they are both talking about the same things but not in like the… not the… it not written the same way. But they're both talking

about the same things but not exactly.

This excerpt is particularly interesting because it showcases Maria's conflicting views regarding the integrated book's structure and its potential for supporting her reading comprehension. On the one hand, she is aware that English and French passages are not entirely equivalent in the book. On the other, she also knows that both protagonists are narrating the same events and that the cat's perspectives are in fact complementary to the dog's perspectives.

Karly's Profile

Our last focal reader, Karly, was also eight years old and in grade 3 at the time of data collection. Like Kaya and Maria, she has been enrolled in French immersion since kindergarten. She exclusively speaks English at home. Karly scored 7/8 on the translated text comprehension questions, and 7/7 on the integrated text comprehension questions, for a total score of 14/15. In Table 4, we have inserted the reading strategies that Karly used as she read both the translated and integrated texts.

Table 4

Karly's Reading Strategies

Monolingual Strategies	TT	IT	Cross-Linguistic Strategies	TT	IT
Focusing on vocabulary – French	4	5	Using passages in other language	1	-
Focusing on vocabulary – English	1	2	Using cognates	-	2
Decoding – French	-	6	Using context (cross-linguistically)	-	1
Decoding – English	1	-	Using structure	-	2
Demonstrating awareness	9	8	Paraphrasing through translation	6	2
Invoking prior knowledge	-	2			
Affective response	-	-			
Making inferences	-	-			
Using context (within same language)	2	1			
Re-reading	2	-			
Asking questions	-	2			
Use of pictures	3	2			
Predicting/confirming	-	-			
Skipping words or passages – French	-	-			
Skipping words or passages – English	-	-			

Note. (-) indicates strategy was never used by the participant. TT = translated text. IT = integrated text.

For the translated text, we identified nine different strategies that Karly used. Similar to Maria, *demonstrating awareness* was the most often reported strategy, and Karly used it to communicate that she did not understand particular words in French, though she also identified a word in English that was unfamiliar. She explicitly shared that she is better in English than French because it was her "first language." Concerted efforts to make sense of the French text were evident through phrases including "Okay it makes more sense"—something she uttered after she read the English passage that followed an unclear French passage. Karly also regularly *paraphrased through translation* while reading the translated text—a strategy that seemed to characterize her approach to reading the translated text. The following excerpt is a relevant example of her regular attempts to understand the story by paraphrasing the French text through translation:

Excerpt 1

> "La petite souris salua Soso et s'approcha. So like it says 'hi' or euh… The little mouse waved and came toward the house. Oh okay, so kind of 'hi.'"

In this passage, Karly uses two different strategies—*paraphrasing through translation* and *demonstrating awareness*. Following the French passage, Karly attempts to translate it, suggesting that she is trying to understand it before "checking" with the English passage. Her use of "or euh…" in her initial paraphrase, coupled with the utterance "oh okay, so kind of "hi"" together suggest that she is demonstrating awareness of her level of understanding of the French text. It appeared that Karly was regularly challenging herself to understand the French text, and then using the English text to check her comprehension. Though Karly also used other strategies including *focusing on vocabulary in French*, it was her *paraphrasing through translation* and *demonstrations of awareness* that seemed to best characterize her reading of the translated text. It is also noteworthy that Karly, as seen in this passage, often verbalized strategies without the researcher's prompt.

With the integrated text, we identified 12 distinct strategies with Karly. She again most commonly *demonstrated awareness*, doing so a total of eight times. Similar to the translated text, she reported about her awareness of difficulty with specific words in French. Though Karly did attempt to *paraphrase through translation* in a couple of instances, she seemed to recognize that without the English equivalent passages, she would need to rely on a number of other strategies to build meaning. As seen in Table 4, strategies including *asking questions*, *use of structure*, *invoking prior knowledge*, and *use of cognates* were reported with the integrated text, but not with the translated text. Karly's reading of the integrated text was best characterized by the use of multiple strategies together to understand unclear passages of text. Excerpt 2 illustrates an example of multiple strategies that Karly used together as an attempt to make sense of the text:

Excerpt 2

> Well, for "ronron, ronron" I didn't understand but there was a "purrrr'' over here and this seems like a sound…So, I'm guessing this is "purrrr". So, that helped me understand a little bit more and she also said it in the other paragraph so…I'm guessing that means "purrrr."

In this passage, Karly *demonstrates awareness* of some confusion related to the term "ronron." This is a *focus on French vocabulary*, and Karly reports that she is *using the picture* that accompanies the text wherein the cat is depicted making a "purrrr" sound. Karly *infers* that it

"seems like a sound" based on what she has pieced together from various textual clues and her interpretation of them. She also *uses context cross-linguistically* by recalling that the same term was used in an earlier paragraph. After the integrated text reading, Karly shared that she needed to rely on different strategies in the absence of having an equivalent English passage to assist her in building meaning—this dynamic approach to reading this style of text was evident throughout her reading and reporting with the integrated text.

Discussion

In sum, across the three cases, the differences among Kaya, Maria, and Karly in their repertoire of strategies used offer a glimpse of their approaches to reading. In considering how these three focal participants compare as readers, one might consider that they position themselves on different parts of a continuum of bilingual reading development. On the one side of the continuum, Kaya represents a reader that does not seem to make adjustments to how they read text based on the demands of the text. Further, Kaya uses a limited range of strategies. While the reasons for Kaya's notable lack of adjustment and range are unclear, this unresponsive style of reading is considered to be less effective than more dynamic and responsive approaches (Matheson & MacCormack, 2021; Paris & Jacobs, 1984). In another part of the continuum, one that demonstrates a more effective use of reading strategies, reading is characterized by greater responsiveness and range. Maria represents a more dynamic reader—one that uses different strategies based on the style or structure of the text she is reading. Despite greater range and responsiveness, reading strategy use is mostly monolingual for her during the interview that took place as she was reading. In the retrospective interview, she did mention that both English and French could be used to understand words in the other language, though such cross-linguistic strategies were not apparent as she read. At the other end of the continuum, reading is dynamic and it involves a range of strategies, but it represents a shift to a heavier reliance on cross-linguistic strategies. As noted by researchers (Alsheikh, 2011; Jiménez et al., 1996), such behaviours can be quite effective because they involve reading strategies that combine L1 and L2 linguistic skills.

Though our measure for comprehension has not been validated as it was designed for the two texts we used in the study, the results may offer some additional insight. Kaya, our first focal student, scored 8 out of 15 in her total reading comprehension score. Maria and Karly scored 13 and 14 respectively, suggesting that their dynamic reading styles seemed to lead to greater comprehension. Further, Kaya scored 6 out of 8 with the translated text, but only 2 out of 7 with the integrated text. Kaya's lack of adjustment in her approach to reading the integrated text supports the idea that reading can be effective when readers transfer strategies across their L1 and L2 (Bourgoin, 2015), but that perhaps it is not effective when the approach does not match the demands (Mokhtari & Sheorey, 2002). Karly and Maria had similar overall scores; however the noted difference with Karly's proclivity for offering unprompted reports of her reading activity may distinguish readers of this study. When readers are comfortable using a mix of monolingual and cross-linguistic strategies, they may be more confident in using them as we saw with Karly.

Another interesting result that emerged from this study is about the need for prompting. Unlike Maria and Kaya, Karly did not require any prompting while reading, and instead offered unsolicited verbal reporting of her thinking throughout the reading of both texts. While she was able to respond to questions following each passage about her thinking, she also reported about her thinking within passages. This could have been the result of stronger language abilities,

particularly within the French language, and therefore, greater confidence in comparison to her peers. Also compared to her peers, Karly used a greater range of cross-linguistic strategies. While Karly and Maria used a comparable number of strategies across both text types, Maria relied mainly on monolingual strategies, where Karly used both monolingual and cross-linguistic strategies across both texts. Surprisingly, Karly was the only participant who reported speaking exclusively English at home.

Limitations

Like all studies, ours have limitations that we must put forward. Considering the exploratory purpose of the research and the limited number of focal students we described for this paper, our objective was not to showcase an exhaustive portrait of reading strategies for dual-language text; the typology we used will likely have to be completed and nuanced as other researchers zero in on how bilingual students engage in dual-language reading. In this perspective, we did not focus on our focal readers' general competency level in reading, nor did we situate them in regard to their peers' reading levels. Future research focusing on dual-language reading could thus zero in on the reading strategies used by proficient and less effective readers as they engage with dual-language books. That way, we will be able to comprehend the strategies that are predominately deployed by stronger readers and provide teachers with concrete ways to helps their students as they read dual-language text. Our focal readers, moreover, happened to be all girls. Subsequent research should examine both male and female students to obtain a broader representation of how children learn and interact with dual-language texts.

In this study, students had to read the integrated book immediately after they read the translated text. We also did not tell students about the structural differences between each book before they started reading the second one. It is thus possible that some of the participants did not have the reflex to adapt their reading behaviours as they engaged with the integrated text. That being said, as we know that efficient readers tend to adapt their strategy more easily (Mokhtari & Sheorey, 2002), this procedure allowed us to document the adaptation of our participants' reading strategies as they read different types of dual-language books. Finally, it is important to note that the measures we designed for reading comprehension of each text type have not been validated. While they may offer additional insight into the reading profiles of our focal students, we do not contend that they can serve as stand-alone measures of reading ability.

Implications and Conclusion

In their efforts to support the bilingual reading development of their students, we suggest that French immersion teachers should encourage students to draw on their L1 as needed. It is evident from our results that readers, as seen with Maria, can be dynamic, but largely monolingual in the strategies they use. Given the identified value of drawing on both L1 and L2 skills when learning an L2 (Ballinger, 2013; Swain & Lapkin, 2013), we argue that teachers should model how they make adjustments to their reading behaviour based on the text, as well as how they use cross-linguistic skills to construct meaning while reading. Further, teachers could explain their thinking behind their approaches and actions in order to show students both how and why they approach reading as they do. We believe that such practices will not only support students in the development of reading skills in French, but that they will also help them understand the potential of cross-linguistic reflections as they read both monolingual and dual-language text.

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Culturally Relevant Pedagogy—A Diffusion Model for District-Wide Change to Address Systemic Racism

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Abstract

Culturally relevant pedagogy (CRP) has been implemented in classrooms and schools across Canada and the United States to address the inequity that has caused an academic achievement gap between Black and Indigenous students and those students who self-identify as White. The purpose of this paper, which draws upon a larger instrumental case study that investigated CRP as a district-wide change, is to demonstrate an effective model for sustainable, deep-level educational change to address systemic racism through CRP. The primary research question from the larger study was: How do people with different roles throughout the hierarchy of the school district make sense of CRP? In this paper, I highlight two of the key findings from the larger study. First, in order for CRP as a district-wide reform mandate to be implemented effectively, the steps of the reform must be diffused throughout the district rather than decreed from the top of the hierarchal chain of a typical public school system. Second, in order for change that impacts an entire school system to occur, there must be a mechanism for deep learning prior to and during the implementation stage for members of the district.

Keywords: culturally relevant pedagogy, second-order change, decolonizing, sensemaking, university-school partnerships

Culturally Relevant Pedagogy—A Diffusion Model for District-Wide Change to Address Systemic Racism

In educational circles across North America, the conversations about race and education have revolved around the atrocious differences in achievement levels between African American and African Canadian students and their White peers. In Canada, this conversation is particularly relevant in the province of Nova Scotia. Nova Scotia has the largest proportion of Canadian born Black people (Statistics Canada, 2010). According to the Statistics Canada (2013) and the data analysis from the Government of Nova Scotia, Department of African Nova Scotian Affairs (2014), in 2001, Black people in Nova Scotia made up the biggest non-White portion of the population with 80.7 percent of Black people being born in the province. Unlike other provinces in Canada, Nova Scotia has the largest percentage of Indigenous Black people in the country. The history of Black people in Nova Scotia can be traced back to the Atlantic slave trade, which was only abolished in Canada in 1834 (The Canadian Museum for Human Rights, 2021), the arrival of the Black Loyalists in 1783 (Thomas & Lindsay, 2001) and the arrival of the Jamaican Maroons in 1796 (Black Cultural Centre for Nova Scotia: African Nova Scotian Museum, 2021).

Black people in Nova Scotia also referred to as African Nova Scotians, have not been spared the effects of racism, although historically, Canada has mistakenly been referred to as a haven of freedom and the Great Mosaic. This is particularly true of education. Achievement data show that Black students are behind their peers in both math and literacy at all levels. This gap widens as they continue throughout the system. In 2016, the percentage of Black students in Nova Scotia who demonstrated achievement on provincial assessments in all school boards in Grades 3, 4, 6, and 8 was far below that of other students disaggregated by ancestry. In Math, less than 50% of Black students met outcomes in Grades 8 and 10 (Province of Nova Scotia, 2016). Provincial assessment data have communicated to educational leaders that there is a problem; however, it does not point to the root of the problem or a solution (Gay, 2000).

The purpose of this paper, which draws upon a larger instrumental case study that investigated culturally relevant pedagogy (CRP) as a district-wide change, is to demonstrate an effective model for sustainable, deep-level educational change to address systemic racism through CRP. The primary research question from the larger study was: How do people with different roles throughout the hierarchy of the school district make sense of CRP? In this paper, I highlight two of the key findings to demonstrate what is required for CRP to be implemented effectively. First, in order for CRP as a district-wide reform mandate to be implemented effectively, the steps of the reform must be diffused throughout the district rather than decreed from the top of the hierarchal chain of a typical public school system. Second, in order for change that impacts an entire school system to occur, there must be a mechanism for deep learning for the lead team prior to the implementation of CRP and for the system during the implementation phase.

In this paper, I outline the need for a new model of district-wide change through the story of how a school district in Nova Scotia, Canada, made sense of implementing CRP throughout its system. I use the stories of how educators, positioned at all levels of the school district's hierarchical organization, made sense of CRP in pursuit of improving academic success for its Black and Indigenous students. Understanding what is required to implement CRP will uncover changes that are required with the structure of a school district. The implementation of CRP through a deep learning mechanism, along with the change to the way reform is implemented throughout a school district, reveal a diffusion model to avoid barriers that naturally occur while implementing change through an organization where information flows downwards implement

deep, sustainable changes to the culture of a school district to interrupt systemic practices plaguing Black children.

