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# Measuring the Impact of Quality System Education Leadership: A Literature Scan



Research Report

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## Measuring the Impact of Quality System Education Leadership: A Literature Scan

Drawing on research conducted in the United States and Canada, this literature scan will explore current evidence pertaining to the following areas of focus:

- key features of quality system education leadership, and
- how to measure impact as it relates to system education leadership.

### Alberta's Professional Practice Standards

In connection to the *Teacher Quality Standard* (TQS), the *Leadership Quality Standard* (LQS) and *Superintendent Leadership Quality Standard* (SLQS) clarify the mechanisms of influence and expected outcomes of system education leadership in the province of Alberta (Alberta Education, 2023abc). The LQS applies to principals and school authority leaders other than the superintendent, which is related to the SLQS (Alberta Education, 2023ab). The overarching descriptions of these standards reflect their interrelation. According to the LQS, “Quality leadership occurs when the leader’s ongoing analysis of the context, and decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all school students” (Alberta Education, 2023a, p. 2). In relation, the SLQS outlines the following expectation:

Quality superintendent leadership occurs when the superintendent’s ongoing analysis of the context, and the superintendent’s decisions about what leadership knowledge and abilities to apply, result in quality school leadership, quality teaching and optimum learning for all students in the school authority. (Alberta Education, 2023b, p. 2)

Compared to the seven in the SLQS, the LQS contains nine *competencies*, which outline the knowledge, abilities, and dispositions that leaders need to effectively demonstrate to achieve the standard (Alberta Education, 2023ab). Moreover, several *indicators* reflect the supporting behaviours that a leader exhibits when working towards each competency, which are “measurable and observable” (Alberta Education, 2023a, p. 2; 2003b, p.2). As such, the SLQS and LQS provide tangible measures to evaluate the quality of leadership within a school authority.

### The Optimum Learning for All Study

Alberta Education commissioned Friesen et al. (2023) to undertake a four-year study of the implementation of the province’s professional practice standards. This mixed methods study included quantitative data collected from online surveys of teachers, leaders, and superintendents across the province, and qualitatively-analyzed data from case studies drawn from ten school authorities. The findings and

recommendations of this longitudinal study will provide an orienting springboard for this literature scan due to the valuable insights it offered regarding Alberta’s leadership standards and how the quality of system education leadership can be measured. As system education leadership roles can be diverse, Friesen et al. (2023) found that school authority leaders, who were not superintendents, found it challenging to connect all of their responsibilities to the LQS, including participants from districts of varied sizes. As such, their recommendations included seeking out an enhanced appreciation of non-superintendent roles and relationships with the provincial standards.

## Quality System Education Leadership

As education system structures vary, scholarship relevant to North American contexts can provide relevant insights for effective system education leadership in Alberta (Brandon, 2019). Drawing on prior literature reviews and a meta-analysis, Brandon (2019) identified four domains with the most robust evidence: (a) cultivating a broadly embraced emphasis on student learning and well-being; (b) fostering coherence between the district’s guiding principles and aims and its resources and processes; (c) developing and sustaining effective communication, relationships, learning communities, and positive culture; and (d) enlisting varied data sources to inform “planning, organizational learning, and accountability” (p. 201). In connection to research supporting high-quality instruction and equity promotion, Leithwood and McCullough (2021) summarized the *nine categories of district leadership practices*, paraphrased as follows: (a) a widely embraced “mission, vision, and goals” (p. 136); (b) clearly articulated pedagogy; (c) intentional and sustained use of evidence within decision making; (d) “learning-oriented organisational improvement processes” (p. 136); (e) well-developed professional learning structures; (f) coherence between resources, expectations, practices, and the district focus; (g) an ongoing emphasis on building capacity within leadership; (h) trustee stewardship centered on policy; (i) and connectedness between leaders and stakeholders. Some research has demonstrated that only principle eight, elected leadership, failed to yield robust evidence of effects on students’ literacy and numeracy achievement (Leithwood & McCullough, 2021). However, both professional district leadership and elected leadership, trustees, influence the district features that correlate with student achievement (Leithwood & McCullough, 2017). In the final report of their longitudinal inquiry, Friesen et al. (2023) confirmed that Alberta Education’s enactment of the LQS, TQS, and SLQS aligned with the research literature on effective school systems that improve student learning.

