CODE
Council of Ontario Directors of Education

STRONG DISTRICTS AND THEIR LEADERSHIP PROJECT

Results of the Research Strand

A project sponsored by the Council of Ontario Directors of Education and the Ontario Ministry of Education

Kenneth Leithwood and Catherine Mccullough

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The excerpt provided in this document is taken from the Strong District and Their Leadership project. It provides detailed "**Results**" of section two, part 4 of the Final Report Research Strand. These results use the data compiled in response to the following eight questions, which were the focus of the research project.

Quantitative data were used to answer the first seven questions and qualitative data were used to answer the eighth question. Detailed responses to the first seven questions include tables summarizing relevant data.

The eight questions are as follows:

1. **On average, just how strong are Ontario's school districts?**
2. **How well developed in Ontario schools are those school, classroom and family Conditions known to make significant contributions to student success?**
3. **Do those Conditions in schools, classrooms and families with demonstrable effects on student success in prior research have comparable effects in Ontario?**
4. **To what extent do each of the characteristics of Strong Districts influence those Conditions in schools, classrooms and families with demonstrable effects on student success?**
5. **How large are the direct and indirect effects of Strong District Characteristics on Student Outcomes?**
6. **How large are the direct and indirect effects of School Leadership on student outcomes?**
7. **Is there a significant relationship between student achievement in math and language and student well-being and engagement?**
8. **How do school leaders understand their district's work and its contribution to their school improvement efforts?**

To review the full report which includes Purposes for the Study, Methods, Results, Recommendations, Possible Next Steps for Ontario's Strong District Initiative, References and Appendices visit the CODE website.

4. Results

4.1 On average, just how "strong" are Ontario's school districts?

Appendix A reports the means (on a 4-point scale) and standard deviations for responses to all items included in the Ontario District Survey. Table 2 summarizes these results and reports the reliabilities (Cronbach alpha) of scales measuring all nine district characteristics, as well as the number of items included in each scale. Two variables, central office staff relations and relationships with local community groups, were measured with just one item so reliability cannot be reported. All scales in this survey exceeded the commonly agreed on acceptable standard for reliability of .70 (Nunnery & Bernstein, 1994) by a significant margin.

Each of the nine district characteristics received mean ratings above the mid-point on the 4-point response scale. Highest ratings were awarded to Mission, Vision and Goals (m = 3.28) and Extent of District Alignment (m = 3.24). Lowest rated was Learning-oriented Improvement Processes (m = 2.72). Standard deviations for all characteristics were relatively small indicating considerable uniformity in ratings among respondents. An exploratory factor analysis (details not reported) conducted on this instrument found that all items loaded on nine factors and almost all items conceptually associated with each district characteristic loaded as expected.

In sum, all nine characteristics of Strong Districts are at least moderately well developed in the province's school districts at present. Three of the nine characteristics are especially well developed - Mission, Vision and Goals for Students, Extent of Alignment and Coherent Instructional Programs. While Elected Leadership is rated among the least well- developed of the nine characteristics, there is also more variation (a larger standard deviation) in responses to this characteristic than the other

Table 2
The Status of District Characteristics in Ontario
Ontario District Survey
Mean, Standard Deviation (SD), Scale Reliability (SR) and Number of Items (N) in Scale

	Mean	SD	SR	N
Characteristics (Aggregate)	2.98	.22	.94	
Mission, Vision, Goals for Students	3.28	.22	.92	7
Coherent Instructional Program	3.07	.29	.97	5
Uses of Evidence	2.92	.28	.94	6
Professional Development	2.89	.25	.90	7
Professional Leadership	2.87	.28	.94	8
Extent of District/District's Alignment	3.24	.26	.90	4
Elected Leadership	2.86	.36	.95	7
Organizational Improvement Processes	2.72	.27	.94	8
Relationships (Aggregate)	2.93	.23	.86	

4.2 How well developed in Ontario Schools are those school, classroom and family Conditions known to make significant contributions to student success?

Appendix B reports the means (on a 5-point scale) and standard deviations for responses to all items included in the *Leading and Teaching in Schools Survey*. Table 3 summarizes these results and reports the reliabilities (Cronbach alpha) of all scales and the number of items included in each scale. Scales on this survey exceed the commonly agreed on acceptable standard for reliability (.70), all but two (Disciplinary Climate and Safe and Orderly Environment) by a significant margin.

The 12 variables measured by this survey all received mean ratings above the mid-point on the 5-point response scale. Highest ratings were awarded to Safe and Orderly Environment (m = 4.09) and Teacher Commitment (m = 4.00); lowest rated were Classroom Instruction (m = 3.52) and Organization of Planning and Instructional Time (m = 3.59). Similar to the results of the district survey, all standard deviations were relatively small indicating considerable uniformity in ratings among respondents.

Results of an exploratory factor analysis (details not reported) conducted on items in this survey closely reflected the conception of variables on which the instrument was developed for half of the 12 variables, while the distribution of items measuring the remaining 6 variables were not readily interpretable. Given the relatively high reliabilities of all 12 scales, subsequent analyses retained the original conception of item assignment.

In sum, all school, classroom and family Conditions measured by the survey are at least moderately well developed in the province's schools. Safe and Orderly Environments and Teacher Commitment are the most fully developed while Classroom Instruction and Organization of Planning and Instructional Time are least well developed. There is significant agreement among respondents about these results.