Literature Review

Culturally relevant pedagogy targets issues of equity. As a system-wide mandate, CRP is aimed at addressing the low achievement of non-White students. Implementing CRP to improve academic achievement for students from marginalized populations has been examined from a teacher and school perspective (Gay, 2010; Ladson-Billings, 1995a/1995b/2006) but rarely studied as a system-wide intervention or reform mandate. According to Gay (2000), educators are culturally responsive to their students when they use their cultural ways of knowing and being as the focus of planning and building instruction. Ladson-Billings (1995a) described being culturally relevant as a way of being that is culturally competent and socially and conscientiously critical, providing a method for students to be successful. Both scholars agree that effective education requires the culture of the students to be placed at the core of all that is done in the act of educating students. The failures of education reform aimed at creating equitable systems, especially in the province of Nova Scotia, tell us that implementing CRP requires that Black culture and history has not been valued and incorporated within the practices, procedures, and policies of the education system (Black Learners Advisory Committee, 1994; Lee & Marshal 2009).

In Nova Scotia, the data on student achievement highlight the inequities in its public schools towards Black students. In 1994, the Black Learners Advisory Committee (BLAC) reported on the systemic barriers facing Black Students in Nova Scotia. Among these barriers were racial stereotyping and the overrepresentation of Black students in special education. Lee and Marshall's (2009) follow up to the *BLAC Report* stated the barriers identified 15 years earlier still persisted and that the recommendations from the *BLAC Report* had, for the most part, not been implemented. In 2016, the province of Nova Scotia Department of Education's report, entitled *Individual Program Plan (IPP) Review: Themes and Recommendations,* noted that students placed on individual program plans found the same barriers as the BLAC report (1994). All these reports recommended that culturally relevant instruction be implemented in Nova Scotia provincial schools.

The implementation of CRP involves system, school, and classroom educators understanding the culture of the students they serve and, in turn, using the information they gain as the avenue to make decisions around leadership and instruction (Gay, 2010). Gay noted that a starting point for implementing this reform is to delve into the concept of culture and, in the process, have educational leaders, change agents, and teachers discover their own culture and its impact on their students.

Many anti-racist scholars (Delpit, 2006; Gay, 2010; Lewthwaite & McMillan, 2010; Milner, 2006; Tileston & Darling, 2008) have concluded that it is imperative that educators challenge and reflect on their thinking and beliefs about children who are of a different race and culture than their own. This includes coming to the realization that deficit thinking, which views Black students as incapable of succeeding academically compared to their White counterparts, has led to poor academic results (Hilliard, 2004). Deficit thinking has led to stereotypes and low expectations of students. Low expectations due to deficit thinking are evident in student achievement data across the United States and the province of Nova Scotia (Bohrnstedt et al., 2015; Province of Nova Scotia, 2016). "The very view of *diversity as a deficit* [*sic*] needs to be reframed if educational reformers are serious about affording all students an equal opportunity to

learn" (Nieto, 1998, p. 430–431). Once educators understand that it is not the students that have been failing but a Eurocentric colonialist education system that has failed the students, the work of CRP can begin. Using CRP as a district-wide reform will have to include steps to address this deficit thinking and transform the individual beliefs of the educators within the district. This is necessary to eradicate practices that perpetuate racism throughout education.

The steps needed to address deficit thinking can be categorized as decolonizing actions and are the first steps in the implementation of CRP. (Battiste et al., 2002; Hilliard, 1978). Ignoring these steps means that any effort to equitable change an organization or system will ultimately fail. Hilliard III (1978) argued that for true equity within education to succeed, each educator must understand: (a) the concept of culture, (b) that there are varying cultures and linguistic styles, (c) that each person sees the world through their own perceptual lens and each one's reality differs from others, and (d) by forcing students to adapt to a culture other than their own is an aggressive act. Decolonizing one's beliefs involves "understanding and unpacking the central assumptions of domination, patriarchy, racism, and ethnocentrisms that continue to glue the academy's privileges in place" (Battiste et al., 2002, p. 84). It is this glue that has permitted deficit thinking to permeate the school system. Once individuals have come to the realization of "why" what they have been doing has not worked for students or the intended mandate, then they are ready to act.

Colonialism is the foundation of education systems and upholds dominant value systems while denying the value of others. It is this foundation that has blurred belief systems about children whose ancestors were the colonized (Battiste, 2013). To truly address systemic issues, change agents will have to look at how the education system is structured and how information and learning disseminates to educators throughout the school district.

The organizational structure of school districts in Canada has not changed significantly in the last 40 years (Campbell, 1975). School districts in the province of Nova Scotia have a hierarchical structure headed by a district superintendent or regional executive director who reports directly to the provincial government agency charged with the responsibility of overseeing education. This is a system that is similar to that described by Campbell. As a bureaucratic system, a school district's organizational and procedural methods depend on its "rules and regulations, official standard operating procedures, written memos, chain of command" (Owens & Valesky, 2007, p. 279). This bureaucratic organizational structure does more than simply position people for the purposes of authority and determining pay scale. By design, it dictates how people are permitted to interact with each other (Meyer, 1984). The limitations of these interactions through communication, isolation of expertise, and a narrowing of decision-making authority cause many organizations to be unable to fully implement change mandates.

Reform endeavours, like CRP, that target equity issues, require that all departments within an organization align to support what happens directly in the classroom (Bishop et al., 2010; Zavadsky, 2009). This includes re-examining how individuals within the hierarchy communicate with each other, how tasks are assigned regardless of traditional department responsibilities, and how collaboration occurs among all levels (Bishop et al., 2010, Coburn, 2003). A reorganization of this type would have educators at all levels within a system directly tied to supporting classroom instruction and school leadership.

With the plethora of research on reforming school districts, one area that is lacking greatly is research that addresses the implementation of initiatives that address racial and cultural inequities (Garcia-Huidobro et al., 2017). Reform agents have not been successful in creating

sustainable large-scale reforms in this area. Bremer (1973) surmised that failure of reform efforts are not due to the reform itself, but because reform "is scarcely understood" (p. 7). In order to include actions of change that would address inequities based on White colonial culture, these inequities must be recognized, seen, acknowledged, and named (Hilliard, 1978).

The majority of reform efforts to improve academic success for Black students have involved a revolving door of interventions, yet, with a few exceptions, the issues of educational inequity still persist. These efforts have involved such things as student-focused initiatives, including grade-level reading interventions, tracking and monitoring student achievement, and pull-out practices that remove students from the classroom setting to receive individual and small group remediation. These interventions amount to what Hilliard (2004) surmised as "weak educational services that are based on low-level recipes, or commercial programs and educational reforms" (p. xxi). These low-level interventions are also referred to as "first-order changes" (Watzlawick et al., 1974).

First-order changes are those changes that can occur without interrupting the *status quo* of an organization and do not require changes to the culture, structure, behaviours, or the belief systems of those tasked with making the changes (Bartunek & Moch, 1987; Cuban, 1998; Fullan & Stielgelbour, 1991; Kezar, 2001; Levy 1986; Waks, 2007). First-order changes can be made quickly because they fit "into the program's existing values and structure" (Kezar, 2001, p. 32). These first-order changes centre on an approach to fixing the child, not the system.

Whereas first-order changes do not change the culture of an organization, second order change is "transformational change; the underlying values or mission, culture, functioning processes, and structure of the organization change" (Kezar, 2001, p. 32). This approach alters the way business is conducted throughout a school system and is an example of a paradigmatic shift. Therefore, second order change would affect individuals throughout a school system and involve every level because their value sets and belief systems would be examined, challenged, and potentially changed (Kezar, 2001). For such an approach to work, leaders will have to understand the culture of the organization, including the belief systems of individuals, to help them to make sense of the changes being mandated (Iveroth & Hallencreutz, 2016).

Sensemaking is the process that people use to create an understanding of their experiences. Determining how people occupying different roles within a school system make sense of CRP as a district-wide reform would help to gain an understanding of what is required at each level of a school district to create deep, sustainable, second-order change. Organizational theorist Karl E. Weick formulated seven properties of sensemaking, which form an analysis structure to understand how individuals come to understand their thinking, actions, experiences, and how they make sense of what they believe to be true. Weick's (1995) seven properties, which I used to analyze the research participants' narratives, are: grounded in identity, retrospective, enactive of sensible environments, social, ongoing, focused on and by extracted cues, and driven by plausibility.

Individuals' identities are grounded in their beliefs and values. It is an individual's beliefs and values that direct the way in which they work. For educators, beliefs drive practice. It is the "why" of what they do. When reform mandates are introduced, individuals wrangle with the question, "What the situation means is defined by who I become while dealing with it or what and how I represent" (Weick, 1995, p. 24). As Kezar (2001), Fanon (1967), and Hilliard III (1978)

have all described, it is one's identity that educators will wrestle with when the change mandate involves the evolving of one's personal beliefs.

Weick's (1995) second sensemaking property, retrospective, is how individuals comprehend information and events after they have occurred. This is the reflective stage that requires time. For educators, this is an important step that is not usually afforded them if they receive the messages of CRP through the usual district-wide communications such as memos or 1-day workshops. This step allows individuals time to come to a state of clarity about CRP with new information being added to their past understanding.

That sensemaking is enactive of sensible environments, Weick's (1995) third property, gives researchers and reform agents important information regarding organizational culture, resistance to change, and how sensemaking is linked to action. The way in which people have made sense of the new information about CRP will be revealed in the actions that they take. The key to school culture is that the people in the organization characterize its culture. The individuals and groups in an organization create the environment in which they are members. Therefore, change agents need to be concerned at the individual level. The actions individuals take may be perceived as resistance or barriers to reform efforts. Barriers to implementing CRP are not externally constructed; rather, the implementers of the reform create those barriers through their actions. The environment, which is created through the changes of reform, is part of the sensemaking process, which, when attended to, can help push reform forward. On the other hand, if change agents do not pay attention to how educators perceive the environmental changes, the enactment of the sensemaker may also halt or suspend progress.

Organizations are socially created by the actions of their members (Iveroth and Hallencreutz, 2016). The social creation provides "both limits and possibilities for new actions" (p. 56). The social sensemaking property is considered the impetus for action (Iveroth & Hallencreutz, 2016; Weick, 1995). Individuals will act or react as per their sense of changes in their environment or culture through observing and talking with others experiencing the same change. Understanding the social aspect of sensemaking will help guide the steps of those implementing CRP.

Sensemaking never stops. Weick's (1995) fifth property of sensemaking is that it is ongoing. Sensemaking is also emotional. Individuals make sense of current practice while reflecting on past experiences, simultaneously balancing their beliefs with the actions of others. As an ongoing activity, sensemakers are continually reaffirming, modifying, or maintaining their beliefs (Mills, 2003).

While individuals are reaffirming, modifying, or adapting their beliefs through sensemaking, they are taking cues from their environment, past experiences, and others around them. The focus on the extracting of cues is Weick's (1995) sixth property. Cues are reference points to draw meaning from (Iveroth & Hallencreutz, 2016; Weick, 1995). This stage of sensemaking draws on people's prior knowledge and experience.

The last property of sensemaking is driven by plausibility rather than accuracy (Weick, 1995). The sensemaking process begins with what people think the situation is about and not necessarily with the actuality of the situation. The environment, the social interactions, and past experiences all lend themselves to what could be a facade of the actual changes taking place.

For reform agents, communication is key here. The changes that actually take place through reform efforts are what makes sense or what is plausible (Weick, 1995). Often in a school district, mandates are passed down from the Ministry of Education to district superintendents. The information is then funnelled through directors to their respective departments. It is then communicated to principals and, lastly, to teachers. This communication pipeline can often be likened to the gossip game. In this game, one person whispers into the next person's ear; this process continues until the last person in the group repeats out loud what they have heard. What the last person utters is usually nowhere near what the original message was. Once the message is out there, it is hard to contradict, whether true or not. Reform agents want to ensure actions that are taken by change implementers are based on accurate information.

It is imperative that educators at all levels receive the same communication and are afforded the same level of learning about CRP. Studies on school reform, particularly those on CRP, outline the failures that can be attributed to the lack of understanding of the system leadership to support educators. Even if a teacher working at the school level has the capacity, they will not likely be able to sustain their work without support from immediate supervisors and system leadership (Parhar & Sensoy, 2011; Young, 2010). The leaders of an organization shape its culture and, therefore, the reform must start with them (Schein, 2012). In my experience, it is assumed that the leaders of school districts already possess the knowledge and beliefs that are needed to implement new reforms. In the areas of equity, decolonization, and cultural consciousness that are required for CRP, as history has demonstrated, a lack of knowledge and unexamined beliefs of leaders have contributed to the issues of systemic racism and the achievement gap (McCray & Beachum, 2014).

Prior to the implementation stage of CRP, leader's must reach the point of critical consciousness where they have the ability to (a) recognize and reconcile their past practices, and belief systems about equity and systemic racism; (b) identify deficit thinking and inequitable practices in others; and (c) critically reflect on practices enacted by themselves and others. McCray and Beachum (2014) recognized these steps as liberatory consciousness, pluralistic insight, and reflective practice. This state of being as a system leader will allow the implementation of CRP to be effective.

Theoretical Framework

The theoretical framework for the original study was informed by both sensemaking and decolonization. Decolonization, in educational circles, is the process by which educators analyze and rethink their beliefs about children based on race and culture (Battiste, 2013). Sensemaking describes the actions individuals take to socially create their realities (Mills, 2003; Weick, 1995). Sensemaking provided the analysis structure for data collection, and decolonization provided the lens through which the data were analyzed. The decolonizing lens allowed me to delve deeper within the seven characteristics of sensemaking: grounded in identity, retrospective, enactive of sensible environments, social, ongoing, extracted by and from cues, and driven by plausibility rather than accuracy (Weick, 1995) to view the actions of educators from an equity perspective (Tuhiwai Smith, 2012).

