

A Canonical Analysis Model Exploring Contextualized Principal Leadership

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Abstract

This study examined the relationship between the (dependent) set of variables measuring principals' leadership practices (general principal leadership, orientation for school renewal, and school renewal principles and practices) and the (independent) set of variables measuring schools' contextual characteristics (school size, proportion of female students, proportion of low SES students, proportion of minority students, proportion of special education students, and proportion of students with English as a second language). We employed canonical analysis based on a sample of 109 principals from a federal intervention project to identify a practically meaningful canonical correlation of 0.41, indicating that principals did make contextualized leadership decisions. General principal leadership was found to be the key variable representing the dependent side of the relationship, while the linear and quadratic effects of both proportion of female students and proportion of minority students were found to be the key variables representing the independent side of the relationship.

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Principals make leadership decisions often based on their school environment (characterized as school context and school climate). In this study, we attempted to gain some insight into how leadership decisions based on school contextual characteristics are made. We took a multivariate approach for data analysis because principals often make different leadership decisions simultaneously based on their school environment. This multivariate approach allowed us to look into the decision making priorities in relation to school contextual characteristics.

Review of Literature

Principal Leadership Decisions

A school system (i.e., a school district) is made up of a myriad of different networks. A superintendent leads all schools within the district, and each school is headed by a principal. Principals are often seen as the leadership entity within each school, tasked with making decisions that best serve their schools. Principals make leadership decisions often based on their school environment for maximum impact on students, teachers, parents, and communities (e.g., Brauckmann & Pashiardis, 2012; Dou et al., 2017; Green, 2018; Khalifa, 2012).

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Principal leadership greatly influences students' educational outcomes, second only to classroom instruction (Coelli & Green, 2012; Ni et al., 2018). There is a distinctive difference between principal leadership and principal decisions both in definition and conceptual nature. Principal leadership can be defined as the way in which a principal leads a school as "principals exercise influence over key functions of teaching, learning, and how schools operate" (Wu & Shen, 2022, p. 2). There are two main conceptualizations of principal leadership. One focuses on leadership models and behaviors of principals (e.g., instructional and transformational leadership) (Wu & Shen, 2022). Instructional leadership is about curriculum and instruction whereas transformational leadership is about developing individuals and organizations (Wu & Shen, 2022). Principal leadership is considered a key factor for improving schools (Sebastian & Allensworth, 2012). When principals are effective in leadership, their positive impact can be widespread within and beyond the school (Sinnema et al. (2015).

In contrast to principal leadership, which is the overall behavior and general outlook of how a principal conducts business, principal leadership decisions are the specific choices that are made by principals to impact the entire school system and beyond (Brauckmann & Pashiardis, 2012; Dou et al., 2017; Green, 2018; Khalifa, 2012; Ni et al., 2018). Principals are often seen as among leaders in their communities, potentially elevating their decision making power as the community expects to trust in them to make the best leadership decisions that eventually benefit the community as a whole (Frick, 2009; Lowery, 2020). Principal leadership decision making is an intricate and complex process involving different mechanisms that expand beyond simple day-to-day school regulations and policy enforcements (Frick, 2009; Shaked & Schechter, 2019).

Principal Decision making Mechanisms

To make decisions that best serve their schools, students and families, and communities, principals must use appropriate decision making mechanisms (Brauckmann & Pashiardis, 2012). One common decision making mechanism or decision making principle is to make decisions based on a comprehensive consideration of practical feasibilities. Principals are in the gateway between the outer world, consisting of entities such as the school board and the community members, and the inner world, consisting of those who are more directly impacted by their decision making (i.e., students, faculty, and staff) (Shaked & Schechter, 2019). There were multiple factors on which principals base their decisions such as individual and school characteristics (e.g., socioeconomic factors) and learning styles among students (Chitpin, 2021). Leadership actions of "expanding the number of choices, identifying possible consequences of various alternatives, and seeking and analyzing relevant information" are also characteristics of this mechanism (Shaked & Schechter, 2019, p. 11).

The other common decision making mechanism or decision making principle is to make decisions that are more culturally relevant or culturally balanced (e.g., Truong et al., 2017). When making decisions, principals must deal with clashes between school policies and classroom practices and cultural values and personal convictions (Frick, 2009). Principals often seek to balance moral values and ethical dilemmas with what is in the best interest of their schools (Lowery, 2020).

Reflecting both decision making mechanisms, most principals tend to make decisions based on their school characteristics (e.g., Chapman et al., 2016). Principals realize that decisions that are practically comprehensive and culturally balanced must be made by first identifying unique characteristics of their schools (i.e., characteristics of school context and school climate) (Khalifa, 2012; Klik et al., 2023; Ruiz et al., 2018; Sebastian & Allensworth, 2012). Overall, empirical evidence supports the decision making mechanism that takes school characteristics into consideration when making decisions for a specific school (Collie et al., 2012; Holzberger & Schiepe-Tiska, 2021; Lee et al., 2024; Veletić et al., 2023).