Consistent with complexity theory applications in education, the relationships between Alberta’s trio of professional practice standards can be represented as a nested structure; Alberta’s professional practice standards outline the expectations for effective superintendent leadership, which influences school leadership to impact the quality of classroom instruction with resultant effects on student learning (Davis & Sumara, 2006; Friesen et al., 2023). In support of this interdependency, Friesen et al. (2023) found a positive and statistically significant relationship between the guidelines

outlined in the TQS, LQS, and SLQS. Similarly, Rincón-Gallardo and Fullan (2016) conceptualized educational systems as *networks*, which refers to a group of individuals or entities that are directly and indirectly linked. In line with Alberta’s nested standards, collaboration transforms high-impact networks through synergetic, continuous improvement that elevates “the professional capital of teachers and leaders to continuously deepen student learning and engagement” (Rincón-Gallardo & Fullan, 2016, p. 6). Given that solely top-down and bottom-up leadership approaches have proven insufficient, Hargreaves et al.’s (2012) notion of Leadership from the Middle is preferable; that is, leaders collaborate on a common vision and plan to develop competencies across the system related to its central aims (Kirtman & Fullan, 2016; Rincón-Gallardo & Fullan, 2016). As Alberta’s education system includes a school authority structure, district office leadership can be conceived as this impactful middle (Rincón-Gallardo & Fullan, 2016). Since each standard reinforces the next, the interconnectedness of Alberta’s professional practice standards can potentially lead to their self-sufficiency (Friesen et al., 2023). This sustained professional capacity aligns with the notion that high-impact networks are marked by continuously improving learning cultures (Rincón-Gallardo & Fullan, 2016).

## Developing Professional Capacity

Moreover, leading from the middle involves a combination of hierarchical and bottom-up drivers that impactfully foster greater *professional capital* (Rincón-Gallardo & Fullan, 2016). According to Hargreaves and Fullan (2012), *professional capital* encompasses: *human capital*, a teacher’s pedagogical efficacy; *social capital*, which pertains to the collaborative capacity of a community; and *decisional capital*, the contextual aptness of a professional’s decision-making skills. Alberta’s professional practice standards reflect all three aspects of professional capital. To support student learning, teachers and leaders are expected to demonstrate strong pedagogical knowledge, effective interpersonal skills, and sound decision-making (Alberta Education, 2023abc). Conditions related to social capital, including teachers’ levels of trust, collective efficacy, and “safe and orderly” (p. 532) climate perceptions, have been found to mediate district impacts on student achievement (Leithwood et al., 2019). In balance with external accountability structures, Fullan et al. (2015) advocated for greater attention to *internal accountability*, “a collective commitment and responsibility to improve student learning and strengthen the teaching profession” (p. 4). Reviewing research that has demonstrated its superior impact, they argued that internal accountability primes the effects of external accountability when striving to enhance student learning outcomes. Effective system education leadership involves jointly developing the professional capital of individuals and the community, animating a culture of “continuous improvement, collective responsibility, and shared leadership” (Fullan et al., 2015, p. 7). To support system-level commitments to ongoing professional growth, Friesen et al. (2023) also found that developing and sustaining “a culture of learning” (p. 57) is a critical endeavor.