Methodology

The research methodology used was an instrumental qualitative case study. The school district in the study was the bounded unit and was chosen because the district's leadership had committed to CRP. The study was concerned not with the school district itself; but, with the phenomena of the

implementation of CRP by educators who occupied different roles and have had different experiences with their implementation efforts.

The bounded school district encompassed both urban and rural hubs and represented Nova Scotia schools as having a diverse population that included Black and Indigenous students. The leader of the chosen school district had decided to implement CRP to address the racial achievement gaps. Another benefit the school district offered was that educators in different hierarchal roles throughout the district were enrolled in a university Master of Education cohort dedicated to developing culturally relevant educators and leaders.

The data collection methods consisted of interviews of each participant, observations of leadership meetings, administrative walkthroughs of principals' schools, and a document analysis of all reports, memos, and trustee meetings throughout the data collection period. Interviews and observations determined how educators made sense of the implementation of CRP using Weick's (1995) seven characteristics of sensemaking. The document analysis revealed what had been communicated and offered about CRP to all members of the district.

In this study, my goal was to determine how my participants made sense of the implementation of CRP through the stories they created. I documented how these educators' stories transformed as new information challenged the parameters that had held their old stories together (Iveroth & Hallencreutz, 2016). These data collection methods are consistent with case study methodology (Creswell, 2013; Merriam, 1998; Yin, 2014).

Participants

Purposeful sampling of participants was used. It was paramount that the participants represented all levels of the hierarchy of the system to be studied. The first two participants represented the top of the hierarchy, the Superintendent and a Senior Director. At the time of this study, three out of the six middle management level and school-based participants (supervisor, principal, and teacher) were selected because of their participation in the Master of Education cohort dedicated to CRP. Additionally, to compare and contrast how educators at these three levels of implementation made sense of CRP, one supervisor, one principal, and one teacher participant who were not on the cohort were chosen using typical sampling (see Table 1 and 2).

Table 1

Unique Sampling of Participants

Unique Sampling	Typical Sampling
1 Supervisor (cohort)	1 Supervisor (non-cohort)
1 Principal (cohort)	1 Principal (non-cohort)
1 Classroom Teacher (cohort)	1 Classroom Teacher (non-cohort)
Superintendent (non-cohort)	
Director/Assistant Superintendent (non-cohort)	

Table 1

Research Participants

Participant Name	Role/Position	Demographic Information

Nicole	Non-Cohort Teacher	White, female, an educator for 2 years
Cassandra	Cohort Principal	Black, female (only Black participant in the study) an educator for 21 years.
Niles	Non-Cohort Principal	White, male, an educator with the district for 28 years
Christina	Cohort Supervisor	White, female, an educator with the district for 25 years
Norman	Non-Cohort Supervisor	White, male, an educator worked for the district for 34 years
Peter	Superintendent	White, male, an educator for 28 years, third year as Superintendent
Patricia	Director/Assistant Superintendent	White, female, an educator for 31 years in the same district

The narratives from the participants gave insight into answering the primary research question: How do people who are positioned in different roles throughout a school district make sense of culturally relevant pedagogical reform? The findings below highlight the narratives of participants at each level of the school district and demonstrate the purpose of this paper: the need for a mechanism for deep learning about CRP throughout the district and the implementation of CRP as a second-order, district-wide change needs to be diffused throughout the system.

Findings

The Story From the Top

Weick (1995) noted that the plausibility of a change implementation coming to fruition is dependent upon what each educator knows and understands of how and why to implement the reform. The district's communication about CRP was intertwined with what the leadership thought the district collectively knew and accepted. For participants who were not members of the university cohort, this meant they were only exposed to what was communicated down through the hierarchy of the district. This communication was connected to what was already known from current practices that focused on social justice initiatives. As Hilliard (1978) described, when it comes to issues of race, if it does not affect you personally, it is easily avoided. Each individual in this case study created a new story from which to enact CRP, using what made them feel comfortable and tied to their individual identities prior to the implementation stage.

The new leader of the district, Peter, the Superintendent, felt strongly that, in his role, it was crucial to close the achievement gap affecting Black and Indigenous students in his district. He believed CRP was the means to do so. This stance, which revealed his identity, is what drove his actions when he began his work as superintendent.

To begin his plan to implement CRP, Peter (a superintendent) used the existing practices of the district's culture "which had tweaked [his] interest" as "the jump-off point." For Peter, these practices included the district's social justice framework and relational approach, which were established prior to his arrival. The district's social justice framework consisted of five pillars; race, gender, class, sexual orientation, and abilities (Superintendent Report, September 2017; January 2018). Peter described the district's relational approach as "not about just fixing what's

broken, it's about doing business in a more relational way, which is about understanding everybody, and being thoughtful and mindful about every decision that we make, who is impacted, and how." By interpreting as he did, Peter was, in fact, merging both frameworks with his definition of CRP, which he described as:

> Making sure that everything in the classroom and in the school, in the lived experience of every student, is relevant to them in their lived experience. And making sure that they see themselves reflected in the school and that they connect to what's going on in the school.

Peter took the first possible opportunity to communicate to his school district the direction in which he wanted them to move. He met with all of his district's leaders to announce that his district would be implementing CRP. In his messaging, he linked his identity with the district's frameworks and connected his vision to his district's student achievement data. The data showed clearly, as the majority of school districts in North America, disparities are disaggregated by race. Peter painted a picture of the realities of education for the district's Black and Indigenous students. Peter publicly declared: "Despite the fact that we know there is no achievement gap at birth, some of our African-Nova Scotian and First Nation learners are not achieving at the same level as some of their classmates" (Superintendent Report, December 2015). He also acknowledged, "When we take a close look at assessment data and see that, overall, our African-Nova Scotian and First Nation learners are achieving at lower rates than their classmates, we know there is a systemic issue" (Superintendent Report, December 2015). By raising awareness of the disaggregated results and how current teaching practices are failing to address them, Peter laid the foundation for the decolonizing process for the leaders of his district.

Peter's intention was to move his district in a new direction. However, the message that landed, as evident in the participants' stories, was that educators were to build upon relational theory and their existing social justice framework campaigns to implement CRP. District messaging did not allow for the continuous acknowledgment of the role that systemic racism plays in the underachievement of Black and Indigenous students in Nova Scotian schools. Therefore, the implementation of CRP did not help educators to comprehend concepts of white supremacy and how their biases may serve to disseminate oppressive attitudes and practices.

With the exception of the district members who were participants in the university CRP cohort, in general, educators were not given the opportunity to genuinely explore the colonization of schooling and the effects of systemic racism on non-White students as part of the implementation process. Failing to address race and, by extension, systemic racism from the concept of CRP fundamentally changed how it was understood by participants. The cohort participants, on the other hand, had additional opportunities for sensemaking about race and anti-racism, which resulted in different understandings of the CRP reform.

Enacting Change at the Senior Management Level

Observations of discussions at the senior management level revealed the implementation of CRP was clashing with the existing story of the district, which detailed the equity efforts around its social justice framework and relational approaches. To implement and support change, there needs to be a common understanding of the change itself (Parhar & Sensoy, 2011; Schein, 2012). At the senior staff level, observation data revealed two truths. First, all members were committed to providing equitable supports to schools. Second, members had not developed a consensus of what CRP actually was or what it entailed. This was evident as senior staff members discussed providing equitable supports to schools. Through the conversations about implementing CRP,

there were constant reminders from and to members of, we "also support schools with social justice" (Senior Management Meeting, Field Notes, February 22, 2018).

It was also revealed at the senior table that the efforts of the district to implement CRP in schools were operating as a voluntary measure, and there were schools that were not opting in "because they do not have the awareness and mindset [of CRP, and] that brings fear" (Senior Management Meeting, Field Notes, February 22, 2018). This created an uncomfortable environment where existing stories about the purpose and practices to enact CRP were being challenged by this new story.

In order for members of senior management to accept that a different model was needed, they needed time and education to understand and embrace what CRP is and how to utilize it as a strategy to address the systemic barriers that were hindering the academic achievement of non-White students.

Two Supervisors Focused on CRP: Different Results

The two supervisors of schools from the study were Norman, the supervisor who did not participate in the university cohort, and Christina, who did. Throughout the implementation of CRP in their district, they acted on what they felt was a moral imperative that was tied to their identities, which focused on an equitable and socially just education system. Both supervisors acknowledged the academic issues documented for Black and Indigenous students in their district. The difference between the two narratives is that Christina possessed more in-depth knowledge of CRP, the history of schooling for both Indigenous and Black people, and had the opportunity to put her learning into practice simultaneously.

For Norman (a non-cohort supervisor), his actions involved sharing the knowledge he already possessed from past learnings that made up his identity. This included emphasizing the need for educators to become "aware of [students'] culture…historically…knowing who they are today, knowing where they've come from, and the journey they've been on.". Norman believed that a key priority was that students' culture needed to be recognized first. He went on to explain that you could then use "that information when you make decisions for our schools." (Norman's understanding of the importance of students' culture as the basis for decision making reminds me of what Gay (2010) posited: "Culture is at the heart of all we do in the name of education" (p. 8).

Norman understood *why* CRP was important. However, he was just beginning to go through the decolonizing process himself. Therefore, he could only share his own story of CRP to the extent that it was developed and how it was strengthened by the messages from the Superintendent and through some materials shared with him by his colleagues who were in the CRP cohort.

Christina's (cohort supervisor) actions involved a deeper awareness of CRP and of how to implement it. Her learning within the university cohort provided her with more time to self-reflect about her own feelings regarding race and culture, and she also had the experience of being in continuous communication with her university cohort peers who were also making sense of CRP. Christina shared,

> The work that I've been doing as part of the cohort has been the best educational experience that I have had…it's given me the language, I think, and the ability to articulate around why this work is important. And the ability to support principals, and really look at practices and question them…We have to question ourselves, question our motives,

> question why we want practices to continue, who that works for, who that doesn't work for.

Through her experiences in the graduate cohort, Christina was also guiding her principals and other educators she worked with through the CRP journey.

Same District, Differing Journeys to CRP Leadership

Both of the school principals in the study started their journey with a willingness to implement CRP. Niles, the non-cohort principal, took actions based on the messages that flowed down from the district level. These messages were filtered through his supervisor, Norman (whose sensemaking journey is discussed above) For Niles (non-cohort principal), this resulted in a lack of deep understanding of CRP and a lack of knowledgeable support from those higher than him on the organization chart. Niles believed it was part of his role as principal to assist teachers in looking "through different lenses, instead of just maybe a White, Eurocentric lens." However, he also felt that CRP "a lot of times, it will depend on the classroom. The teacher is…the one that's in charge of that classroom." He was willing and had great intentions; however, he lacked the in-depth knowledge and experience required to lead the implementation of CRP.

Cassandra, the university cohort principal, through her learning and simultaneous actions to implement CRP in her school, was able to deepen not only her own understanding of the change mandate but also the understanding of her teachers. Her university learning gave her the opportunity to grow in her knowledge and confidence as an instructional leader. Cassandra shared,

> Being a leader is very complex…culturally relevant pedagogy, and the implementation of it at our [district] level, has completely changed me as a leader because it has forced me to reflect critically on everything. On my practice, on my communication with teachers, on professional practices, and where that fits…culturally relevant pedagogy, it drives the bus on everything…as a leader, after going through a year of conversations with teachers, about data, about everything that has to do with learning about kids, their stories, our community, it has just changed the way I align how I do business…I have grown).

Furthermore, she was learning CRP alongside her own supervisor and others who were in the cohort and who were in leadership positions within the district. This enabled Cassandra to look at the process of implementing CRP from a system's perspective. She viewed herself as a change agent within the system, which was both a benefit and a barrier for Cassandra. She had the knowledge and the willingness to implement CRP at her school site; however, those she relied on to support her teachers did not. The math and literacy consultants assigned to her school had received the same messaging from the district as all other non-cohort educators, so oftentimes, Casandra felt alone in her efforts. The convergence of experiences for Cassandra enabled her to advance CRP further in her own school than Niles was able to do, and she was actually well ahead of where the system, as a whole, found itself.

Culturally Relevant Teachers, Implementing What They Know

As with the other participants in this study, both Cory, a cohort teacher, and Nicole, a non-cohort teacher, were eager to put into action the learning they received about CRP. They were willing to do whatever they could with the knowledge they had to improve schooling for the children they served. However, they brought very different experiences that shaped the same change initiative and were provided with very different support for their sensemaking journey.

Nicole was an enthusiastic beginning teacher who had limited personal or academic experiences to equip her to understand racial and cultural differences. Cory was a mid-career teacher who had lived, worked, and studied in diverse contexts that supported his understanding of cultural differences from a more socially critical stance. Cory was provided with multiple opportunities to continuously reflect upon and practice being a culturally relevant educator. Nicole was given only a few very surface level opportunities to do this.

It is not surprising, then, that Nicole's understanding of the definition of culture is reminiscent of the original messages found in the district's Superintendent's Report (Superintendent Report, Oct. 2015) about CRP as linked to what the district was doing in terms of social justice and relational theory. When asked to describe CRP, Nicole (non-cohort teacher) stated: "But a lot of it [CRP] is, you know, making those connections with kids, based on their own culture, and understanding the why and how behind their behaviours and…, kind of, nature in our classroom". Her sensemaking journey of CRP closely matched her prior experiences and the surface level notions of CRP projected by her district. When asked what she would tell others about CRP, Nicole replied, "I usually start by talking about the fact that it is not about race…that we're talking about the different cultures in our area." Nicole's sensemaking journey followed along the same path as the other non-cohort participants in this study. The district's leadership messages impacted all non-cohort participants in a similar way. Without the benefit of professional learning about CRP and time to decolonize their thinking, actions from educators at each level of the organization chart remain relatively the same.