School Characteristics

School characteristics consist of both school context and school climate. Academic track, social composition, and teacher collaboration are just a few examples of school characteristics (Holzberger & Schiepe-Tiska, 2021). Specifically, school context consists of characteristics that cannot be changed (e.g., the school's location, the age of the building, the size of the school, the student population). One way to classify school context is school physical characteristics and student intake characteristics (e.g., Baafi, 2020; Meador, 2025). Meanwhile, school climate consists of characteristics that can be changed (e.g., disciplinary climate, parental involvement, teacher involvement, student interaction, community relations) (e.g., Green, 2018).

Some researchers classify school climate using main themes and sub themes (in parenthesis) as teacher support (helping disposition, encouraging perseverance, making instruction relevant, caring beyond the classroom), teacher expectations (keeping students motivated and engaged), school safety (emotional energy and stress, bullying experience, the role of media), and peer social and emotional competence (peer support, classroom disruption) (Giraldo-García et al., 2023).

Principals' Contextualized Decision making

Each individual school is unique in environmental characteristics of both school context and school climate and therefore the needs of each school differ based on those characteristics (Hastings, 2025). Principals need to use their knowledge of school environmental characteristics to make leadership decisions that are in the best interest of their schools, often referred to as a multidimensional perspective when making leadership decisions (Shaked & Schechter, 2019). To prevent the type of “trickle down” decisions principals must contextualize their decisions. Brauckmann and Pashiardis (2012) emphasize the importance of contextual framing for decision making, specifically noting the importance of working with stakeholders, parents, and the community. Although the literature contains good arguments for principals' contextualized decision making, discussion on this practice is rare from an empirical research perspective. Policymakers increasingly expect that challenges at the school level must be resolved at the school level, and this expectation is an acknowledgement of contextualized decision making. However, there has been a rather weak knowledge base on how this expectation can be turned into successful leadership, calling for an integration between context (i.e., school environmental characteristics) and leadership (i.e., decision making) (Brauckmann et al., 2020). With this motivation, we aimed in this study to provide some empirical insights into the nature of principals' contextualized decision making.

Method

Data

High Impact Leadership for School Renewal 2.0 (HIL 2.0) was an intervention project with a goal to develop leadership capacity of practicing and aspiring principals in local schools in a Midwest state of Michigan in the United States (see Ma et al., 2024). HIL2.0 recruited 115 schools with Grades 5 and 8 in urban and rural regions. In general, these participating schools were considered socioeconomically disadvantaged because they reported a rate of students eligible for free and reduced-price lunch higher than the average of the state. Data were collected for evaluation purposes in the spring semester of 2024. All principals and teachers in the 115 participating schools were invited to complete online principal and teacher questionnaires respectively. Data used in this study involved 109 principals (schools) who responded to the principal questionnaires.

Measures

HIL2.0 adopted previously developed and validated instruments (questionnaires) to measure various leadership practices. Principals responded to three instruments of (General) Principal Leadership, Orientation for School Renewal, and School Renewal Principles and Practices. (General) Principal Leadership was a borrowed instrument from the Programme for International Student Assessment (PISA) to measure the effectiveness of principals in their general leadership roles, including four domains of curriculum development, instructional leadership, teacher participation in leadership, and instructional improvement and professional development (see Appendix A). PISA reported sound psychometric properties on this instrument. Orientation for School Renewal was an instrument developed and validated in the original HIL project to measure the extent to which school staff are actively engaged in continuous school improvement processes (see Ma et al., 2020). The instrument contained seven domains of focus on students and their achievement, continuous school improvement, balance between the internal and external influences, the dialogue, decision, action and evaluation (DDAE) process, implementation integrity, implementors as active developers, and internal responsibility and professionalism (see Appendix B). Finally, School Renewal Principles and Practices was another instrument developed and validated in the original HIL project to measure strategies implemented in school to support sustainable progress in educational effort leading to school renewal (see Ma et al., 2025). The instrument contained four domains of developing and sustaining the school's positive core, developing and sustaining collective ownership, making evidence-based decisions, and fostering and supporting organizational learning (see Appendix C). Overall, these instruments demonstrated sound psychometric properties. For data in this study, reliability (which is specific to a particular data collection) was all above .90 on the three instruments.