Table 3

The Status of School, Classroom and Family Conditions in Ontario Schools

Leading and Teaching in Schools Survey

Mean, Standard Deviation (SD), Scale Reliability (SR) and Number of Items (N) in Scale

	Mean	SD	SR	N
Conditions Aggregate	3.77	.17	.94	
School Leadership	3.95	.19	.96	22
Classroom Instruction	3.52	.21	.93	11
Uses of Instructional Time	3.62	.18	.87	6
Academic Emphasis	3.76	.19	.84	5
Disciplinary Climate	3.62	.23	.75	4
Teacher Commitment	4.00	.23	.94	6
Teacher Trust in Others	3.97	.18	.82	4
Teacher Collective Efficacy	3.84	.21	.88	5
Organization of Planning and Instructional Time	3.59	.31	.80	4
Safe and Orderly Environment	4.09	.19	.77	6
Collaborative Cultures and Structures	3.69	.21	.92	9
Family Educational Culture	3.61	.26	.89	5

4.3 Do those Conditions in schools, classrooms and families with demonstrable effects on student success in prior research have comparable effects in Ontario?

The portion of the framework for this study about school, classroom and family Conditions summarized a considerable amount of evidence about the contribution of each of 12 Conditions to student success. This question asks whether that evidence can be replicated in the specific context of Ontario districts. Results reported in the Tables 4 through 7 suggest that this is the case. These results are reported as correlations between each of the 12 Conditions and all four student outcomes measured as both a 1 year and a change-over-five years estimate.

Language achievement

Only Uses of Instructional Time and Organization and Planning for Instruction do not contribute to the 1-year measure of Language Achievement but 11 of the 12 Conditions have non-significant negative relationships with the five-year change in Language Achievement (see Table 4). The strongest effects on (correlations with) the 1-year measure of Language achievement (in order) are

- Teacher Trust (.61)
- Academic Emphasis (.59)
- School Leadership (.50)
- Classroom Instruction (.49)
- Teacher Commitment (.49)
- Disciplinary Climate (.45)

The primary explanation for the negative 5-year change correlations is negative five-year gains.

Table 4
Relationships between School, Class and Family Conditions and Language Achievement
(Correlation Coefficients)

	1 year	5-year change
Conditions aggregate	**.64****	**-.17**
School Leadership	.50**	-.25
Classroom Instruction	.49**	-.03
Instructional Time	.25	.06
Academic Emphasis	.59**	-.24
Disciplinary Climate	.45**	-.25
Teacher Commitment	.49**	-.06
Teacher Trust	.61**	-.12
Collective Efficacy	.63**	-.19
Organization & Planning	.29	-.18
Safe Environment	.64**	-.06
Collaborative Culture	.47**	-.09
Family Ed. Culture	.57**	-.17
*p<.05, **p<.01		

Mathematics Achievement

As Table 5 indicates, all 12 Conditions are significantly related to the one-year measure of math achievement and two Conditions make weak but significant contributions to changes in math achievement over five years – Uses of Instructional Time (.34) and Academic Emphasis (.31).

Table 5 distinguishes between results for Academic and Applied math achievement. As this table makes clear, the 12 Conditions generally have much stronger relationships with Academic as compared with Applied math achievement, as well as the 1-year achievement results compared with changes in such achievement over five years.

All 12 Conditions are significantly related to the 1- year measure of Academic Math achievement. Similar and especially strong relationships are evident for Collective Teacher Efficacy (.68), Safe and Orderly Environment (.65), Teacher Trust (.63) and Academic Emphasis (.63). Only Uses of Instructional Time and Organization of Planning for Instruction are significantly related to changes over five years.

Four Conditions are significantly but relatively weakly related to the 1-year measure of Applied Math achievement – Teacher Commitment (.39), Collective Teacher Efficacy (.33), Safe and Orderly Environment (.33) and Collaborative Culture (.31).

Table 5
Relationships between School, Class and Family Conditions and Student Academic and Applied Math Achievement

	Gr. 3, 6 & 9 Academic		Gr. 9 Applied	
	1 year	**5-year change**	**1 year**	**5-year change**
Conditions Aggregate	.68**	.16	.30*	.05
School Leadership	.55**	.12	.21	.17
Classroom Instruction	.51**	.15	.22	-.05
Use of Instructional Time	.32*	.40**	.11	-.13
Academic Emphasis	.63**	.23	.17	-.07
Disciplinary Climate	.49**	.22	.12	-.11
Teacher Commitment	.56**	.12	.39**	.06
Teacher Trust	.63**	.14	.23	-.04
Collective Efficacy	.68**	.02	.33*	.11
Organization & Planning	.42**	.30*	.21	.18
Safe & Orderly Environment	.65**	.06	.33*	.09
Collaborative Culture	.54**	.06	.31*	.10
Family Educational Culture	.48**	-.25	.14	.08
*p<.05, **p<.01				

Student Well-Being

Table 6 reports correlations between the 12 Conditions and three estimates of student well-being, an aggregate estimate, as well as separate estimates of well-being in math and well-being in language. In the case of each estimate, correlations are reported with a 1-year measure and a change-over-five-years measure.

The first two columns of data report correlations between the Conditions and the aggregate measures of student well-being. As a whole, the 12 Conditions are moderately related to the 1-year aggregate measure of well-being (.40) but not the five-year change measure. Academic Emphasis (.56) and School Leadership (.49) stand out as the most influential of the 12 Conditions although Teacher Trust (.36) and Collective Teacher Efficacy (.39) also have significant but weaker relationships with well-being. The change-over five-year aggregate measure of well-being is significantly related to Academic Emphasis (.40) and Organization and Planning for Instruction (.29) only.