Discussion

As I began this study, my goal was to seek to understand how educators, with different roles within a school district, made sense of and implemented CRP. One of the findings was where individuals are positioned in the hierarchy of the school district greatly affects the depth of information they receive regarding the change initiatives. The hierarchy controls what information is granted to educators according to their positionality within the system. No matter what the intentions of the original messaging were, starting from the bottom of the organization chart, messages rely on how individuals on one level above made sense of the communication about CRP. The result of being constrained by the organizational hierarchy did not allow for the learning and decolonizing to happen for members throughout the district.

The three cohort participants, while implementing what they were learning within their specialized graduate program, were able to make changes to their practices to become culturally relevant. The cohort supervisor, Christina, while only able to work with the principals within her family of schools, was able to deeply influence these individuals in ways that she could not have otherwise. Cassandra, the cohort principal, was limited by the constraints from the lack of understanding about CRP from her district instructional supports but, nonetheless, was able to influence her own teachers quite significantly because of what she was learning in her cohort. Cory had the greatest ability to impact students and was successful in working with his principal to implement CRP directly in his classroom. On the other hand, the progress of the non-cohort members was stifled by a lack of learning and communication. The findings of this paper make it strikingly apparent for the need for deep-level learning to occur to effectively implement district-wide second order change through CRP and a method to communicate learning through the entire district.

A Mechanism for Deep Learning: University and School District Partnerships

School districts, due to the constraints of funding and time, are not able to create the conditions for deep learning required to implement CRP effectively. The learning required begins with the decolonizing steps. This includes, as explained by McCray and Beachum (2014) and Tuhiwai Smith (2012), having educations at all levels of the system reach the stages of critical consciousness, reflection, and pluralistic insight. This can only be accomplished by setting up a learning regimen that allows all educators to truly understand their own culture and its impacts on students who are of another culture. Educators have to recognize, value, and accept the cultural, learning, and communication styles of their students. Educators also have to understand how to incorporate this knowledge into their lessons (Gay, 2000; Hilliard, 1978). Educational leaders must internalize this learning and be prepared to articulate systemic issues when they are occurring and provide solutions.

To counter the issue of time and funding to provide such learning, school districts can easily partner with university faculties of education. School district-university partnerships make logical unions since both are responsible for improving educational leadership and teaching to improve student achievement. At the university level, classes are designed to provide both in-service teachers and preservice teachers the opportunities to increase their knowledge and skills in all areas of education by providing time, guidance, and opportunities to process their learning (Seller & Hannay, 2010, p. 197). Universities are not bounded by the same time restrictions and funding requirements as school districts. For instance, university faculties can work together in partnership with school districts to develop learning plans for individual schools, groups of schools, and leadership teams. Through such a partnership, school districts would have access not only to research but also to the researchers themselves (Glickman et al., 2014). The benefits of university partnerships would also extend to the universities. Researchers would have access to the field in which they are studying (Seller & Hannay, 2010). Once the learning has occurred, for at least the leaders of the district, the implementation of CRP can begin.

A New Model for Change

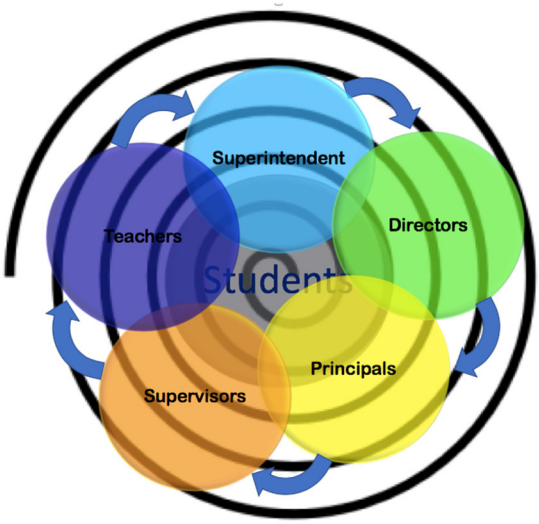
The findings for this study suggest that implementing CRP as a second order district-wide reform requires a model that allows for diffusion of CRP throughout the district. The stories of the research participants demonstrate how working to implement change within the stringency of a hierarchical system can be stifling and can create barriers between levels.

In order for CRP to be implemented effectively, a school district needs to move away from its business model, where information flows downward, to a model where knowledge and information can be diffused throughout the district. There needs to be a reimaging of the positionalities that would make up the membership of the team leading the implementation of the change. In a traditional school district's hierarchy, communication flows from the senior leadership team down to the teacher level, passing through the filters represented by the understanding of the directors, supervisors, and principals, to finally reach the level of impact at the student level. Using the top-down traditional method of communication and change is like trying to implement CRP by pouring information down a funnel—except the funnel has holes in it. What comes out of the end of the funnel is only what managed to survive past the holes. The surviving filtered product, streaming out of the funnel, is what is left to impact students. The surviving bits do not represent the totality of what needs to happen throughout all of the levels of the district to truly impact student achievement.

When thinking of change that permeates all aspects of the district, the knowledge, skills, and attitudes need to be diffused throughout the system to touch all individuals within the district, no matter their positionality. For this to happen, the leadership team should be comprised of members who have different organizational roles throughout the system and have acquired the necessary knowledge and reached a point of critical consciousness. For example, the leadership team would include the superintendent, directors, supervisor(s), content area specialists, principals, and teachers (See Figure 1). There also needs to be representation from the groups to which the change mandate is aimed. For the diffusion of CRP, that would require lead team members from the communities the implementation of CRP is meant to address: Black and Indigenous. In order for the diffusion of change to be successful, the leadership team needs to consist of educators that have already obtained the requisite knowledge. The leadership team would be the early adopters and be in a position to begin communication of the diffusion (Rogers, 1983).

Figure 1

Diffusion of Change Model for School Districts



Thinking of change as diffusion would allow the knowledge, skills, and attitudes within the leadership team to spread throughout the district and affect the enormous number of people required for the culture of the organization to change. Using the process of diffusion to implement CRP, the reimagined decolonizing lead team would be working, at the same time, through all the levels of the school board and collaborating with each other to implement CRP (Rogers, 1983). In a sense, the boundaries created by the hierarchical structure of the district (Weber, 1947) determines who gets to work with whom and how would become more porous and flattened. The sharing of information would be cyclical instead of top-down. In this way, the learning and sharing would be continuous and not be blocked at any level. (See Figure 1)

With a leadership team that has been immersed in the deep learning required to implement CRP, the starting story of the implementation would likely begin with asset-, rather than deficit-, thinking. Battiste (2013) noted that decolonizing education involves the unpacking of who controls the knowledge. A lead team that has already taken time to work on changing their individual stories through decolonizing and sensemaking processes could serve to affirm and honour students that are currently being harmed by colonizing practices in education. Hale (2001) and Kuykendall

(2004) both stated that Black children do not start school disadvantaged; however, it is through schooling based on colonialist and white supremacist attitudes and practices that they find themselves at a disadvantage. A lead team that represents the organizational and racial diversity of the system is much more likely to be able to delve more deeply into systemic issues such as racism and white supremacy, the eradication of which is necessary for the implementation of CRP. The leadership team would be focused on changing the culture of the organization through decolonization. This would, in turn, begin to interrupt the inequitable practices that have led to the achievement gap. CRP, implemented across a whole district, would start to live up to its promise to create an equitable school system (Gay, 2010; Ladson Billings 1995a/1995b).

Conclusion

This study is significant for several reasons. First, because the findings give educational leaders insight into what is necessary to create deep-level sustainable district-wide reform from the perspectives of educators within all levels of a school. This research also enhances the current thinking on educational reform and CRP by exploring it through sensemaking and decolonizing frameworks. Sensemaking and decolonizing, individually, are well-established theoretical frameworks (Battiste, 2013; Tuhiwai Smith, 2012; Weick, 1995) but have rarely been used together.

I recognize the results of this study are based on one school district in the province of Nova Scotia, Canada. However, this school district, as a bounded unit, had a similar population to most school districts in the province of Nova Scotia, being largely staffed with White teachers with a population of Black students. This makes this study transferable throughout Nova Scotia and beyond because the findings and conclusion have led to a model for effectively implementing CRP as a second-order reform across a school district.

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Pay Attention to This: A Knowledge Translation Study of ADHD and its Brain Basis to Preservice and In-Service Teachers

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Abstract

The purpose of the present study was to develop a knowledge translation (KT) activity for educators about the brain in children and adolescents with attention deficit hyperactivity disorder (ADHD). The goal was to increase our participants' knowledge about ADHD and its brain basis. In addition to neuroscience content, the KT activity included the personal story of the lead researcher's lived experience with ADHD to provide context, and to inform the participants' perceptions of ADHD. Framed in an action research paradigm, our study undertook three cycles of reflection, planning, action, and observation to develop and improve a knowledge translation activity. The knowledge translation activity was presented to 48 preservice and in-service teachers and members of the public across Canada, with a mixed methods approach to evaluate the outcomes. The findings demonstrated that this knowledge translation activity was effective in enhancing participant knowledge about ADHD. Quantitively, a non-significant trend was observed that participants shifted their perceptions from social and behavioural causes to brain-based causes of ADHD. Qualitatively, the participants indicated making connections between the personal story and neuroscience. Effective KT requires a review of context vocabulary and opportunity for teacher interaction. Teachers are aware of several behavioural management strategies but do not have a clear idea of how or why they work. Teaching neuroscience to teachers allows for a discussion of neurodiversity and a strength-based approach to programming and accommodation. This research could help guide future knowledge translation research into the benefits of combining personal lived experience with neuroscience content.

Keywords: knowledge translation, neuroscience, attention deficit hyperactivity disorder, lived experience, storytelling, action research, neurodiversity

Pay Attention to This: A Knowledge Translation Study of ADHD and its Brain Basis to Preservice and In-Service Teachers

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that can affect an individuals' performance in educational, occupational, and social situations (American Psychiatric Association [APA], 2013). An individual with ADHD may present with hyperactive symptoms (e.g., has difficulty sitting still, difficulty managing impulses), inattentive symptoms (e.g., often does not seem to listen when spoken to directly, often losing track of time or possessions), or a combination of both (APA, 2013). Advances in neuroscience have demonstrated that there are distinct differences in neural anatomy and neural processing among children with ADHD compared to typically developing children (Boon, 2020; Kasparek et al., 2015; Uddin et al., 2017). Scuitto et al. (2000) found that while teachers may know the signs and symptoms of ADHD, they are less versed in the course and treatment of ADHD. Teacher knowledge regarding ADHD-specific intervention is limited, and mainly low-intensity interventions are implemented in classrooms (e.g., preferred seating, body breaks, sticker charts) (Wesney, 2020). Teachers, thus, may be familiar with behavioural presentations of ADHD but may be unsure of how to best support their students using evidence-based practices.

Across Canada, the prevalence of ADHD is on the rise, from about 3% of 10–14-year-olds being diagnosed in 1999, to about 5% being diagnosed in 2012 (Vasiliadis et al., 2017). Students with ADHD are less likely to enroll in post-secondary education than both their neurotypical peers and youth with other mental health conditions (Statistics Canada, 2019). Children with ADHD face barriers that their peers do not, such as a lack of adequate support in transition periods (e.g., from elementary to secondary school, from high school to post-secondary) as well as lower parental expectations; in fact, the latter is so impactful, it has been shown to explain the differences between post-secondary education attendance between students with ADHD and other youth (Statistics Canada, 2019).

Boon (2020) has advocated for a systematic update in the professional development for preservice and in-service teachers to better support students with ADHD. Specifically, Boon (2020) suggested that an understanding of the neuroscience of ADHD will enhance understanding of students with ADHD and why they behave differently than other students. In this present study, in turn, we developed a knowledge translation (KT) activity aimed at increasing teacher knowledge of the brain basis of ADHD, in order to respond to the needs of students with ADHD and help teachers reflect on what is needed to provide this support. Further, we paired the neuroscience information with sharing the lived experience of a person with ADHD, with the goal of capitalizing on the benefits of storytelling for effective KT (Bourbonnais & Michaud, 2018).

Self-Location

As shown by other scholars in education research and informed by Indigenous research methodologies, there are benefits to the researcher explicitly identifying their positionality and approach to research (Gillies et al., 2014). In recognition of the value of this practice, Kathryn Isenor, the lead researcher, completed a self-location for this study, as follows:

> I am an undergraduate researcher who was diagnosed with ADHD in my third year of university. I experienced the difficulty of ADHD during childhood without diagnosis and without the assistance that accompanies it. This research is significant to me as an individual with ADHD because I know what it feels like to be an inconvenience in a

classroom. When I learned that there was a brain-based explanation for my experience, it changed the way I saw myself.

The better I understand ADHD, the better I can deal with it, which goes the same for people around me. This research is beneficial because merely knowing that there is a brain basis for these differences helped me, and I think it has helped others. As a student with ADHD, I was not intentionally disruptive or trying to make things hard for my teachers and classmates. I now know that children with ADHD can be intimidating and frustrating for educators because of the added complication of behaviour management, but I was never trying to be a difficult student. By improving understanding of ADHD, we can enhance interactions between students with ADHD and their teachers and hopefully make the classroom better for everyone involved. This research is so important to me because I want teachers to be considerate and understanding in their interactions with all their students, neurotypical or not. This knowledge translation research could impact so many students' lives.

Literature Review

Teachers are often ambivalent and unconvinced about the legitimacy of ADHD diagnoses and the brain basis of ADHD (Boon, 2020). Evidence shows that teachers with more knowledge of ADHD in general (symptoms, diagnosis, treatment) display less stigma towards students with ADHD (Toye et al., 2019). As well, descriptions of the biological explanation of ADHD reduce social distance between educators and their students (Lebowitz et al., 2012). Further, storytelling can enhance knowledge translation (Bourbonnais & Michaud, 2018). Thus, we chose to incorporate the lived experience of a person with ADHD into our KT activity. The main intention of this KT activity was to challenge ambivalent attitudes among teachers and reduce stigma surrounding ADHD by providing evidence of its brain basis (Haslam & Kvaale, 2015; Loughman & Haslam, 2018; Toye et al., 2019). We posit that by combining the brain content and personal story, we created an interesting, informative, and effective KT activity for educators.