## Fostering System Coherence

In addition to professional capital, *system coherence* is another element of effective leadership (Fullan & Quinn, 2016; Fullan et al., 2015; Rincón-Gallardo & Fullan, 2016). With evident overlap, Fullan and Quinn (2016) outlined four impactful leadership activities in their Coherence Framework: developing a clear orientation, fostering a strong teamwork culture, enhancing student learning, and maintaining accountability. They define *coherence* as the cohesive appreciation of the goals and expectations of people who engage in joint work (Fullan & Quinn, 2016). As opposed to a static outcome, Honig and Hatch (2004) described coherence as a dynamic “process, which involves schools and school district central offices working together to craft or continually negotiate the fit between external demands and schools’ own goals and strategies” (p. 16). This notion of calibration and shared responsibility also features in Honig’s (2012) research on the work of district office leaders in developing principals’ instructional leadership competencies; specific district leaders act as *Instructional Leadership Directors*, which are roles understood as “teachers of principals’ instructional leadership” (Honig, 2012, p. 735). Honig (2014ab) summarized the principles and conditions for Central Office Transformation, which involves three key facets: “learning-focused partnership relationship” (p. 82) among district leaders and school principals, enhancing and calibrating district office supports that target teaching quality, and re-conceptualizing district leadership practices towards capacity building. To support these leadership shifts, direction setting is necessary with attention to consistent messaging and communicated rationales; in addition, leaders need safeguarded time to do this work and to focus on evidence when making decisions about the effectiveness of practices (Honig, 2014b). This system-level concentration on instructional leadership, district-driven alignment, and the professional growth of leaders and teachers is harmonious with Leithwood’s (2010) features of effective district leadership.

## Insights from the Optimum Learning for All Study

With the implementation of Alberta’s professional practice standards, Friesen et al. (2023) also highlighted the significance of cultivating a clear direction and building professional capacity within education systems. Tantamount to Alberta’s professional standards is the cohesiveness of the school authority’s vision and its focus on student outcomes; emphasis on professional learning and ongoing growth were also identified as facilitators (Friesen et al., 2023). Friesen et al. (2023) further clarified that leaders need to monitor and assess teachers’ professional learning, and to increase opportunities for high-yield activities that facilitate teacher collaboration, aligned with the standards. Although participants reported progress over the four years, Competency 5 emerged as an area that demands continued capacity building (Friesen et al., 2023), which pertains to “Supporting the Application of Foundational Knowledge about First Nations, Métis, and Inuit” (Alberta Education, 2023a, p. 4; 2023b, p. 4; 2023c, p. 5). Ongoing professional learning was recommended to enhance the collective efficacy of teachers, leaders, and superintendents (Friesen et al., 2023). To maintain provincial professional practice standards, the relevance of fostering

professional capital and coherence in system education leadership is evident, especially concerning Competency 5.

## Measures for System Education Leadership Impact

### The Standards as Measures

In a review of the international literature on professional practice standards, Adams and Allan (2019) summarized their varied utility in education. Referencing an Organisation for Economic Cooperation and Development (OECD) working paper, they clarified that the standards could set expectations, but they can also serve as measures:

Standards can be used to describe and communicate what is most worthy or desirable to achieve, what counts as quality learning or as good practice. Standards can also be used as measures or benchmarks, and, thus, as a tool for decision-making, indicating the distance between actual performance and the minimum level of performance required to be considered competent. In other words, standards can be understood as defining the dimensions of performance or the domains of learning that are valued and that are worthy of being promoted, but they can also be used to assess if what is valued is being achieved or not. (Centre of Study for Policies and Practices in Education, 2013, p. 14).

Compared with international contexts, Adams and Allan (2019) referred to Alberta's standards as distinctly conveying the interwoven professional competencies that teachers are to hone across their career in service of student learning. As such, the professional practice standards provide guidance for teacher and leader evaluations (Adams & Allan, 2019).

### The Framework for District Leadership Practices

To measure the impacts of district leadership, it is necessary to clarify the mechanisms of their influence within schools. In the *Framework for District Leadership Practices*, Leithwood and McCullough (2021) summarized the findings of four extensive studies centered on system and school leadership outcomes, which spanned eight years of investigation. In addition to three district-level studies, Leithwood and McCullough (2021) referred to a school-based leadership study (i.e. Leithwood et al., 2020), which tested their *Four Paths Model*. However, the sample was limited to 81 elementary schools in Texas. To clarify the mechanisms of impact for district leadership, Leithwood and McCullough (2021) described the relationship between district leadership and student outcomes as indirect, mediated by school leaders and environmental conditions in home and school “Conditions on the Rational, Emotional, Organizational and Family Paths” (p. 136). According to this framework, these four

conditions directly impact student achievement, engagement, and well-being.