School Leadership (.34) and Academic Emphasis (.40) are also significantly related to the 1-year measure of well-being in language but none of the 12 Conditions is related to the five-year change in language well-being.

As compared with well-being in language, school, classroom and family Conditions play a much more influential role with well-being in math. Ten of the 12 Conditions are significantly related to the 1-year measure of this outcome and five of the 12 Conditions are significantly related to the change-over-five-years measure.

Table 6
Relationships between School, Classroom and Family Conditions and Student Well-Being
(Correlation Coefficients, N=45)

	Well-Being Aggregate		Well-Being Language		Well-Being Math	
	1 year	**5-year change**	**1 year**	**5-year change**	**1 year**	**5-year change**
Conditions Aggregate	.40*	.28	.18	-.02	.48**	.36*
School Leadership	.49**	.22	.34*	-.12	.49**	.36*
Classroom Instruction	.21	.19	.02	-.10	.30*	.30*
Instructional Time	.24	.22	.15	.08	.26	.22
Academic Emphasis	.56**	.41**	.40**	.03	.55**	.49**
Disciplinary Climate	.31	.33*	.10	.06	.40**	.38*
Teacher Commitment	.26	.18	.11	.01	.31*	.21
Teacher Trust	.36*	.23	.17	.02	.42**	.27
Collective Efficacy	.39**	.23	.20	.07	.44**	.23
Organization & Planning	.29	.29*	.11	.00	.37*	37*
Safe Environment	.22	.23	.02	.08	.33*	.23
Collaborative Culture	.23	.20	.05	-.03	.31*	.27
Family Educational Culture	.22	-.12	.09	-.27	.27	.04
*p<.05, **p<.01						

Student Engagement

Table 7 reports correlations between the 12 Conditions and three measures of student engagement - an aggregate estimate, as well as separate estimates of engagement in language and engagement in math. In the case of each estimate, correlations are reported with a 1-year measure and a change-over-five-years measure. Scales separately measuring cognitive, Behavioural and social engagement were combined for this analysis.

The first two columns of data report correlations between the Conditions and the aggregate measures of student engagement. As a whole, the 12 Conditions are moderately related to the 1-year measure of engagement (.42) but not the change-over-five-years measure. School Leadership (.60), Academic Emphasis (.53) and Family Educational Culture (.51) are the most influential of the 12 Conditions, although four other Conditions are also significant. School Leadership (.46), Academic Emphasis (.38) and Collaborative Cultures (.30) have moderate to weak but significant relationships with the change-over-five-years measure of aggregate student engagement.

Results for the 1- year measure of language engagement closely mirror the aggregate engagement results. None of the Conditions is significantly related to the change-over-five-years measure of language engagement. Math engagement (1-year measure) is moderately influenced by 7 of the 12 Conditions, the strongest of which include School Leadership and Academic Emphasis (both .55) along with Family Educational Culture (.45), Collective Teacher Efficacy (.44) and Teacher Trust (.42). Change-over-five-years measures of math engagement are significantly influenced by School Leadership (.44) and Academic Emphasis (.39), as well.

In sum, these results point to the significant role that a large handful of school, classroom and family Conditions has on student engagement. While the influence of School Leadership, Academic Emphasis and Family Educational Cultures stand out in relation to most measures of engagement, Teacher Trust, Collective Teacher Efficacy and Safe and Orderly Environments constitute a weaker but still significant set of influences.

Results across all four student outcomes, reflect, in the Ontario context, research about the 12 Conditions reported in prior research. These results provide a clearly affirmative answer to the question posed in this section of the report with respect to math and language achievement. Furthermore, these results remain affirmative in relation to both well-being and engagement, outcomes not commonly addressed by prior research, although this affirmation is not as strong as it is in reference to math and language achievement.

Table 7

Relationships between School, Class and Family Conditions and Student Engagement

(Correlation Coefficients, N = 44)

	Engage Aggregate		Engage Language		Engage Math	
	1 year	**5-year change**	**1 year**	**5-year change**	**1 year**	**5-year change**
Conditions	.42**	.26	.41**	.14	.46**	.30*
School Leadership	.60**	.46**	.50**	.12	.55**	.44**
Classroom Instruction	.15	.11	.21	-.01	.19	.15
Instructional Time	.04	.05	.20	.19	.22	.15
Academic Emphasis	.53**	.38**	.44**	.22	.55**	.39**
Disciplinary Climate	.20	.00	.28	.10	.25	.00
Teacher Commitment	.19	.07	.21	.00	.22	.07
Teacher Trust	.39**	.24	.35*	.20	.42**	.25
Collective Efficacy	.41**	.25	.42**	.14	.44**	.29
Organization & Planning	.26	.20	.23	.12	.32*	.29
Safe Environment	.32*	.25	.35*	.18	.39**	.29
Collaborative Culture	.34*	.30*	.28	.02	.35*	.32*
Family Educational Culture	.51**	.17	.39**	.04	.45**	.22
*p<.05, **p<.01						

Results reported in Tables 4 through 7 demonstrate that, across all 8 indicators of student outcomes (4 outcomes, 2 measures of each), the two most powerful Conditions are Academic Emphasis (significant effects on 7 of the 8 outcome measures) and School Leadership (significant effects on 5 of the 8 outcome measures). While Collective Teacher Efficacy influences only four outcomes, it has the strongest effects, of all 12 Conditions, on one-year measures of language and math achievement. Three additional Conditions have significant effects on 4 of the 8 outcome measures – Disciplinary Climate, Teacher Trust and Collaborative Cultures.