While students with ADHD can present challenges to schools and classrooms, we propose that neurodiversity can also afford certain strengths and benefits to classroom environments. Equipping classroom teachers with neurodiverse perspectives can assist them in accessing the strengths and abilities of all students within inclusive classroom settings (Rentenbach et al., 2017). Often, students with ADHD who have adequate cognitive and interpersonal skills are able to find success in social and academic tasks, but it is their impulsivity and inattention to detail that may impact performance (Climie et al., 2017). Research exploring strengths of students with ADHD is limited (but see Hoogman et al., 2020), thus adopting a strength-based approach to ADHD is a worthwhile research endeavor (Climie & Mastoras, 2015). Thus, we explored a method of describing the neuroscience of ADHD, while centering a student with lived experience as the expert in delivering this information.

Building Educator Competency Through KT

KT is a process for changing attitudes and building understanding, which involves taking evidence borne from scientific research and translating it into consumable knowledge for a relevant audience (Davis et al., 2003), and bridging the gap between research and practice (Bennett et al., 2016). Despite its critical importance for enabling evidence-based practice, little research has looked into effective strategies for KT (Bourbonnais & Michaud, 2018; Zhao et al.,

2020).

Teacher professional development (PD) has been well discussed in the extant literature. Participation in PD is associated with improvements in teacher knowledge (Roehrig et al., 2012), self-efficacy in working with individuals with emotional and behavioural challenges (Latouche & Gascoigne, 2017), and more positive teacher attitudes towards working with students with ADHD (Zentall & Javorsky, 2007). Quality PD is generally teacher-led, involves discussion of topics that inform teacher practices, is focused on instruction, and is engaging and collaborative (Desimone et al., 2002; Hunzicker, 2011). In contrast, KT is generally researcher-led and empirically based, focused on taking the findings of scientific research and making them accessible to lay audiences. KT has demonstrated efficacy in supporting teachers and students in developing critical thinking and scientific knowledge (Jacque et al., 2013).

Much of the research into KT focuses on healthcare and public health (e.g., Chapman et al., 2020; Zhao et al., 2020). Even in these sectors, research into KT's effectiveness is still an emerging area (Bourbonnais & Michaud, 2018; Zhao et al., 2020). The use of research to inform evidence-based practice is less well-established in education compared to medicine (Hemsley-Brown & Sharp, 2003). Previous KT studies targeting educators have been focused on increasing competency in topics such as diabetes (Nichols & Norris, 2002), concussion (Provvidenza et al., 2019), and eating disorders (McVey et al., 2009).

Research on ADHD-related KT activities for teachers is limited. Past research has demonstrated that teacher knowledge about ADHD can be improved through participation in KT activities (Barnett et al., 2012). Barnett et al. (2012) used a web-based intervention for a 7-week knowledge translation activity which resulted in teachers' knowledge about ADHD positively changing. To our knowledge, there are no previous research studies investigating the effectiveness of combining a personal story with neuroscience research for educator KT.

KT Activity Content

Our research team developed a KT activity to share current neuroscience findings as they relate to ADHD, combined with the lived experience of having ADHD. The content included in the KT activity is summarized below.

Neuroscience

The neuroscience content was based on the work of Kasparek and colleagues (2015), in which many brain imaging studies were reviewed. Many brain-based factors may have a role in the presentation of ADHD, including changes in brain shape/size and connectivity between brain regions (Kasparek et al., 2015; Uddin et al., 2017). These changes are correlated with numerous clinical features, including executive dysfunction and co-occurring anxiety. Importantly, the current treatments can improve at least some of these processes in people with ADHD, and treatment-related benefits can be observed both clinically and via neuroscientific methods such as brain scans (Kasparek et al., 2015). Brain development trajectory is also different between children with ADHD and typically developing children (Shaw et al., 2007).

It is important to note that these brain differences do not always represent impairments, but rather may simply be differences. These functional differences vary from person to person, and individuals with ADHD can be high achieving and successful despite these differences (APA, 2013). As such, the KT activity described these brain differences in order to reduce stigma, and to help teachers better understand the mechanism of effective accommodations.

The notion of celebrating differences, rather than focusing on deficits, is related to the concept of neurodiversity. Neurodiversity refers to the ways in which different brains receive, interpret, and respond to social and environmental cues, resulting in different manifestations of behaviour. Neurodiversity was originally conceptualized and discussed by activists and researchers of autism spectrum disorder (ASD; den Houting, 2019), but has expanded to apply to other neurodevelopmental disorders such as ADHD and specific learning disorders (Armstrong, 2015; Sonuga-Barke & Thapar, 2021). A neurodiversity paradigm shifts the conversation from the student as having a disability, to an examination of the classroom environment as a disabling context where the student's success is limited due to its lack of hospitality, accommodation, or consideration (den Houting, 2019). Framing ADHD as an example of neurodiversity allows for teachers to consider not only the functional deficits experienced by students with ADHD, but also the complementary strengths and abilities. This further allows teachers to consider not only the accommodations that are required for students with ADHD, but also how an inclusive classroom can help students with ADHD to reach their full potential.

Personal Story

The following is a summary of Kathryn's personal story that was included as part of the KT activity.

> My experience with ADHD was as unique to me as anyone else with the diagnosis. As a child, I was enthusiastic and successful in school and a very quick learner. I was also easily distracted and constantly disruptive. Because I had a high reading level, teachers would often give me books to read to the class in order to keep me occupied. I struggled when I moved from elementary to secondary school because I had been given more attention and special treatment in elementary. As I progressed, school was less interesting because I was given the same amount of work as everyone else, so I got bored and would read in class or distract my friends. In high school, my priorities shifted and my attendance got worse. I rarely completed assignments, but I was still excelling on tests. As a child, I displayed many ADHD symptoms but fell through the cracks—maybe because I was a girl, or maybe because my grades were fine.
>
> In university, I lost all structure and things got worse. There were no repercussions for missing class or skipping assignments, so I did both regularly. Despite feeling like I was underperforming and failing, I could not push myself to get things done. After failing my first year and coming back on academic probation, I worked hard to stay afloat and come back from such a terrible year. In my third year, a university counsellor suggested that a lot of my struggles sounded like ADHD and she recommended I get tested. I was diagnosed that summer. Finally, it all clicked. I was not experiencing the same thing as my peers and simply doing worse, my brain is different. I cannot do the same thing and expect the same results because my brain is not the same. In my fourth year, I had support from the school, I had strategies to accommodate the differences in my learning abilities, but most importantly, I knew that there was not anything worse about me, I was just different. With the accommodations in place, I improved my grades enough to be accepted as an honours student (with special permission from the chair of psychology and the dean) and was able to do work I was proud of, finally feeling like I was meeting my potential. ADHD is not "solved" for me, but by understanding my brain and the fact that it is different, I am able to manage my symptoms and be kind to myself when I cannot operate like a neurotypical individual.

Research Objectives

Using current neuroscience research, our study sought to expand educators' existing knowledge of ADHD by discussing the brain basis of ADHD. By understanding the biological explanation for ADHD, educators can recognize why symptoms occur and better understand their students who are not neurotypical (Boon, 2020). We also integrated a personal experience with ADHD in order to help participants connect with the material. We sought to identify and challenge preconceived notions of ADHD among teachers and enhance understanding by explaining the brain science behind the symptoms of ADHD. We hypothesized that participation in our KT activity would shift teachers' attitudes away from social explanations (e.g., ADHD is a result of poor discipline), towards accepting neuroscientific explanations of ADHD.

Methods

This study utilized an action research framework to develop and refine the KT activity. Action research is a "sequence of self-reflective, ongoing cycles" (Bennett et al., 2016), meaning that the research is actively reflected on and revised as necessary. Action research is a critical method that intends to create and inspire change to a system. In the current study, the cycles of action research included the "reflect" phase (reflecting on what might need to develop or change), the "plan" phase (planning for change), the "act" phase (acting to bring about change), and the "observe" phase (evaluating the resulting change), then returning to reflection in the following cycle (Kemmis & McTaggart, 1988; Bennett et al., 2016). We planned three cycles for our study. For each cycle, we considered our own observations as well as the feedback from participants in order to plan and implement improvements for the next cycle.

The research team was led by Kathryn, an undergraduate student researcher, who has lived experience with ADHD. The research was supervised by professors from divergent disciplines. Erin Mazerolle is an assistant professor specializing in neuroscience. Conor Barker is an assistant professor and registered psychologist, with expertise in special education and inclusive classroom practices. The research team met for weekly meetings throughout the action research process as part of Kathryn's honours thesis in psychology.

Participants

The first cycle was delivered as a pilot to the research supervisors. The second cycle was delivered to a class of 19 graduate students in a Master of Education Inclusive Education class. The third cycle was an open public presentation targeted at teachers with 29 participants. Participants of the third cycle were recruited from social media, email, and word of mouth.

Measures

Participants were invited to participate in pre-activity and postactivity surveys. Across the latter two cycles, 41 participants completed the preactivity survey and 22 completed the post activity survey. Of our preactivity survey respondents, 42.5% were in-service teachers and 2.5% were preservice teachers. The remaining participants reported being either former teachers, individuals that worked with students in other capacities (student advising, educational assistant, community support worker, etc.), or did not state their occupation. The average (standard deviation) years of teaching experience among survey respondents was 10.6 (7.8) years with a range of 0 to 29 years.

The preactivity and postactivity surveys also asked participants to share experiences and strategies for aiding students with ADHD. Vignettes developed by Lebowitz and colleagues

(2012) were used to describe a student with ADHD without stating the diagnosis and attitudes were measured about this vignette (e.g., "To what extent is disruptive behavior the student's fault?"). The same attitudes were then measured in questions that specifically referred to a student with ADHD. The survey also asked participants to rate the degree to which ADHD symptoms are attributable to social factors and brain factors. Questions about attitudes were measured on a Likert scale that ranged from 1 (not at all) to 9 (completely). See Table 1 for the specific text used for the questions. The post-activity survey additionally asked participants to share their major take-aways and provide general feedback on the KT activity. The goal of the surveys was to compare attitudes about ADHD before and after the knowledge translation. We were also interested in teacher strategies for supporting children with ADHD to see if there was already knowledge in place of how to help these students.

Data Collection and Analysis

In addition to the preactivity and postactivity surveys (see description above in Measures section), an audit trail of the action research cycles was also completed (Wolf, 2003) which include collected items such as a personal journal on the process and progress of the activity development, feedback from the research supervisors, and minutes from all research meetings. Preactivity and postactivity differences in responses to survey questions about attitudes were compared using a Wilcoxon signed-rank test in SPSS 26. Qualitative data were summarized using a simplified thematic analysis (Braun & Clarke, 2006).

Results

Summary of the KT Activity

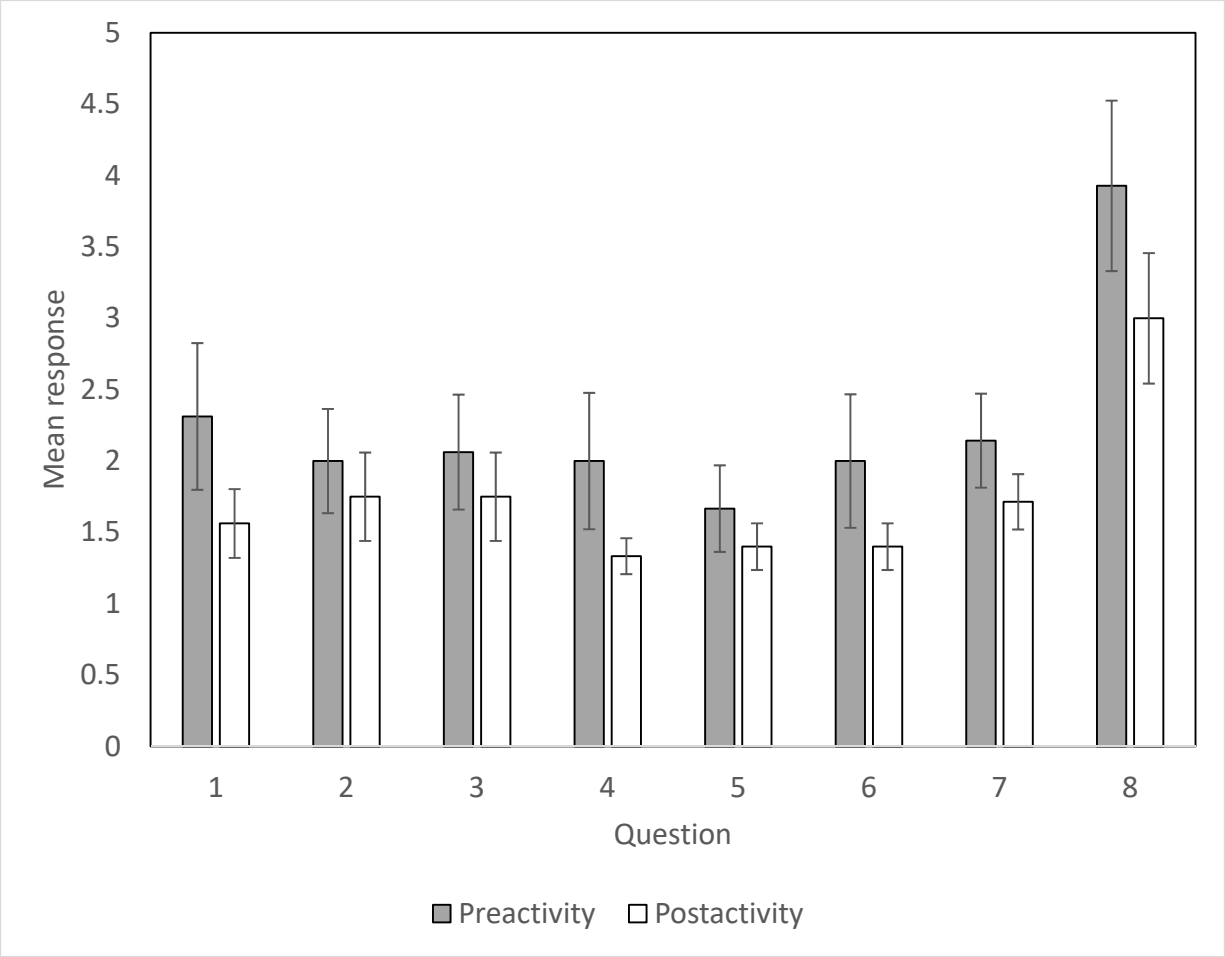
The KT activity covered Kathryn's personal experience with ADHD, discussed a number of brain content topics surrounding ADHD, and closed with a discussion about neurodiversity that was linked back to the personal experience. Some specific content included challenging ADHD myths, explaining executive functioning, and comparing neurotypical brain development to brain development in children with ADHD.