## Student Learning Outcome Measures

For accountability, the pinnacle measure of education systems is student learning (Fullan et al., 2015). Since Alberta’s professional practice standards are conceptualized as ultimately influencing the “optimum learning for all students,” then student outcomes provide an appropriate measure for leadership impacts (Alberta Education, 2023a, p. 2; 2023b, p. 2; 2023c, p. 2; Friesen et al., 2023; Friesen & Brown, 2019). Friesen et al. (2023) employed three outcome measures to assess the implementation of the professional practice standards: achievement, well-being, and engagement. As their rationale for this choice, Robinson et al.’s (2008) meta-analysis on leadership impacts found that academic achievement was the most prevalent outcome metric with some studies including measures of well-being and engagement. In a mixed methods and professional learning research project that lasted nine years, Leithwood and McCullough (2017) partnered with Ontario provincial authorities and their school districts. Their student outcome measures included students’ literacy and numeracy achievement, well-being, and engagement. Their rationale for a focus on well-being related to its emphasis in provincial policy, and with regards to student achievement, its correlation with sustained student achievement. Moreover, critiques of the district effectiveness literature have questioned evaluative educational research approaches that rest all measurement of student learning on test scores (Blazar & Schueler, 2023; Trujilo, 2013). In a review of the quantitative district effectiveness research, Blazar and Schueler (2023) called for greater attention to teacher-quality measures that may help reveal the pressure point of system-level approaches that fail to improve student learning outcomes.

Due to the nested structure of the professional practice standards, the TQS clarifies the student outcomes that result from effective instruction (Friesen et al., 2023). The LQS builds on the TQS, indicating that “the leader’s ongoing analysis of the context, and decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all school students” (Alberta Education, 2023a, p. 2). Relatedly, the SLQS stipulates that “the superintendent’s ongoing analysis of the context, and the superintendent’s decisions about what leadership knowledge and abilities to apply, result in quality school leadership, quality teaching and optimum learning for all students in the school authority” (Alberta Education, 2023b, p. 2). Across the standards, the axiological underpinnings related to student success are evident. For example, the TQS identifies that student learning can be measured by students’ achievement of curricular outcomes (Alberta Education, 2023c). The significance of student engagement is specifically referenced in TQS Competency 3. Moreover, TQS Competency 1 and 4 reflect the importance attributed to supportive relationships and learning environments. Three TQS competencies also explicitly identify mental health (i.e., Competency 1, 3, and 4), which renders well-being another valid measure. Finally, an attentiveness to diversity and inclusion are also featured in the TQS, including a competency specific to pedagogical knowledge of First Nations,

Métis, and Inuit contexts (i.e., Competency 5). As such, the standard suggests that student achievement, engagement, well-being, and equity are all key considerations when evaluating student outcomes that result from quality teaching. These four outcome measures were also reflected in the district effectiveness literature, summarized below.

## Student Achievement

Research has linked system-level factors with student achievement outcomes (Leithwood & McCullough, 2021; Trujillo, 2013; Waters & Marzano, 2006). In a meta-analysis, Waters and Marzano (2006) analyzed data from 27 studies, accounting for 2,817 school authorities and 3.4 million academic achievement records; they identified a statistically positive relationship between school authority leadership and students' academic achievement ( $r=0.24$ ). However, Chingos et al. (2015) challenged the quality of this meta-analysis due to its emphasis on survey-based studies reliant on the self-reporting of superintendents. As a measure of optimal student learning, several reviews of the district effectiveness literature have spotlighted the paramountcy of student test achievement scores in the extant research (Blazar & Schueler, 2023; Trujillo, 2013). In a review of 99 cross-disciplinary quantitative studies, Blazar and Schueler (2023) found that 86 used student achievement data as an outcome measure.