4.4 To what extent do each of the characteristics of Strong Districts influence those Conditions in schools, classrooms and families with demonstrable effects on student success?

This question reflects one of the most important assumptions on which the framework for the study is based. That is, districts rarely influence students directly. Rather, districts contribute to student success by helping to create the Conditions in schools, classrooms and families that nurture such success. Justification for this assumption in the present study depends on finding significant correlations between District Characteristics and the 12 Conditions.

Results reported in Table 8 provide such justification in relation to 9 of the 12 Conditions. The effects of the nine district Characteristics on each of the 12 Conditions are described in that table. As the first column (District aggregate) of data in this table indicates, the aggregate measure of district characteristics has significant effects on 6 of the 12 Conditions including Classroom Instruction (.37), Teacher Commitment (.42), Teacher Trust (.45), Collective Teacher Efficacy (.41), Safe and Orderly Environment (.39), and Collaborative Cultures (.44).

From 5 to 8 of the 9 district characteristics contribute significantly to these effects:

- Coherent Instructional Programs has a significant effect on 8 Conditions
- Mission, Vision and Goals has a significant effect on 7 Conditions
- Uses of Evidence has significant effects on 6 Conditions
- Relationships (aggregate) has significant effects on 6 Conditions
- Alignment has significant effects on 5 Conditions
- Professional Leadership has significant effects on 5 Conditions
- Organizational Improvement processes has significant effects on 5 Conditions

Seven of the nine district characteristics (not Professional Development or Elected Leadership) have significant effects on five Conditions -the three teacher dispositions (commitment, trust and efficacy), as well as Safe and Orderly Environments and Collaborative Cultures. These five Conditions seem to be especially susceptible to district influence.

In sum, considering the correlations reported in Table 6, it is reasonable to claim that at least seven of the nine District Characteristics are important influences on consequential Conditions. Most of these seven are significantly related to multiple Conditions while two district characteristic appears to influence only one Conditions: Mission, Visions and Goals for Students has a significant effect on Academic Emphasis (.31); Coherent Instructional Programs has a significant effect on Disciplinary Climate (.33).

None of the nine district characteristics is significantly related to School Leadership, Uses of Instructional Time. Organization and Planning for Instruction, or Family Educational Culture.

These results raise questions for district leaders about how to make greater contributions to those four Conditions. Results also point to the lack of significant contributions to any of the 12 Conditions of district -sponsored Professional Development and Elected Trustees. While the contribution of Elected Trustees might be considered too diffuse, or its role in school improvement too complex to discern in a study such as this, no such argument can be made for district-sponsored Professional Development. These results warrant a review by district leaders of how best to ensure that this feature of districts can make a more significant contribution to improving both Conditions and those student outcomes (see Table 4) measured by the study.

Table 8

Effects of District Characteristics on School, Class and Family Conditions (Correlation Coefficients, N = 45)

	District Characteristics***									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Conditions Aggregate	.38**	.41**	.46**	.42**	.16	.34*	.30*	.18	.32*	.31*
School Leadership	.13	.21	.17	.14	-.05	.15	-.01	.08	.21	.03
Classroom Instruction	.37**	.32**	.48**	.35*	.16	.27	.27	.24	.38*	.33*
Instructional Time	.29	.15	.32*	.20	.24	.19	.26	.27	.27	.18
Academic Emphasis	24	.31*	.28	.22	.09	.24	.10	.12	.28	.17
Disciplinary Climate	.25	.28	.33*	.29	.17	.19	.21	.08	.16	.16
Teacher Commitment	.42**	.38*	.47**	.40**	.21	.31*	.34*	.20	.44**	.40**
Teacher Trust	.45**	.42**	.43**	.44**	.27	.42**	.37*	.20*	.43**	.45**
Collective Efficacy	.41**	.46**	.49**	.53**	.16	.40**	.32*	.10	.36*	.32*
Organization & Planning	.16	.24	.18	.18	.05	.19	.19	.14	-.05	.06
Safe Environment	.39**	.40*	.44**	.53**	.11	.32*	.33*	.21	.28	.32*
Collaborative Culture	.44**	.47**	.51**	.50**	.24	.37*	.32*	.20	.33*	.38*
Family Educational Culture	.09	.21	.20	.191	-.09	.12	.07	-.12	.04	.13
*p<.05, **p<.01										

*** 1 = District Aggregate
2 = Mission, Vision, Goals
3 = Coherent Instructional Guidance
4 = Use of Evidence
5 = Professional Development
6 = Professional Leadership Development
7 = Alignment
8 = Elected Leadership
9 = Learning-oriented improvement processes
10 = Relationships

4.5 How large are the direct and indirect effects of Strong District Characteristics on Student Outcomes?

Direct Effects

The term "direct effects", as it appears in this question, should not be interpreted literally. Almost everything a district does is, in some way, filtered through or mediated by other Conditions much closer to the real experiences of students. Data reported in this section, however, does not take any of those Conditions into account. Typically, such direct effects estimates underrepresent actual effects, as compared with analyses that also include measures of mediating Conditions.

Table 9 reports correlations between each of the nine district characteristics and four student outcome measures. There are two sets of correlations reported for each of the four student outcome measures, a 1-year measure and a 5-year change measure.

The first line of data in Table 9 indicates significant and similar size correlations between the aggregate measure of district characteristics and the 1-year measures of Language (.36) and Math (.30) achievement. District characteristics do not have a significant effect on (or relationship with) changes in math and language achievement over five years or on any of the measures of student well-being and engagement. Indeed, many of the correlations between district characteristics and the well-being and engagement measures are negative, albeit not significantly so.