Quantitative Results

Across both Cycles 2 and 3, 14–16 participants answered the questions about attitudes towards ADHD on both the preactivity and postactivity surveys, depending on the question. Given the small sample size, we opted to combine the quantitative data from both cycles. Wilcoxon signed-rank tests showed no significant differences between preactivity and postactivity ratings for any of the survey questions ($p > .05$). However, all questions trended toward a change in attitude in which participants placed less blame on individuals with ADHD and rated ADHD as more attributable to neurological factors than social factors post-activity. Figure 1 shows the mean responses to the Likert scale survey questions preactivity and postactivity, with error bars representing standard error. The text of the questions can be found in Table 1. Lower numbers represent assigning less blame to individuals with ADHD and/or greater belief in the brain basis of ADHD ($p > .05$ for all questions, Wilcoxon sign-rank tests). Table 1 provides the questions that were asked of the participants.

Figure 1

Mean Responses to the Likert Scale Survey Questions Preactivity and Postactivity



Note. The text of the questions can be found in Table 1. Lower numbers represent assigning less blame to individuals with ADHD and/or greater belief in the brain basis of ADHD. N=14-16 depending on the question ($p > .05$ for all questions, Wilcoxon sign-rank tests). Error bars represent standard error.

Table 1

Questions From the Likert Scale Survey Questions Preactivity and Postactivity (from Lebowitz et al., 2012, used with permission)

Vignette for questions 1-3.	
Andrew is an 8-year-old boy who has been having some difficulties both in school and at home. In class, he often has difficulty staying focused and paying attention. He fidgets and squirms in his seat constantly, and the teacher often has to repeat directions for him multiple times. He becomes easily distracted, missing details, and forgetting to turn in homework assignments. While the rest of the children are quietly working, Andrew is often up and out of his seat, roaming around the classroom. At home, Andrew is often impatient and often is unable to control his emotions. He becomes bored with tasks easily and frequently interrupts his parents' conversations and activities.	
Question 1	Suppose that Andrew receives the treatment that is standard for problems like his but no improvement occurs. To what extent is this due to Andrew's lack of self-discipline or willpower?

Question 2	Suppose that other children who sit near Andrew in class are distracted by Andrew's behavior, which negatively impacts their learning. To what extent should Andrew be reprimanded or punished?
Question 3	Suppose that Andrew is failing in school. To what extent is this due to Andrew's lack of self-discipline or willpower?
Prompt for questions 4-8.	
Consider a student that has a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD).	
Question 4	Suppose the student receives the treatment that is standard for ADHD but does not improve. To what extent is this due to the student's lack of self-discipline or willpower?
Question 5	Suppose that other children who sit near the student in class are distracted by their behavior, which negatively impacts their learning. To what extent should that student be reprimanded or punished?
Question 6	Suppose the student is failing in school. To what extent is this due to their lack of self-discipline or willpower?
Question 7	To what degree do you attribute ADHD symptoms to the brain? (Note: responses to this question were reverse coded for the purposes of the graph)
Question 8	To what degree do you attribute ADHD symptoms to social factors? (e.g., parental discipline)

Qualitative Emergent Themes

Eighteen participants across Cycles 2 and 3 completed postactivity survey questions which were used for the simplified thematic analysis. The findings for each theme we identified are described below.

Activity Design

Our study found a few points of interest regarding the design of the activity. First, we found that the participants required the language of the activity to be accessible and understandable within their context. Much of the language and vocabulary used in neuroscience is not typical day-to-day vernacular for preservice and in-service teachers. Terms such as *volume reduction, cortical maturation,* and *frontostriatal dysfunction* require some form of introduction or contextualization in order to be understood and valuable among the teacher participants. As we simplified the language used to communicate complex neuroscience topics, we noticed an increase in the number of comments from participants suggesting improved retention of the neuroscience content.

Further, we found that the participants benefited from an opportunity to discuss and engage with each other about the content as part of the KT activity. As one participant indicated in the feedback form, the activity could be improved with:

> Longer time in the break out or a facilitator that provides more opportunity for the group to speak. Less questions to discuss in the breakout room, seemed to [*sic*] big to get to the heart of the discussion in the time allotted.

Even in short KT activities, teachers strongly value the opportunity to discuss with peers their thoughts and reflections as it comes to teaching and teaching practice, even with teaching

peers they have not previously met before.

Teachers' Needs and Strategies

When looking at the needs and strategies of teachers, we found that participants identified many strategies for working with children with ADHD. Participants in the second cycle (graduate students in a Master of Education Inclusive Education class) were able to identify five types of interventions: behaviour management (e.g., body breaks), student engagement (e.g., allowing them to integrate their interests), academic adaptations (e.g., allowing them to be graded on different types of assignments), teacher behaviour (e.g., maintaining communication with students' guardians), and environmental accommodations (e.g., different seating arrangements). In the third cycle (public), participants identified strategies from the following categories: behaviour management, teacher behaviour, workload management (e.g., chunking up assignments), and inclusivity (e.g., assignments that allow multiple grading options). Despite identifying several strategies, multiple participants indicated they wished that additional strategies were explored as part of our activity. For example, one participant stated that they felt more time should have been spent on strategies, suggesting "A bit more of what teachers can do in the classroom" would be useful going forward. Our presentation did not specifically include strategies for teachers, but it indirectly provided neuroscientific explanations for why strategies are needed or why they may be effective.

The apparent contradiction of knowing many strategies and still wanting more suggests that teachers may not have a working knowledge of how these strategies can assist children with ADHD in being more successful in the classroom, or how to implement the strategies effectively. A discussion of strategies Kathryn has personally used to manage ADHD was also included in the KT activity. One participant stated that this content expanded the way they think about ADHD management: "I have moved from thinking only about classroom accommodations, pediatrician referrals etc. to what do students need to be successful once they have completed school and need to exist as a successful citizen."

Role of Sharing Personal Experience Within Knowledge Translation

We made numerous observations related to the inclusion of personal experience in the KT activity. First, the method used to personalize the presentation was affected by the online nature of the delivery of the activity. Pictures of Kathryn as a child attending elementary school, and the use of artifacts such as her university transcripts helped to illustrate her personal story and allowed participants to better link it to their own students. From the activity, Kathryn shared:

> I was diagnosed that summer. Finally, it all clicked, I wasn't experiencing the same thing as my peers and simply worse, my brain is different. I can't do the same thing and expect the same results because my brain is not the same.

Near the end of the activity, during a story about Kathryn's grandfather and the benefits of neurodiversity, more childhood photos were included as well as one with her grandfather. From the activity, Kathryn shared:

> He was passionate, full of life, hard-headed and loved for who he was. He was praised for the things that would have labelled him as having a disorder, and if that doesn't show what a strength neurodiversity can be, I'm not sure what else to tell you.

These features of the presentation increased personalization to counter the depersonalized nature of online presentations.

A major focus of the personal aspect of the presentation was to emphasize the individual differences and unique experiences of those with ADHD. For example, Kathryn linked her own experience of a relatively late diagnosis to gender differences in ADHD diagnosis rates and symptoms. This difference was something that connected with the participants, as one stated: "It was powerful to hear a first-hand account of ADHD in females." One participant stated: "I appreciated hearing the info/story from someone with the 'lived experience.' Much more powerful and effective, as compared to reading from an article/book."

Benefits of Brain Content

The delivery of the neuroscience of ADHD was a crucial aspect of our study. This component benefitted the most from the iterative process of the action research methodology we used. One example of this is an improvement to our discussion of typical brain development compared to brain development in those with ADHD. In our second cycle, which was delivered to graduate students, one participant asked about the difference between typical executive functioning development of adolescents and the executive functioning impairment of ADHD. We speculated that teachers may tend to contextualize their knowledge of children with ADHD via comparisons with typically developing children. In the following cycle, we expanded on this content by including a video comparing brain maturation in typical children and children with ADHD. Another point of the presentation that benefitted from multiple iterations was the topic of neurodiversity. We alluded to neurodiversity in early versions of the presentations and expanded on it greatly in the final presentation. Discussing the benefits of neurodiversity can counter some of the negative connotations of the word "disorder," as well as the negative experiences teachers may have had in the past. While categorization is useful for understanding and adaptation, it can also marginalize individuals in a way that ignores potential strengths they have due to their differences.

As well as giving our participants a greater understanding of their neurodiverse students, this study intended to use the explanation of neuroscience to destigmatize ADHD and reduce the emphasis on the social determinants of ADHD (e.g., poor parenting). Teacher professional development discourses regarding ADHD are often more focused on reducing disruptive symptoms rather than the disabling classroom environment. A shift towards improving inclusivity in the classroom could help students with ADHD flourish and find success.

Discussion

This study used action research methodology to develop a KT activity for educators on the neuroscience of ADHD. Our work was novel in that we included a personal story from an individual with ADHD in the KT activity. Participants reported connecting with the personal story. We also observed a non-significant shift in attitudes among our participants, towards assigning less blame to students with ADHD and attributing ADHD symptoms more to the brain than social factors.

Knowledge Translation Activity Effectiveness

We reached 48 educators in the final two cycles. The most consistent feedback received was appreciation of the personal story and recognition of the differences among individuals with ADHD. Many of the major take-aways from the survey and discussions were facts about ADHD that were directly connected to the personal aspects of the presentation. Some of these were individual differences and appreciation of our message of hope for students with ADHD.

Another major take-away was that our participants were not aware of the differences in presentation of ADHD in girls. Girls tend to be underdiagnosed in part because ADHD is more common in boys and so people do not look for it in girls (Quinn & Madhoo, 2014). As well, girls tend to present more often with inattentive symptoms rather than hyperactive symptoms which get more notice (Quinn & Madhoo, 2014).

Another interesting finding was that while our participants identified several strategies that can support students with ADHD, they continued to solicit additional strategies. The purpose of our KT activity was to review the neuroscience to help teachers understand how and why these strategies work rather than to expand teacher strategies that they already know and are using. Neuroscience knowledge may help teachers implement the strategies more effectively in the classroom as it provides them with a scientific understanding about how they are used not to manage student behaviour but rather to increase a child's performance potential. This, in turn, shifts teachers' perspectives towards understanding, accepting, and valuing the contributions neurodiverse students bring.

Action Research for Developing a Knowledge Translation Activity

Action research was an effective method to develop this KT activity. Multiple cycles were performed, allowing for reflection and enhancement with each iteration. Improvement in the quality of the activity took place over the course of the research in a structured, documented manner. Over the course of development, the action research approach changed this activity to enhance the personal aspect. It also provided multiple opportunities to reflect on and refine the brain content.

The research team included experts in both neuroscience and education. By combining these areas of expertise, we were able to better serve the target audience of preservice and in-service teachers. We found that the iterative nature of the action research method, which provided multiple opportunities to integrate the expertise from both fields, was a highly effective collaborative approach.

Value of Self-Location and Sharing the Personal Story

Self-location is the practice of identifying yourself and your perspective within the research (Gillies et al., 2014). Kathryn used self-location to gain awareness of her perspective and to share it explicitly. Through self-location, she identified herself within the study and provided context. This practice helped the research team value the personal experiences shared and recognize the benefits in acknowledging the role of those experiences in motivating and informing the research process.

In fact, we found that inclusion of the personal story was a major strength of the KT activity we developed. From the qualitative data, feedback was consistent in the appreciation of the personal story. The "major take-aways" reported by participants were directly connected to the personal story shared (e.g., the uniqueness of ADHD presentation among individuals, the strength of embracing neurodiversity). The questions asked by participants during the final question period were mostly personal rather than general or focused on brain content. It was inspiring to observe that participants connected with the material through the personal story. This observation was consistent with previous evidence for the effectiveness of storytelling for KT (Bourbonnais & Michaud, 2018).

Interdisciplinary Challenges and Opportunities

This research was developed by a team of researchers each bringing their own experiences and expertise to develop the best possible KT activity. Interdisciplinary research brings both challenges and opportunities and was a great strength to this work. A neuroscientist is essential in order to present accurate and relevant neuroscientific information to our participants. However, the work that is done in neuroscience is a very different style to the more qualitative nature of this research. Evaluation of KT greatly benefits from qualitative perspectives, which allow deeper insight into the impacts of the activity than a Likert-style survey could ever provide.

Limitations

Due to the ongoing global pandemic, our KT activity had to be presented online. Both the activity and the survey participation may have been impacted by the online format. An in-person presentation would have been preferred because the personal story may have been more impactful. If surveys were distributed in person following the activity, we may have achieved a better response rate.

Participants may have had more positive or neutral attitudes about ADHD or brain science at baseline than the larger population because the activity was advertised as a presentation about ADHD and the brain. This may have played a part in the lack of significant attitude changes, because participants may have entered the study with higher-than-average positive attitudes about ADHD (Zentall & Javorsky, 2007).

Our results indicated a trend toward a change in teacher attitudes, but did not necessarily result in any change in teacher practice. Similar limitations have also been reported by previous studies in that we may have improved teacher self-efficacy and knowledge, but we may not have made a change in teacher practices (Barnett et al., 2012; Blotnicky-Gallant et al., 2014; Latouche & Gascoigne, 2017; Zentall & Javorsky, 2007). We recognize, however, that our goal was not necessarily to change teacher practice, but rather to explore the outcomes of combining neuroscience with the use of personal story.