In Ontario and Alberta, longitudinal provincial research partnerships have relied on standardized test scores as a key measure of student learning outcomes (Friesen et al., 2023; Leithwood & McCullough, 2017). In addition to surveys of school and district leaders, Leithwood and McCullough (2017) collected literacy and numeracy achievement data from Ontario's Education Quality and Accountability Office (EQAO) testing program. For each year of the inquiry, EQAO testing yielded literacy and numeracy achievement data for grades 3 and 6, literacy for grade 10, and mathematics for grade 9. With Level 3 denoted as the acceptable standard, student achievement is reported according to the "percentage of students achieving at each of the 4 levels (1 = lowest, 4 = highest)" (Leithwood & McCullough, 2017, p. 29). They relied on EQAO data from 2016 and fluctuations across five years for each district. To measure student achievement, Friesen et al. (2023) also enlisted standardized provincial assessment scores from Alberta's Provincial Achievement Tests (PATs), which includes grades 6 and 9, and Diploma Exams (DIPs) for grade 12. They used achievement data from Year 1 and Year 4 of the study, analyzing the relationship between the standards (i.e., TQS, LQS) and achievement data (i.e., PAT and Diploma scores).

Other Canadian studies have consistently employed provincial test achievement scores as measures (Handford & Leithwood, 2019; Leithwood & Azah, 2017; Leithwood et al., 2019). In two studies conducted in Ontario (i.e. Leithwood & Azah, 2017; Leithwood et al., 2019), the provincial testing scores included literacy and numeracy achievement from grades 3, 6, 9, and 10. With data from 21 districts in

British Columbia, Hanford and Leithwood (2019) used provincial achievement test scores from grades 4 and 7 mathematics and language arts; grades 10 and 12 English; and grade 10 mathematics. Leithwood et al. (2019) tested the direct and indirect impacts of the nine district effectiveness traits on student achievement as mediated through the four paths of influence (*rational, emotional, organizational, and family*) and school leadership. They found that district features had robust indirect impacts on student achievement through the rational, emotional, and organizational paths (overall indirect effects,  $b=0.26$ ), highlighting the individual mediators of “teacher trust, collective teacher efficacy and safe and orderly environments” (p. 532). For total effects on student achievement (Pearson  $r$  effect size), four district features had the most significant influence on numeracy and literacy achievement: *mission, vision and goals, coherent instructional program, uses of evidence, and district alignment* (Leithwood & Azah, 2017; Leithwood et al. 2019). Hanford and Leithwood (2019) also found that the nine studied features of effective district leadership impacted student outcomes with greater impacts on elementary achievement when compared to secondary school achievement.

## Wellbeing

In addition to student achievement, Blazar and Schueler (2023) argued that district effectiveness researchers should assume a more holistic view of student outcomes, including socio-emotional measures. To assess well-being outcomes, Leithwood and McCullough (2017) clarified the challenges with this construct from an education perspective; well-being is dynamic, and they argued that it should be understood within the scope of schools’ responsibilities related to student learning. Fullan (2021) coined the term, *Academics Obsession*, to critique the sustained privilege of test-based academic achievement in measuring student success. Alternatively, Fullan and Quinn (2024) proposed a shift towards a *humanity paradigm*, motivated by four transformed propellants, including “Well-Being and Learning” (p. xv). This holistic view of learning aligns with research that has spotlighted the interrelation of learning, well-being, and development in promoting optimal student outcomes (Darling-Hammond et al., 2020). To exemplify a more holistic view of learning outcomes, Fullan and Quinn (2024) described the case of an Ontario district, Ottawa Catholic School Board, which embraced the *Global Competencies* (i.e., “character/compassion, citizenship, collaboration, communication, creativity, and critical thinking” p. 26), as a novel student outcome measure. This district had proposed that students could self-assess their development within a chosen competency as a part of their report card, alongside academic achievement. There is a paucity of published peer-reviewed research that explores the relationship between district leadership, related to professional practice standards, and broader outcomes of student achievement.