Three of the 9 district characteristics have significant direct effects on both Language and Math achievement – Mission, Vision and Goals (.43 and .39), Coherent Instructional Programs (.41 and .40) and Organizational Improvement Processes (.41 and .33). An additional three characteristics have significant effects on Language alone - Uses of Evidence (.34), Professional leadership (.30) and Relationships (.35).

In sum, none of the nine district characteristics have significant direct effects on changes- over-five-years in any of the student outcomes included in the study and none of these characteristics had significant effects on student well-being or engagement. However, most of the nine district characteristics (all but Professional Development and Elected Trustees) have significant direct effects on the one-year measure of Language achievement and two of the nine have significant effects on the one-year measure of Math achievement: (a) Mission, Vision and Goals and (b) Coherent Instructional Guidance.

Table 9

Direct Effects of District Characteristics on Student Outcomes

	Language		Mathematics		Well-Being*		Engagement**	
	1 year	5 year	1 year	5 year	1 year	5 year	1 year	5 year
Characteristics Aggregate	**.36***	**-.01**	**.30***	**.05**	**.13**	**.00**	**-.02**	**-.14**
Beliefs & Vision for Stud.	.43**	-.15	.39**	.04	.20	.04	.14	.02
Coherent Instruct. Program	.41**	-.13	.40**	.04	.15	.00	-.02	-.17
Use of Evidence	.34**	.03	.27	-.01	.06	-.00	.14	.08
Professional Development	.09	-.00	.09	.12	.00	-.03	-.14	-.19
Professional Leadership	.30*	-.07	.26	.07	.23	-.01	.12	.00
Extent of Alignment	.24	.14	.18	.09	.03	.04	-.13	-.25
Elected Leadership	.11	.04	.09	.07	.06	.06	-.18	-.21
Organizational Imp. Process	.41**	.00	.33*	.03	.17	-.01	-.00	-.11
Relationships Aggregate	.35*	.06	.20	-.09	.03	-.05	-.06	-.22
*p<.05, **p<.01								

*Well-being here is the mean of well-being in language & math.

**Engagement includes engagement in language, math (cognitive, social & behavioural combined)

A Comparison of 2017 and 2010 Results

One of the overall goals of this study was to determine the extent to which results from the 2010 study of high performing Ontario districts about the direct effects of district characteristics on students' math and language achievement could be replicated. The 2010 study (Leithwood, 2011; Leithwood & Azah, 2016) did find greater direct effects of district characteristics on five-year change scores in math and language than did the 2017 study. Table 10 compares results of the two studies on one-year measures of math and language.

Table 10

Direct Effects of District Characteristics on Student Outcomes: A Comparison of 2017 and 2010 Results

	1-year Math		1-year Language	
District Characteristics	**2017**	**2010**	**2017**	**2010**
Mission, Vision and Goals for Students	.39	.41	.43	.38
Coherent Instructional Guidance	.40	.36	.41	.43
Uses of Evidence	.27	.30	.34	.37
Professional Development all members	.09	.24	.09	.33
Alignment	.18	.34	.24	.35
Learning-oriented improve processes	.33	-.07	.41	-.04
Professional Leadership	.26	-.00	.30	-.02
Elected Leadership	.09	.08	.11	-.01
Relationships Aggregate	.20	.18	.35	.13

Both studies found similar, practically meaningful effects of four district characteristics on one-year measures of both math and language achievement: Mission, Vision and Goals, Coherent Instructional Guidance, Uses of Evidence, and Alignment. Weak effects on both math and language achievement were reported by both studies for Elected Leadership. The 2017 study reported much stronger effects for Professional Leadership and Learning-oriented Improvement Processes on both math and language than did the 2010 study, while the opposite was true for Professional Development.

In sum, this study largely replicates the results of the 2010 study for five of the nine district characteristics and provides justification, not found in the 2010 study, for Professional Leadership and Learning-oriented Improvement Processes.

Indirect Effects

To explore the indirect effects of district characteristic on student outcomes, Power Indices were calculated with a narrow focus only on mathematics, currently a key priority in the province[1]. As a reminder, Power Indices in Table 11 were calculated by multiplying the correlations between each of the 12 Condition and math achievement and the correlations between each of the nine district characteristics and each of the 12 Conditions. For example, the correlation between School Leadership and academic math achievement is .55 (see Table 5) and the correlation between Mission, Vision and Goals for students and School Leadership is .21 (see Table 9). The power index resulting from the multiplication of these two correlations is .12 (top left cell of Table 11)

As a means of focusing on the most promising district paths to improving students' math achievement, we limit our discussion to Power Indices at the .20 level and beyond. Of 108 Power Indices in Table 11, 32 achieve this standard (an additional four are either .18 or .19).

None of these 32 Power Indices, however, are associated with School Leadership, Uses of Instructional Time, Disciplinary Climate, Organization and Planning for Instruction or Family Educational Cultures. Evidence reported earlier indicates that all five of these Conditions have significant relationship with math achievement. The Power Indices suggest that districts were not having much influence on student math achievement through these five Conditions at the time of data collection, not that they could not nor should not in the future with some intentional action by districts. In particular, Family Educational Culture is associated with very weak Power Indices but its effects can be quite significant primarily for the math achievement of students in challenging circumstances. With equity of achievement as a primary provincial goal for education, this Condition should continue to be considered very important for district improvement purposes.