Finally, due to the COVID-19 pandemic, our KT activity was delivered in an online format, which provided both opportunities and challenges. One opportunity was that we were able to deliver our activity to teachers and members of the public across Canada during our third cycle. We also were able to record our session for others to view on their own time. Some participants had limited opportunity to participate due to poor internet connectivity, particularly among rural participants. To accommodate participants with poor internet connectivity, we opted not to include a video of the presenter, which likely had the effect of reducing personal connections made between the presenter and the audience. We also had a low response rate to our survey, with only 37.5% of participants having completed the surveys.

Areas of Future Work

While the ongoing global pandemic did provide a complication in terms of how the activity would be ideally presented, the online format may be ideal for distributing the KT activity more broadly. Future efforts will be made to create a video with this presentation to make it available to more people. This format will limit audience participation and interaction but will also improve accessibility. One way of simulating the audience participation aspect could be to include an intermission in which the participants are asked questions about the topic. This could provide that opportunity for reflection in the asynchronous online setting that the discussion

groups were attempting to achieve.

While the KT activity in our final cycle included content on the benefits of neurodiversity in general and related anecdotes from Kathryn's life, future iterations could include more research results related to the positive aspects of ADHD. This is still an emerging area of research, although there is some evidence from meta-analysis that subclinical ADHD is associated with enhanced divergent thinking relative to both typically developing individuals and individuals with clinical ADHD (Hoogman et al., 2020). As this research continues to evolve, our important message of the benefits of neurodiversity can be refined.

This research could serve as a template for combining personal lived experience and neuroscience for KT activities on other neurodevelopmental disorders, such as ASD, specific learning disability, or intellectual disability. More teacher education on the brain basis of these disorders could improve the classroom environments for all kinds of neurodivergent students.

Conclusion

In conclusion, this study found that action research methodology applied to knowledge translation was effective for developing a KT activity to educate teachers on the brain basis of ADHD. We found that many participants reported connecting with the personal experience content, suggesting that combining lived experience and neuroscience content may be a powerful approach for future KT efforts.

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"Gratitude to Old Teachers": Leaning into Learning Legacies

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Abstract

Amongst a group of poet-scholar friends, all of us students of the American poet Robert Bly, we often speak of our "gratitude to old teachers," the title from one of Bly's (1999) poems. We cherish a meditative awareness of deeply rooted presences holding us up, buoying us as we stride across "Water that once could take no human weight" that now "holds up our feet / And goes on ahead of us." What is this mystery? Through the love and support of "old teachers," we are held, led, and supported, into an unknown future that, without their guidance, we might never have reached. Many of Bly's students (myself included) refer to how meeting him "changed" or even "saved" their lives. Similarly, I could say this of meeting and studying with Canadian curriculum scholar and poet Carl Leggo. Practicing gratitude to old teachers fosters vital pedagogic engagement and personal connection in a world often fraught with isolation and despair. Reflecting on how these poetic influences have inspired and guided my own personal and professional life, this essay ruminates on grateful legacies within literary and curriculum studies, and beyond.

***Keywords*:** gratitude, curriculum studies, mentorship, poetry, poetic inquiry

"Gratitude to Old Teachers"— Leaning into Learning Legacies

To Robert Bly (1926-2021)—Teacher, mentor, friend in mythopoetic forays

Gratitude to Old Teachers
When we stride or stroll across the frozen lake,
We place our feet where they have never been.
We walk upon the unwalked. But we are uneasy.
Who is down there but our old teachers?

Water that once could take no human weight—
We were students then—holds up our feet,
And goes on ahead of us for a mile.
Beneath us the teachers, and around us the stillness.
~ Robert Bly (1999)

The title of this essay originates in Robert Bly's (1999) poem of the same name, a phrase that has become a reflective mantra of sorts amongst a group of poet-scholar friends, all of us former students of Bly's. Often associated with deep image poetry (Poetry Foundation, 2020), Bly (1975)wrote narratively, using imagistic "leaps" that describe "a leap from the conscious to the unconscious and back again, a leap from the known part of the mind to the unknown part and back to the known" (p. 1). Following the example of deep image poets such as Federico Garcia Lorca, Bly's (1975) goal in "leaping is the ability to associate fast" (p. 4), creating a spark, a sense of spaciousness, room for the imagination to soar (or dive deep) into unmapped psychic territory. Take this image of the frozen lake; we walk atop our old teachers (is that even respectful, we wonder?); there is something uneasy, as Bly said; almost eerie. Will the ice break?

This is the poem's brilliant leap, for here, fear gives way to trust: our old teachers will hold us up. We will not break through the ice of life's long crossing and be lost. As seasoned travelers know, there is no guarantee of outcome, and caution must always prevail. But we are guided, led even, and we are supported. We are shown the way by those who have gone before. We are even *held aloft* atop their generous shoulders, like a capricious child, riding when we are tired, too tired to walk on our own. Read the poem again; savor its mysterious images, its gift of companionship, its words of power.

My title also references an idea oft-repeated by Carl Leggo in conversation with students and colleagues: that is, to *lean in* to things, meaning *everything*, whether that be learning, or writing a poem; trouble or grief; likewise, joy, pleasure, or challenging new growth—"*leaning*" as a way of being, of coming close(r) to things we might not otherwise be sure how to approach. Carl's philosophy of leaning guided his pedagogy, modeling how we, his students, might also *learn to lean*, thereby easing ever more gently into unknowns, ever more creatively into the knowns, assuming a stance of *flow*, of openness, willing to find out; *becoming* in process with our lived

experiences. This offering, then, includes Dr. Leggo's signature suggestion to *lean into* things, out of poignant gratitude to him for helping me bridge the worlds of my poetic and scholarly endeavors (already always in overlap!).

The idea, nay, *ethos,* of a gratitude to old teachers has changed how I hold and carry former teachers within me, in heart and mind, and how I honor teachers currently walking beside me, with a reverence that travels backwards and forwards in time, going back to bring the past forward into the future, toward my students-yet-to-be, where they too will reap the gifts of my teachers with/in me.

Gratitude to old teachers means gratitude for what is given—what we are taught—and gratitude for grace, for when and where we are led to our teachers by forces that can only be described as serendipitous, gratitude that teachers, whether they know it or not, often call to us, compelling us, long before we arrive on their doorsteps. Take my example of meeting Robert Bly in person for the first time. Arriving at the Great Mother and New Father Conference (begun by Bly in 1975), I took a wrong turn, and instead of finding the registration tent, I wound up at an old carriage house on the property. I walked up the stairs on the side of the building, to what looked like an apartment upstairs. I knocked, to ask for directions. A woman who I did not recognize opened the door and started to tell me where to find the main camp buildings. Just then, a shock of white hair poked round the door jamb, looked inquiringly at me, but without asking who I was or what I needed, the man whom I almost instantly recognized (from pictures on book jackets) as Robert Bly, said to me, "You're Persian, aren't you?"

He was right, of course, and thus began a long and fruitful mentorship, where I—like many—say that meeting Robert has significantly "changed" or "saved" my life. (The woman who had opened the door was Ruth Bly, Robert's wife, and a beloved "old teacher" in her own right.) We are a tight-knit group of poets, singers, artists, and rebels, all committed to this journey where, Rumi (as cited in Çitlak & Bingül, 2007, p. 81) reminds us, "Ours is not a caravan of despair" (p. 81); traveling along, poetically aspiring, we follow the music, listening to the song of our old teachers in the earth, rising up to show us the way.

Bly's correct identification of my ancestral heritage from Iran led me to study with renowned Rumi scholar, Dr. Parviz Sahabi, in Vancouver, BC. This, in turn, allowed me to fulfill Robert's request of me, "to hear some Rumi in Farsi from you next year" (personal communication, June 8, 2004). The following June, on a remote loon-filled lake in Maine, thanks to Robert's initial charge, and Dr. Sahabi's excellent tutoring on melodic and metaphoric nuances of the Persian language, I recited the opening lines from Rumi's long teaching poem *The Mathnawí* (1925/2013)*,* colloquially known as "The Song of the Reed Flute,"in Farsi, to the accompaniment of a sitar's melodic murmur, the tabla's soft heartbeat, and Robert's approving nods, fingertips dancing invisible notes in the dawn's glowing air.

> *What you seek is seeking you.*
>
> ~ *Rumi* (1247/1995)

> Rumi says, Lovers are in each other
> all along. What I'm moving toward is
> moving toward me: I don't know why

we haven't collided yet!
A pedagogy of the moment,
what you seek is seeking you
like gravity, magnetic pull
the moon's metonymic orbit.
Opposite attract.
What you seek is seeking you,
sleek trickle now a surging stream
river winding, meandering
home to the sea, where I see:
what I seek is seeking me,
revealed, salt-soaked and glittering,
there inside me all along.

* * *

Winter Solstice (For Robert Bly)

Christmas night
solar eclipse in Capricorn

no stars in this black Sierra sky

just solitary snowflakes
falling on a heavily blanketed
white shore
melting swiftly
in the lake's gaping black mouth

In the heavens
Jupiter poised to play
Saturn, the taskmaster,
reclining into a well-earned rest

this winter night

unnaturally still
hushed
as the sun's covered face
on the world's other side
casts its shadow northward
time
stands still
axis poised
wheel
turning

darkness shrouded in celestial quiet
murmuring chatter of animals
agape
at midnight's gift of speech,
marvel
peace of a child's heart
our guiding star

Light returns,
sun shrugs off night's veil
dark waves lick the shiny ice cream shore

Will Shakespeare was one of my first "old teachers." Along with Emily Dickinson and Robert Louis Stevenson, Shakespeare led me into poetry, and a different form of pedagogy, among staggering shadows, colored lights, a blackened stage, some magical words tossed to the floor like so many loaded dice. Working with a Shakespearean youth company in the U.S., Will (and company director, Richard Carter) introduced me to Dr. George Belliveau, professor of drama education and research-based theatre at University of British Columbia-Vancouver, who was studying our little-company-that-could, and suggested that I introduce myself to Dr. Carl Leggo. Carl welcomed me as his master's student in poetic inquiry and a/r/tography, encouraging my scholarship in rhizomatic lines of flight interspersed with poetic reflection. My world has never been the same since; Carl's mentorship led to other teachers, mentors, and friends too many to name in this short space, but for whom my gratitude continues to grow, reverberating backward and forward in time and space, spreading the love of gratitude for an old teacher.

Reverberations of gratitude remain with us, even after death, through the veils, where these reverberations buoy us and carry us forward through our days in mysterious, often pedagogic, ways. In April 2019, walking on a bluff outside Metchosin, BC, I came upon a patch of wildflowers that I didn't recognize. Upon closer inspection, the words "Fawn lily" came to mind*, though I had never seen this flower before*. Then, suddenly, I thought of Carl Leggo, who had just died that March, and I vaguely recalled . . . had he written about fawn lilies? But how could I know what they were, having never seen them before? I started to doubt myself, yet in what felt like a sharing across the veils, I looked up "Fawn Lily" on my phone. Also known as Wild Easter Lily (thus connotative of resurrection, redemption, and new life), riotous clumps of the cream-colored blossoms dotted the mossy headland. Was it a feeling-tone that called out to me? *Was it Carl?* Delicate petals sweeping up like an elaborate headdress behind a prayerfully bowed face reminded me of Carl's long, white hair flowing from his regal deportment. Such mysteries reverberate and return in different shapes, colors, voices and teachers: unexpected surprises, gifts and grace all.

That spring, I made a flower essence from these beautiful white flowers, wanting to somehow preserve this sense, the taste and delicate scent, of a friend of Carl's: to imbibe this elixir, its healing vibrations, to take in to my own systems and soul some distillation of the friend Carl was to me, the teacher and guide, as well as the general healing properties of this lovely wildflower. Now, I know, of course, that technically a flower essence cannot be made of another person's spirit . . . or do I? In the realm of vibrational essences (such as crystal or flower essences), what do I know? I listen to my guides, seen and unseen, and I follow my heart (as also in writing, teaching, and scholarship). Mostly, all turns out well. And as for what I don't know? I learn to relish and trust unknowing (Seidel, 2017) and that which is unknown ever more fervently. For just look at the gifts that come from unknowing, like the name of a wildflower never seen before, or communion with a departed friend on an airy springtime afternoon.

As it turns out, White Fawn Lily flower essence "helps you settle into deep loving introspection and reverence for all life. This inspires the nature of your gift to the world, the gift of Peace and your authentic self" (Tree Frog Farm, 2020, para. 2). If that does not sound like the essence of Carl Leggo's spirit dispersed in liquid droplets of a vibrational remedy, I don't know what else might . . . other than starlight, wind song, or the sound of one's own beating heart.

Another long-time teacher-friend to whom I offer unending gratitude is Nils Peterson, a friend and peer of Robert Bly (who, nonetheless, considers himself a student of Bly's). Peterson is a professor emeritus of English at San Jose State University in California: a tall, gangly,

unassuming, and unabashedly-in-love-with-poetry poet, Nils has gained quite a reputation among our raggle-taggle writing group for delivering excellent poetry prompts. Given the 2020 cancellation of the annual "Great Mother Conference" (as it's affectionately known), we held an online version, and one day, when someone was talking over Zoom about Higgs Boson (an elementary particle in particle physics), Nils misheard the statement as "pigs' bosoms." He was so taken with what he thought he'd heard that he suggested it as our daily prompt. Although we immediately corrected him as to what he'd (incorrectly) heard, the catchy prompt stuck!

On Pigs' Bosoms

It's a long way from particle physics
to pigs' bosoms—or is it?
Slip of the tongue, and Higgs Boson
enters the ear like a wave on the surface
of the particle sea, pigs' bosoms, and the poet
hears a prompt in that ample welcome
(innermost recess, enclosed place, abode
of tender affections, inclination and desire).
A pig's bosom,
tender underbelly lined
with succulent mammaries
a harbor of teats
cherished nectar's source concealed
like Higgs Boson, hiding in plain sight
beneath a mountain in Cern
where farmers on the Franco-Swiss border
wonder why physicists study stars
in a particle collider underground instead of lying prone under a night-lit sky looking up.
Two sisters in their 80s
greet wonder every night
beneath that starry sky
gazing up to see with naked eyes
what their father showed them when they were small
what a collider reveals in light years
the whirring firmament
the motion of time.