The Canadian researchers who have studied student well-being outcomes have relied on provincial reporting data (Friesen et al., 2023; Leithwood & McCullough, 2017). For example, Friesen et al. (2023) relied on data from the Alberta Education Results Reports (AERR). In particular, the measures of *Citizenship* and *Safe and Caring*

*Learning Environment* were selected as well-being outcomes related to student learning. In contrast, Leithwood and McCullough’s (2017) student well-being measures were taken from the EQAO student attitude surveys. These surveys probed students’ views of their well-being related to math and language arts, including questions related to their emotional responses to academics, confidence, and self-efficacy.

## Engagement

Large-scale studies in Ontario and Alberta have also included student engagement measures to assess student learning outcomes (Friesen et al., 2023; Leithwood & McCullough, 2017). Friesen et al. (2023) relied on AERR’s student engagement reporting data. As well, Leithwood and McCullough (2017) included data from annual EQAO student attitude surveys to obtain a measure of student engagement; the data led to the development of scales to assess social, cognitive, and behavioural engagement dimensions. The cognitive engagement reporting items probed students’ learning strategy use in math and language arts, whereas behavioural engagement prompts related to their involvement in extra-curriculars, creative arts, and sports. For behavioural engagement, students were asked about their family-based activities that supported academics. However, the researchers acknowledged the limitations of these six behavioural engagement questions to measure school engagement.

Broader student engagement research has also identified appropriate student outcome measures. Drawing on multi-year national data from 32,322 Canadian students, Willms et al. (2009) defined student engagement as “the extent to which students identify with and value schooling outcomes, have a sense of belonging at school, participate in academic and non-academic activities, strive to meet the formal requirements of schooling, and make a serious personal investment in learning” (p. 7). They identified three connected domains within engagement: social, academic, and intellectual. Their measures of engagement included probing extra-curricular involvement; reported connectedness to the school community; school attendance behaviours; and perceived relevance, which is the “enjoyment, interest, and motivation to do well in...language arts and mathematics classes” (p. 11). In connection, Blazar and Schueler (2023) found that only six reviewed quantitative studies employed high school graduation rates as an outcome measure for district effectiveness, and only four used additional K-12 student measures such as “attendance, suspensions, and retained in grade” (p. 6).

## Equity

In an increasingly complex world, equity and inclusion are attracting heightened global attention in education policy (OECD, 2023). With a total of 35 major indicators, OECD (2022) developed the Education Equity Dashboard to showcase international efforts to foster equity and inclusion. Their broad goals include considerations that all students should have the opportunity to learn and flourish

within environments that prioritize equity and inclusion, but also that “education contributes to equitable economic and social outcomes” (OECD, 2022, para 7). Similarly, Alberta’s professional practice standards outline a vision of optimal learning that includes equity; teachers and education leaders have a shared responsibility to “ensure all Alberta students have access to quality learning experiences” (Alberta Education, 2023c, p. 2). Moreover, the TQS, LQS, and SLQS also emphasize expectations for inclusive schools and classrooms that value diversity (Alberta Education, 2023abc).

With regards to student achievement, a number of scholars have focused on the significance of equity when measuring district outcomes (Anderson & Young, 2018; Fullan & Quinn, 2024; Leithwood, 2010; Rorrer et al., 2008). Leithwood (2010) conducted a well-cited review of 31 district effectiveness studies. In this review, district efforts to foster a shared perspective and beliefs included equity considerations: “concepts of ‘closing the gap’ as well as ‘raising the bar’” (p. 250). In this review, the majority of districts were American and served populations with high numbers of historically underserved students, so equity considerations were emphasized. Furthermore, several reviews have highlighted school districts’ efforts to improve outcomes for diverse and underrepresented student groups (Leithwood et al., 2010; Rorrer et al., 2008). To narrow achievement differences, this disaggregation of data, with attention to historically underserved or diverse learners, can provide a nuanced understanding of student achievement (Leithwood, 2010). In school improvement initiatives, successful districts often started by targeting the lowest-achieving students as a priority; positive impacts were attributed to a shared view that moral purpose underlies equity-centered approaches (Leithwood et al., 2010; Rorrer et al., 2008).