Seven of the remaining 12 school, classroom and family Conditions are associated with Power Indices at or above .20 and point to three distinct paths (adopting labels from LSA's theory of action) that districts are pursuing with some success in their math improvement efforts.

The Emotions Path. The most powerful district path to improved math achievement includes a cluster of three teacher dispositions - Teacher Trust, Collective Teacher Efficacy, and Teacher Commitment – hence the "Emotions" label. Seven of the district characteristics have some influence on the cluster of Conditions defining this path. So, work toward improving any of the these seven should be done in ways likely to instill Teacher Trust, commitment to their district's expectations for student achievement in math along with a sense of collective efficacy about accomplishing those expectations. High levels of trust and commitment will be promoted by transparency about existing approaches to math instruction, motivation to work with others to find more effective practices and willingness to risk trying

[1] Power Indices were calculated for student well-being also but none achieved close to the .20 level judged to be practically meaningful.

promising new practices. Teacher Trust and commitment will develop to the extent that teachers understand and share the district's expectations for student success in math and participate in district decision making about the most promising approaches to math instruction. Teachers sense of collective efficacy will develop as teachers come to believe that the professional development available to them contributes to the capacities they need to improve math achievement among their students and that the district's policies, procedures and allocation of resources are closely aligned with - and enable - their efforts to improve students' math achievement.

Table 11
Power Indices for Academic Math Achievement

Conditions	Vision	Coh. Inst.	Evidence	PD	Align	Elect Lead	Prof Lead	LOIP	Rel.
School Leader	.12	.19	.07	.03	.05	.04	.08	.12	.02
Classroom Instruction	.16	.25	.18	.08	.14	.12	.14	.20	.17
Uses of Instructional Time	.05	.10	.06	.08	.08	.09	.06	.09	.06
Academic Emphasis	.20	.18	.14	.06	.06	.08	.15	.18	.11
Disciplinary Climate	.14	.16	.14	.08	.10	.04	.09	.08	.08
Teacher Commitment	.21	.21	.26	.12	.19	.11	.17	.25	.22
Teacher Trust	26	.26	.27	.17	.23	.13	.26	.27	.28
Collective Efficacy	.31	.31	.33	.11	.22	.07	.27	.25	.22
Org & Plan	.10	.10	.08	.02	.08	.06	.08	.04	.03
Safe Environ.	.26	.26	.29	.07	.21	.14	.21	.18	.21
Collab culture	.25	.25	.28	.13	.17	.11	.20	.18	.21
FES	.10	.10	.09	.04	.03	.04	.06	.02	.06

The Organization Path. A second less powerful cluster of related Conditions includes Safe and Orderly Environments and Collaborative Cultures. Approximately the same district characteristics have some influence on these Conditions as on Conditions on the Emotions path. District efforts to improve student math achievement should include explicitly embedding instructional expectations about math in districts' visions, missions and goals for students, providing coherent but flexible instructional guidance to schools about math instruction, especially guidance that is "balanced", that is, guidance that includes both district advice about promising instructional practices and considerable local autonomy about whether and how to implement those practices. This path relies on the use of multiple sources of evidence to:

- identify those components of the math curriculum needing focused attention
- locate evidence about the most promising approaches to instruction related to those components and
- monitor the challenges and successes associated with implementing improved math instruction in classrooms.

The Rational Path. The third and least powerful, but still significant, of the three clusters of related Conditions includes Academic Emphasis and Classroom Instruction. Four of the nine district characteristics have some influence (significant or close to significant) on these two Conditions. Two of these district characteristics also influence the Emotions Path and two the Organizational path. Mission, Vision and Goals for Students, Coherent Instruction Guidance and Learning-oriented Improvement Processes are an especially critical sub-set of the 9 characteristics for districts aiming to improve their students' math achievement.

District-level Leaders Influence on Other District Characteristics

The status of district characteristics measured in this study is undoubtedly influenced by many "forces," for example: constraints and opportunities provided by the province, district cultures which may have deep historical roots, and both strong and sometimes contradictory community expectations. District characteristics most certainly interact in complex ways, as well. However, district leadership, including both professional and elected leadership, is among the influences held most directly accountable for the status of such characteristics as well as valued student outcomes. Keep in mind that "professional" sources of leadership are multiple and include district efforts to recruit, select, develop and assess leaders at both school and district levels in keeping with the conception of a "district" described in the first paragraph of this report.

Although results described in Table 3 report almost no direct effects of leadership (either source) on student outcomes, expecting direct effects is neither reasonable nor consistent with relevant leadership theory and evidence. Even the effect of school-level leadership on student achievement is now widely understood to be largely mediated by school and classroom Conditions. It is, however, quite reasonable to expect significant district leadership effects on other district characteristics.

Table 12 summarizes the results of examining the effects of district leadership (professional and elected) on the status of other district characteristics. These data indicate that both sources of district leadership combined (far right column) have significant moderate to strong effects on all other district characteristics. The strongest effects are on three district characteristics - Mission, Vision, and Goals (.73), Professional Development (.74) and Alignment (.72). Correlations between Professional and Elected Leadership and other district characteristics, reported in the two middle columns of Table 12, indicate stronger effects of Professional as compared with Elected Leadership on all district characteristics.

In sum, results suggest that district leadership has quite significant effects on features of the organization which are known to improve student achievement. Furthermore, the extent to which Elected Leadership is related to, or influences, important characteristics of districts may come as a surprise to those who remain skeptical about the value that trustees add to districts' efforts to improve student achievement when they enact their policy-oriented roles as the framework for this study suggests is most effective.