This must be a little like pigs' bosoms

great turners of the wheel of life,

twelve piglets suckling a mystical sow

ample concealer hidden from view

tails whirling to conjure daylight worlds

in a dance of particles

between linguistic understanding
and the wealth of wisdom
in a pig's bosom

all the matter we know.

Carl Leggo (2019) said, "Learn to lean on uncertainty." This must be a bit like walking across frozen water; *we place our feet where they have never been*. We trust. In that stillness all around, we listen for the voices of our old teachers, guides on the road that lies ahead. *Water that once could take no human weight*—our forays in personal and professional lives—*holds up our feet.* Miraculous. Gratitude to old teachers, never-ending, carries us forward on invisible waves of support, and extends forward in time to new teachers-in-training, welcoming them into a community of "old teachers," where they, too, will become someone's mentor, part of someone else's story, someone else's memory of an encouraging word along the way, of loving hands on your shoulders, eyes imploring your own, "Keep writing. Whatever else you do, *keep writing"* (personal communication, Carl Leggo, July 3, 2013).

This final poem refers to Mary Oliver's (1992) poem "The Summer Day" in its narrative queries to another poet and "old teacher." Piggy-backing on another poet's words is a technique known in poetic pedagogy as "mirroring" or "scaffolding." Mirroring can be an effective homage to beloved teachers, or simply a scaffolding technique that moves the poem's narrative along, in the case of this poem, hopefully both.

Practicing gratitude to old teachers fosters vital pedagogic engagement and furthers personal connection between generations of scholars, inspiring hope in a world fraught with isolation and despair. Reflecting on how these poetic influences have inspired and guided my own personal and professional life, I hope I contribute, in turn, to grateful legacies within poetry, education, and worlds of inquiry and transformation yet to come.

To Carl Leggo (1953-2019)

In April, month of resurrection,

I am alive and you are dead.

I wish you were not dead.

I wish you were here to enjoy

this fulsome day dawning

in your inimitably lyrical
witty and alphabetical way.

You are not here,
and I am alive.

Just as Mary Oliver
(your favorite poet)
asks, I ponder
that one wild and precious question
since you've been gone.
And you are not here
to console or advise.

I think to myself,
'What would Carl say?'
Several times already this has worked
to calm and guide me
(the way "calm"
rhymes with "Carl")
to *lean into*
ways of thinking
I think your heart,
nestled in the heart of pedagogy,
would promote
and lovingly approve:

Live poetically.
Alive in all our senses.

Yet today, I simply miss you,
yearn to hear your voice
in the ear of my heart

see your eyes sparkle
with joy and *pathos,*
mirroring my delight
in this holy life.

How adventuresome you must be
in your new incarnation,
daisy, star, apple tree,
ocean, bird, bumblebee.
Who else have you become?

Remembering you,
what *will* I do
every day
with this,
my most wild
most precious
life?

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A Review of *French Immersion Ideologies in Canada* by Sylvie Roy

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French Immersion Ideologies in Canada, the landmark work of Dr. Sylvie Roy from the Werklund School of Education at the University of Calgary, synthesizes and interprets over 15 years of groundbreaking French immersion research. The author draws from substantive empirical data gathered from educators, parents, and students alike, providing deep insights into the taken-for-granted beliefs and perspectives of such stakeholders. Building on the adjacent theoretical perspectives of Heller's (2011) critical sociolinguistics and Blommaert's (2010) sociolinguistics of globalization, Roy advances the framework of sociolinguistics for change (Auger et al., 2007; Auger & Roy, 2012; Dalley & Roy, 2008) to unpack and dissect the deep-seated discourses and ideologies in French immersion. Whereas Roy's scholarship has important implications for French immersion stakeholders throughout Canada, the researcher is exceptionally gifted at navigating the distinct sociolinguistic context of Alberta. As French immersion educators and emergent researchers in Saskatchewan, we are keenly interested in the author's insightful and illuminating scholarship with respect to the ideologies embedded in such programs, especially as situated within the unique linguistic landscape of the Canadian Prairies.

In the first section of her book, "French Immersion Context," Roy provides a historical overview of French immersion and explores the foundational beliefs within such programs. What is French immersion? For whom was the program designed? Who can learn successfully in this program? The scholar offers a critical and honest assessment of elitism in French immersion, discussing discourses pertaining to students with special learning needs and learners from low socioeconomic backgrounds. Moreover, Roy critiques the pervasive myth that French immersion is suitable only for students with strong English language proficiency, a categorically erroneous and discriminatory perspective resulting in the exclusion of newcomer and Allophone students throughout Canada (Davis et al., 2019, 2021; Galiev, 2013; Mady, 2012, 2015). Roy invites readers to reflect on our underlying assumptions and beliefs about language learning and the extent to which our diverse perspectives and ideas shape French immersion programs.

Subsequently, in the sections titled "Bilinguals and Multilinguals" and "Who is Legitimate to Teach or to Speak French?," Roy explores diverse ideologies pertaining to language, identity, and belonging, discussing the extent to which such ideologies influence the learning and teaching of French as an additional language in immersion programs. How do we define and understand bilingualism and multilingualism in Canada? Who can learn and speak French? Who can truly be considered bilingual and multilingual in Canada? The author questions long-standing concepts of bilingualism, including the framework of two solitudes that compartmentalizes students' languages into discrete categories, rather than a holistic view of languages as integrated systems within learners' diverse linguistic repertoires. Roy discusses the tendency for French immersion students to say, *"Je suis bilingue, mais…"* or "I am bilingual, but…" because they perceive their variety of French as inferior to the language of Francophones. Indeed, the scholar's work illustrates that both native-speakerism – the ideology that native French speakers, especially from France, are the legitimate representatives of French language and culture – and linguistic insecurity (Meyerhoff, 2006) are endemic to immersion programs for educators and students alike. Notwithstanding certain grammatical shortcomings of French

immersion students, Roy argues convincingly for the legitimacy of the distinct language variety of such learners.

In the fourth major section, "Teaching and Learning," Roy explores the pedagogical implications of the aforementioned ideologies in French immersion programs. How can educators simultaneously teach language skills and curricular content effectively? What are the roles of students' first languages in their learning of French? How should English be used in the French immersion classroom, especially in light of the growing linguistic diversity in such programs throughout Canada? Drawing from a sociolinguistics for change perspective, Roy discusses the divergent discourses pertaining to translanguaging in broader contexts of language learning, examining the pedagogical role of students' first languages in the French immersion classroom (Cummins, 2014; Swain & Lapkin, 2013). The author brilliantly illustrates the complex tensions between empowering students to use their first languages judiciously as linguistic resources in the French immersion classroom while also seeking to protect the French language from the dominance of English (Ballinger et al., 2017; Lyster, 2019). Also noteworthy is Roy's appeal to educators to recognize French immersion students as bilinguals in progress, rather than failed Francophones. In this section, Roy challenges readers to reflect not only on our unexamined ideologies, but also on the impact thereof on pedagogies, practices, and policies in French immersion programs.

French Immersion Ideologies in Canada is engaging, thought-provoking, and essential reading for students, parents, educators, administrators, and researchers alike. Simultaneously accessible and complex, this groundbreaking work invites all stakeholders into the critical conversations worth having in French immersion and would serve as an exemplary resource for professional development and higher education purposes. Furthermore, sociolinguistics for change presents a promising and important theoretical perspective for future scholarship. Roy offers the rare and elusive perspective of a scholar who is both intimately knowledgeable and steadfast in her support of French immersion, while simultaneously being deeply committed to challenging such programs to grow and adapt for the future. What have we learned from years of teaching and research in French immersion programs? Where do we go from here? For Roy, the questions are as important as the answers, and we look forward to learning from her inquiry for years to come.

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A Review of Social Theory for Teacher Education Research: Beyond the Technical-Rational by Kathleen Nolan & Jennifer Tupper, J. (Eds.)

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Social theory has played a vital role in educational research. In the past, education research has drawn on an enormous volume of outstanding theoretical work contributing to education research. Nevertheless, much of this work adopts a theoretical focus and application that circumvents everyday practice, or the lived world of the teacher. Educational theorizing and practice, then, can remain distinctly separated. In this book, Nolan and Tupper ask how influential social theory can be more effectively associated with the educational practitioner (e.g., frontline teachers). *Social Theory for Teacher Education Research: Beyond the Technical-Rational* directly targets this rift in bolstering a more critical educational practice. The authors seek to access a rather broad theoretical literature, specifically as attending to effective educational practice. The objective is to transform, or at least mitigate, educational approaches that have remained somewhat aloof and instrumental. Arguably, then, this is not simply a challenge offered the theorist. The analyst must question a current obsession in preservice education to emphasize professional practice while in the process overlooking deeper structures and configurations of power. The authors survey this somewhat fractured landscape in a process of applying a theoretical interpretation to guided teacher research and discovery. The task is to assist the reader in critically rethinking this dividing line. This includes a reorganization of "technical-rational discourse" as an approach that hobbles education programs, teacher training, and the directed lifeworld of the professional. A central theme evolves here as existing teacher education programs and practices often emphasize professional standards, best practices, and prescribed measurements over academic insights and sociological explanations. The argument: Using social theory in teacher education research can promote deep-seated interpretations and conceptualized understanding of teaching practice.

This Tupper and Nolan edited book includes original case studies that further an understanding of the importance of social theory in the co-construction of knowledge in teacher education research. To achieve this the volume is divided into four distinct, yet thematically cohesive sections. Section 1 draws upon specific, historically applied, theoretical approaches. Included here are the extended logic of Barad and Deleuze, conceptually operating in a world of educational multiplicity. Bourdieu's field approach provides an alternative theoretical structure, critically reviewing the work of the teacher educator in creating responsible preservice educational environments. Section 2 discusses proactive teacher education programs and supports in the development of useful working technologies. Employed here are a myriad of pedagogical approaches and resources intended to address articulated classroom complexities at political, social, cultural, and historical levels. Section 3 asks the reader to consider alternative perspectives in guided field-based teacher education. Here one is asked to deeply reflect upon a teacher educator's identity, past, present, future. Drawing from Pinar's understanding of *currere*, experience becomes the medium of reflective analysis. Foucault enriches the theoretical field further in Section 3, introducing the metaphor of the panopticon. Employing Bentham's creation, one is introduced to complex ways in which the rules of social formation shape knowledge and truth and ultimately the lives of individuals. Section 4 directly targets the subject of teacher

education. Drawing upon specific social theoretical frameworks the analyst theorizes both role and direction in teacher education.

Addressing each selection individually, the reader is treated to a rather eclectic and varied content, with theoretical approaches ranging both in terms of influence and extension. Here the residual influences of Weber are as at home as the discursive technologies of the post-structural thought. For example, in Chapter 4, Tupper and Nolan, exposed and analysed the "technical-rational" as the authors deconstruct power relations held within a specific educational field. Employing the writings of Bourdieu this article stresses the need for a more critical institutional approach to preservice teacher training, assisting teacher candidates in understanding and anatomizing current issues associate with a wider social and cultural context. The authors excavate the contested confluence of teaching and learning, stressing the need for an anti-oppressive education, effectively bolstering teacher candidates' critical thinking in cultivating active learners.

In Chapter 9 Sorensen acknowledges the deficits of humanism in the field experience of teacher education, as for the author, a differing theoretical exploration and refinement are required. Here new materialism and humanism serve to harness self-continuity and "indeterminacy" in teacher education, assembling a dynamic and interactive construction of knowledge, skills, and abilities. The work of the educational theorist Pinar is employed as reflective participants contemplate the past, analyze the present, and imagine the future.

For Chapter 10, Betts and Block draw from the extensive literature of Michel Foucault. Bentham's much-publicized model of the panopticons is employed, specifically in critiquing the ever-popular technique of performance-based measurement. Focusing upon what is described as the "success-failure binary" in teacher candidate practicums the authors seek to archeologically unearth discursive patterns in power/knowledge regimes. In this work educational discourses are named and critiqued, truth regimes occupying a discursive reality where all things are seemingly dangerous. Under the constant surveillance of the panopticon (Foucault, 1995), compliant bodies are surveyed and measured, with subject definition and identity synonymous with the language used in constructing the same. The authors, however, offer the reader a way out.

This collection covers disparate and contested theoretical literature. Underwriting this journey is the declared need to liberate education and educational analysis from tired and repetitious narratives which serve to ignore significant social processes. Social theory is neglected in teacher education. The text offers detailed and operable ways to advocate for change. The contributors are representative of institutions located in Canada, the United States, the UK, Australia, Brazil, and New Zealand. This volume, therefore, represents a collaborative body, international in scope, and is not constrained by social location. Arguably, contributors employ rich and varied theoretical approaches; however, sharing needed expertise in conjoining research with practice. Articles selected for this book appropriately pinpoint an editorial "focus on theory." Contributors draw upon a wide range of theoretical postures and theorists. Included here are Michel Foucault, Pierre Bourdieu, and Martin Heidegger. Addition contributors include Michel de Certeau, Basil Bernstein, and Bhashar. Importantly, the text facilitates a dialogue between relevant participants activating a deeper understanding and contextualized interpretation in teacher education.

Arguably, there is value here for the seasoned educator and neophyte alike, a toolkit for anyone interested in understanding teacher education research. Tupper and Nolan's selection recognizes the challenges and complexities associated with comprehending and critiquing

educational processes. The authors argue for an application and understanding of social relations in education. They call for a critical response. Required are the adoption and deployment of different teaching approaches, technologies, and methodologies. For this, at least in part, we turn to theory, albeit cognizant of relevant social environments factors. There are lessons to be learned here if the reader is willing to listen. This collection asks us to rethink our deepest assumptions and biases concerning teaching and learning, particularly in educating the next generation of practitioners. This is an important request and one that should be heeded. Overtly managerial programs and processes make better cars than people. The choice is up to us. As Dewey (1995) so aptly articulates, there is nothing to which growth is related except more growth.

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