The recent American turnaround literature provides additional equity considerations related to measuring student outcomes. To explore the results of turnaround initiatives in Michigan related to the *Every Student Succeeds Act* (ESSA), Burns et al. (2023) conducted a mixed methods study. When education accountability policies defined student outcomes solely through achievement test results, schools adopted inequitable practices that bolstered their scores (Burns et al., 2023). Under ESSA, Burns et al. (2023) clarified that states must employ a broader measure and target for student learning outcomes, beyond test achievement scores. Their study’s student outcome measures included grades 4 and 8 literacy and numeracy achievement on state tests, SAT scores, and statistics related to high school graduation and dropout. Similarly, Blazar and Schueler (2023) recommended that future causal research broaden student outcomes to include “absences, suspensions, on-time grade progression, high school graduation, [and] college-going” (p. 29).

## Measuring the Impact of System Education Leadership

Several reviews have critiqued the methodological quality of the district effectiveness literature (Anderson & Young, 2018; Blazar & Schueler, 2023; Leithwood, 2010). In addition to highlighting the lack of longitudinal designs, Anderson and Young (2018) questioned the generalizability of extant research. They cautioned that most

published studies were conducted in large, urban districts that were actively engaged in reform with enrollments that exceed the average size of most US districts. Moreover, they clarified that the district samples were concentrated in specific US regions and often served populations with low socioeconomic status. In addition, Blazar and Schueler (2023) found that only 27% of included quantitative studies enlisted an experimental or quasi-experimental design, typically on topics that bear minimal relevance to this scan (e.g., teachers' unions and salaries). The remaining observational studies that focused on causal evaluations (73%) employed multivariate regression models, although they challenged whether these studies achieved adequate internal validity. In terms of topics, they found a dearth of quantitative research on the topic of coherence (i.e., in terms of instructional programs). They identified a study included in this scan (i.e., Leithwood & Azah, 2017), as unique in the reviewed literature, enlisting survey methods to investigate district-level performance differences. Within the district effectiveness literature, there is an evident paucity of research that can make strong, generalizable causal claims relevant to the topic of this scan.

Across quantitative studies, several strategies were used to statistically analyze data for impact. When the district is the unit of analysis, sample size is often a barrier as insufficient numbers limit the options for statistical analyses that can yield causal insights (Handford & Leithwood, 2019; Leithwood & McCullough, 2017). To analyze quantitative data in their mixed methods study, Leithwood and McCullough (2017) used Pearson Correlations to analyze direct links between variables and Power Indices to approximate indirect relationships, which they acknowledge as generally weak analyses for causation. They argued that the theoretical grounding of their District Effectiveness Framework was sufficient to employ causal language in describing their results, which tested the direct and indirect effects of the nine district effectiveness features. Among the included studies of Leithwood and his colleagues, only Leithwood et al. (2019) employed strategies for statistical analysis that allowed for causal explanations; this study enlisted descriptive statistics, confirmatory factor analysis, and regression mediation analysis. To study superintendent leadership, Hough (2014) enlisted hierarchical multiple regression and analyses of covariance. The analyses of covariance addressed whether superintendents, who had greater, equivalent, or lesser estimates of their humility when compared with other district leaders' perceptions, were associated with student achievement. Analyzing secondary data from a larger study, Lee et al. (2012) employed structural equation modeling (SEM). To measure impacts of district leadership, the most robust data analysis strategies employed in these peer-reviewed studies were regression mediation analysis and SEM.

To measure the impact of Alberta's professional practice standards, the longitudinal mixed methods design and statistical analyses employed by Friesen et al. (2023) allowed for a deep exploration of the implementation process. Quantitative survey data was analyzed using a trio of statistical techniques: Multiple Analysis of Variance (MANOVA), SEM, and Multiple-Multivariate Regression Analysis. MANOVA was used to investigate differences among survey groups. For the TQS, Friesen et al. (2023) had a sufficient sample to employ SEM, probing the relationships between the