Table 12
Effects of Professional and Elected Sources of Leadership on other District Characteristics

	Professional	Elected	Combined
Mission, Vision, Goals	.74**	.58**	.73**
Coherent Instructional Program	.77**	.47**	.68**
Uses of Evidence	.73**	.43**	.63**
Professional Development	.78**	.56**	.74**
Extent of District/District's Alignment	.76**	.54**	.72**
Organizational Improvement Processes	.55**	.48**	.58**
Relationships (aggregate)	.64**	.59**	.69**
*p<.05, **p<.01			

4.6 How large are the direct and indirect effects of School Leadership on student outcomes?

School Leadership is one of the 12 school, classroom and family Conditions in the framework for the study. However, it is of significant interest to educational policy makers and reformers premised on the now widely-held belief that School Leadership makes a significant indirect contribution to student success (e.g., Hallinger, 2011; Leithwood et al, 2010).

Direct Effects

Tables 4 through 7, above, reported the direct effects of School Leadership on the four sets of student outcomes, correlations of .50 for Language, .55 for Academic Math, .21 for Applied Math, .49 for the aggregate Well-Being Measure and .60 for the aggregate Student Engagement measure. These results indicate that the direct effects of School Leadership rank at approximately the mid-point among all 12 Conditions for Language, Academic Math (6 Conditions have weaker effects) and Applied Math (5 Conditions have weaker effects). The direct effects of School Leadership on student Well-Being are stronger than all other Conditions except Academic Emphasis (.49 compared to .56) and the strongest of the Conditions for student engagement.

Indirect Effects

Notwithstanding the impressive direct effects of School Leadership on student outcomes, School Leadership effects on students are mostly indirect raising a question about which other Conditions in schools, classrooms and families are most susceptible to influence by School Leaders. Table 13 provides the first half of the answer to this question. This table indicates that all relationships between School Leadership and other Conditions are moderately to highly significant, the aggregate correlations being .57. While this confirms much earlier evidence about the key role of school-level leadership, it also points to a challenge for district leaders since, as Table 8 indicated, none of the nine district Characteristics had any appreciable effect on School Leadership; on average, districts seem to be making very little contribution to the quality of school leadership or they are doing so in ways not measured by this study.

Table 13

Relationships between School Leadership and Other School, Classroom and Family Conditions

Conditions	School Leadership
Conditions Aggregate (without leadership)	.57**
Academic Emphasis	.77**
Teacher Trust in Others	.68**
Organization of Planning and Instructional Time	.66**
Collaborative Cultures and Structures	.65**
Classroom Instruction	.59**
Teacher Commitment	.58**
Instructional Time	.53**
Teacher Collective Efficacy	.51**
Family Educational Culture	.50**
Safe and Orderly Environment	.50**
Disciplinary Climate	.35*
**p<0.01 level; *p<.05	

To complete answering the question about indirect School Leadership effects, a series of Power Indices were calculated. Table 14, reports the results of those calculations - estimates of the indirect effects of School Leadership on the five student outcomes included in the study, mediated by each of the remaining 11 school, classroom and family Conditions[2]

Table 14
Indirect Effects of School Leadership on Four Student Outcomes

School, Classroom and Family Conditions	Student Outcomes				
	Math Academic	Math Applied	Language	Well-Being	Engagement
Classroom Instruction	.30	.13	.29	.12	.09
Uses of instructional time	.17	.06	.13	.13	.04
Academic Emphasis	.49	.13	.45	.43	.41
Disciplinary Climate	.17	.04	.16	.11	.07
Teacher Commitment	.32	.23	.28	.15	.11
Teacher Trust	.43	.15	.41	.25	.27
Collective efficacy	.35	.17	.32	.20	.21
Organization & Plan	.28	.14	.19	.19	.17
Safe Environment	.33	.17	.32	.11	.16
Collab culture	.35	.20	.31	.15	.22
FES	.24	.07	.29	.11	.26

Across all five student outcomes, School Leadership has the largest impact by improving Academic Emphasis in schools, followed by Teacher Trust in Others, Collective Teacher Efficacy and Teacher Commitment. Academic Math is especially susceptible to School Leadership when it successfully improves one or more of those four Conditions, in addition to Safe and Orderly Environments and Collaborative Cultures. Applied Math is much less susceptible to School Leadership, although some improvement seems likely by influencing the status of Collaborative Cultures (.20) and Teacher Commitment (.23).

Language outcomes are especially sensitive to School Leadership influence with improvements to at least 8 of the 12 Conditions likely to pay off in greater achievement. Increases in Student Well-Being seem likely when School Leadership nurture improvements in Academic Emphasis (.43) but also Teacher Trust (.25) and Collective Teacher Efficacy (.20). Finally, School Leadership interventions with 5 other Conditions are associated with Student Engagement - Academic Emphasis (.41), Teacher Trust (.27), Collective Teacher Efficacy (.21), Collaborative Cultures (.22) and Family Educational Cultures (.26).

[2] As a reminder, these indices are the product of multiplying the correlations between each of the four student outcomes and each of the school, classroom and family Conditions by the correlations between School Leadership and each of the 11 other Conditions. For example, the top left cell of the Table reports a relatively large power index of .30 for the indirect effects of School Leadership on Academic Math achievement. This is the product of multiplying the correlation between School Leadership and Classroom Instruction (.59 – see Table 13) with the correlation between Classroom Instruction and Academic Math achievement (.51). This Power Index is .59 x .51 = .30. As a rule of thumb for interpreting the practical importance of these indices, we adopted the same rule of thumb used for interpreting the practical importance of effect sizes, so the discussion of data in Table 14 is limited to Power Indices of .20 or greater.