standard's competencies and their impacts. Due to sample size limitations, Friesen et al. (2023) were unable to develop a SEM model that reflected the LQS and SLQS data; however, a regression model of the LQS identified robust relations among "Competencies 2 and 1, 3 and 1, 3 and 2, 5 and 4, 9 and 8" (p. 103). Also, they employed a multivariate regression to investigate the link between the TQS and measures of student learning, well-being, and engagement. To measure impact, Friesen et al. (2023) enlisted multivariate multiple regression analysis to analyze the link between independent variables (i.e., the TQS and LQS) and 2019 and 2022 provincial reporting related to the measures of student engagement, achievement, and well-being. Their findings indicated that participants' self-ratings of their professional capacities were linked to favourable student learning outcomes. Moreover, the qualitative cross-case analysis yielded data across the first three years of Friesen et al.'s (2023) study. Across districts, they identified themes related to professional practice shifts that occurred during the policy implementation. Using a data matrix, complementary analysis was used to combine quantitative and qualitative data that resulted from their study. As such, their convergent mixed methods design allowed for robust insights into the impacts of implementing Alberta's professional practice standards.

## Conclusions

In response to the *Optimum Learning for All Students* study (Friesen et al., 2023), this literature scan has identified several features of quality system education leadership. In addition, this scan has reviewed the extant literature to provide guidance on measuring impact related to system education leadership. To promote optimum student learning, Alberta's professional practice standards outline the expected competencies of system education leaders; in their nested structure, superintendents influence other leaders within the system, which impacts quality teaching to ultimately shape student learning outcomes (Friesen et al., 2023). Although several scholars have summarized the features of evidence-based system education leadership (e.g., Brandon, 2019; Leithwood, 2010; Leithwood & McCullough, 2021), this scan spotlighted considerations consistent with Friesen et al.'s (2023) findings. When school districts are conceptualized as complex networks, system education leaders' crucial roles in developing the competencies of all staff and fostering a sustained culture of professional growth are evident (Fullan et al., 2015; Friesen et al., 2023; Rincón-Gallardo & Fullan, 2016). Within this capacity-building approach, several scholars have highlighted the importance of attending to coherence within the system, so that all stakeholders can effectively engage in the driving aims of their expected joint work (Fullan & Quinn, 2016; Fullan et al., 2015; Friesen et al., 2023; Honig, 2014b; Leithwood, 2010; Rincón-Gallardo & Fullan, 2016).

To measure the impacts of system education leadership, this literature scan found a dearth of high-quality research. In Alberta, high-quality learning is the expected outcome of effective teaching (Alberta Education, 2023c; Friesen & Brown, 2019; Friesen et al., 2023). In Alberta and Ontario, Canadian scholars have relied on student achievement, engagement, and well-being as student learning measures (Friesen et al., 2023; Leithwood & McCullough, 2017). The TQS and research literature

also suggest that equity considerations should factor into evaluations of student outcomes (Alberta Education, 2023c; Anderson & Young, 2018; Fullan & Quinn, 2024; Leithwood, 2010; Rorrer et al., 2008). Furthermore, the most prevalent outcome measure featured in the literature is standardized test scores (Blazar & Schuler, 2023; Handford & Leithwood, 2019; Hough, 2014; Leithwood & Azah, 2017; Leithwood et al., 2019; Trujilo, 2013). To measure student engagement and well-being, large-scale studies in Ontario and Alberta have relied on provincial reporting data (Friesen et al., 2023; Leithwood & McCullough, 2017).

With regard to methodological quality, the district effectiveness literature has been well-critiqued (Anderson & Young, 2018; Blazar & Schueler, 2023; Leithwood, 2010). Across the literature featured in this scan, regression mediation analysis and SEM were commonly used to assess system education leadership impacts. In contrast, Friesen et al. (2023) comprehensively investigated the implementation of Alberta's professional practice standards. The strengths of this study included its longitudinal design and in-depth exploration of qualitative and quantitative data. In addition to the rich qualitative data gleaned from interviews, they measured impact through the use of several statistical techniques: MANOVA, SEM, and Multiple-Multivariate Regression Analysis. As such, the findings of this extensive study, as contextualized within this literature scan, provide further direction for understanding and assessing quality system education leadership in Alberta.

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