4.7 Is there a significant relationship between student achievement in math and language and student well-being and engagement?

Table 15 reports relationships between student achievement in math and language and both student well-being and student engagement. Both well-being and engagement measures referred to in this table are based on those scales specific to the subject domain, as explained earlier in the report. For example, the first correlation in the table (.38) is the correlation between the 1-year language achievement score and the 1-year score for well-being in language.

Results concerned with well-being indicate mostly moderate to strong relationships between both 1-year and change-over-5-years achievement scores in mathematics (Academic and Applied) and a significant but weak relationship between 1-year well-being scores and 1-year language scores. One-year engagement scores are moderately (.47) to strongly (.71) related to 1-year language and 1- year math achievement only.

In sum, while both well-being and engagement are positively related to some measures of achievement, well-being and math achievement are especially tightly linked.

Table 15

Relationships between Well-Being, Engagement and Achievement

	Well-Being		Engagement	
	1 year	**5-year change**	**1 year**	**5-year change**
Grades 3 & 6 Language				
Achievement 1 year	.38*	.10	.47**	.14
Achievement 5-year change	-.19	.32*	-.05	.16
Grades 3, 6 & 9 Academic Mathematics				
Achievement 1 year	.76**	.35*	.71**	.27
Achievement 5-year change	.51**	.64**	.08	.15
Grade 9 Applied Mathematics				
Achievement 1 year	.66**	.53**	.03	-.05
Achievement 5-year change	.37*	.54**	.11	.07
*p<.05, **p<.01				

4.8 How do school leaders understand their district's work and its contribution to their school improvement efforts?

This section summarizes the responses of 48 principals and vice-principles from across the province to a series of ten questions about the work of their districts. The first question was about what school leaders found most and least helpful while each of the nine remaining questions explored the current status and value of one of the Strong District characteristics. For a response to be included in this summary, it had to be provided by at least three interviewees, although many more interviewees provided most of the response included in the summary.

The Most and Least Helpful District Initiatives

The initial question asked interviewees about initiatives taken by their districts, during the current year, that have been most and least helpful to their school improvement efforts and to explain their assessment of those initiatives.

Two sets of district initiatives or practices were identified by principals and vice-principals as especially helpful to their work in schools – provision of opportunities to further develop their own expertise, along with access to supplemental expertise, and flexibility by districts in determining when to exercise central control and when to provide more autonomy to schools.

Opportunities to further develop one's expertise and access supplemental expertise took six forms:

- ***Membership on a Principal Learning Team.*** Interviewees strongly valued their membership in district-based networks as sources of capacity development for instructional leadership. Such membership allowed one to share ideas and to learn about best practices from one's peers. "Math Pods" were a version of such networks created in at least one district. These pods clarified the priority to be given to improving math achievement and organized school collaboration on the basis of need rather than geography.
- ***One-on-one professional conversations with superintendent***. Some interviewees had frequent contact with their superintendents. Such contact was viewed as an important source of professional development about school improvement, as well as a source of additional support from the district for improvement efforts.
- ***School based instructional rounds.*** Prevalent in some districts in the province, instructional rounds were viewed as a useful form of capacity building by some interviewees.
- ***Openness and encouragement of professional learning opportunities through PD funds and Ministry initiatives for teaching staffs***. These sources of professional development provided funds for release time to engage in professional development
- ***Monthly meetings with senior administrator (Director and Superintendents) meetings with all principals, vice principals and senior district leaders.*** The typically mandatory attendance required at such meetings forced busy school leaders to take time out once a month to connect with others outside their own schools and to better understand actions being taken by their own districts and by the province. These meetings were valued especially when they included vice-principals. As well, such meetings often provided school-level leaders opportunities for participation in district-wide decision-making, opportunities viewed as quite helpful in their subsequent work in schools.
- ***Access to instructional coaches and consultants.*** Such access reduced the anxiety principals and vice-principals sometimes experienced as expectations for improvement in their schools exceeded the limits of their own professional knowledge and skill.

Flexible approaches by districts to school autonomy and central direction were valued for purposes of instructional improvement, as well as for responding to unexpected events. About instructional improvement, interviewees spoke at length about the value they attributed to opportunities for their schools and their teachers to engage in such work based on needs detected in their own schools and classrooms. Districts were especially helpful when they allowed for such local autonomy within a set of broad central expectations and when they provided professional development time and expertise specifically designed to support school priorities within the districts' broad central priorities and expectations.

About unexpected events, districts' flexible approaches to school autonomy and central direction were also valued when they extended to managing the labour disruptions that had occurred in the province during the year. Respondents valued recognition, on the part of their districts, that the current years had not been "typical" and that schools needed the freedom to decide on their own priorities. Respondents also valued constant communication with district leaders on how to manage the labour disruptions and how principals could "get things back on track".

Some of the initiatives identified by respondents as "most helpful" were among district initiatives also viewed as "least helpful". On the surface, this contradiction could be explained as simply differences of opinion to be expected amongst a large group of people. A more fundamental explanation, however, is the perceived nature or quality of a district initiative as part of school leaders' responses to the challenges they faced in their own schools. In some districts, and among significant numbers of respondents, least helpful district initiatives included:

- The nature of some district-provided professional development;
- Some of the directions mandated by the Ministry of Education;
- Excessive withdrawal of principals for meetings out of their own schools;
- Initiative overload by districts;
- Insufficient money and time for professional development in schools.

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