Meanwhile, we obtained information on school contextual variables from a public database managed by the State of Michigan. Variables included school (enrollment) size, proportion of female students, proportion of low SES students, proportion of minority students, proportion of special education students, and proportion of students with English as a second language (see Appendix D for descriptive statistics). These variables are considered critical and sufficient to represent school contextual characteristics (e.g., Ma et al., 2008). Meanwhile, we were not able to obtain school-level variables considered critical and sufficient to represent school climate characteristics. We avoided adding other measures (e.g., school climate) because our leadership questionnaires were already lengthy enough for both principals and teachers to complete. To generate further insights into the role of school contextual characteristics, each school contextual variable was accompanied by its squared term (e.g., school size was accompanied by school size squared) in canonical analysis.

Statistical Procedure

Canonical analysis was the primary statistical technique in this study to integrate context and leadership. It is a multivariate member of the family of regression methods. Canonical analysis quantifies a relationship between two sets of variables, as opposed to regression analysis that quantifies a relationship between one variable (on one hand) and a set of variables (on the other). In this study, we had two sets of variables, one set of variables representing leadership dimensions (i.e., general principal leadership, orientation for school renewal, and school renewal principles and practices), and the other set of variables representing school context (i.e., school contextual characteristics). Following the familiar notion of regression analysis, one set (leadership) could be referred to as the dependent set (of variables), and the other set (context) could be referred to as the independent set (of variables). Typically, the outcomes of a canonical analysis to which researchers pay close attention are a canonical correlation (the multivariate version of a univariate Pearson correlation) between the two sets and an identification of key variables in each set that help establish the relationship between the two sets.

Canonical analysis works with two sets of variables. Specifically, canonical analysis works with multiple dependent variables (in the dependent set of variables), as opposed to regression analysis that works with only one dependent variable. Because of this, the relationship between the two sets of variables can be more than one dimension as in the case of regression analysis. Each dimension is measured by a canonical correlation (coefficient). Statistical significance has long been used to determine whether a canonical correlation is statistically significantly different from zero (i.e., the null hypothesis). Nonetheless, arguments have been growing strong against the absolute use of the frequentist's notion of statistical significance because a significance test does not consider prior knowledge and tends to be inaccurate when working with complex statistical models (e.g., Akoglu, 2018; Esterhuizen et al., 2024). For example, one of the most influential articles appeared in the prestigious journal, *Nature*, with the title "Scientists rise up against statistical significance" (Amrhein et al., 2019). As a result of the increasing criticisms, rubrics have been developed in multiple fields or disciplines to attach practical meanings to correlations of different magnitudes (instead of relying entirely on statistical significance). Rubrics in some fields close to education science are presented in Appendix E. It was the intention of this study to examine canonical correlations from both perspectives (statistical significance and practical importance). All canonical analyses in this study were executed on the SPSS platform.

Results

We carried out canonical analysis to examine the relationship between the (dependent) set of variables measuring principals' leadership practices and the (independent) set of variables measuring schools' contextual characteristics. Results indicated that there were three dimensions of the relationship between the dependent set of variables (i.e., general principal leadership, orientation for school renewal, and school renewal principles and practices) and the independent set of variables (i.e., school size, proportion of female students, proportion of low SES students, proportion of minority students, proportion of special education students, and proportion of students with English as a second language). Table 1 presents canonical correlations for these dimensions (i.e., 0.41 for the first dimension, 0.36 for the second dimension, and 0.17 for the third dimension).

Table 1

Calculation of Canonical Correlations

	Canonical Correlation	Squared Correlation	Eigenvalue	Percentage
1	0.41	0.17	0.20	0.52
2	0.36	0.13	0.15	0.40
3	0.17	0.03	0.03	0.08

Interestingly, none of the three canonical correlations reached statistical significance at the traditional cut-off value (i.e., the alpha level) of 0.05. Given that canonical analysis represents a complex multivariate statistical model, a total reliance on statistical significance might not be reasonable. An examination of the three canonical correlations made it particularly wanting to claim importance on the first dimension, the most likely dimension to be statistically significant, with a canonical correlation of 0.41. Such a magnitude, according to Appendix E, would be considered strong in political science, moderate in psychology, and fair in medicine, all with important practical implications. Overall, we thought that it was reasonable to claim that the first dimension of the relationship was practically meaningful. With such a conviction, we proceeded to identify variables on each side that contributed to the establishment of the relationship representing the issue of principals' contextualized decision making (see Tables 2 and 3).

Table 2 presents the factor loading of each leadership variable to the dependent side of the first canonical dimension. A common statistical practice when working with factor loadings (e.g., in factor analysis) is to use 0.40 as the baseline to measure the importance of factor loadings. A label then is typically derived to summarize variables with important factor loadings (i.e., ones large than the baseline value). As a result, the first canonical dimension on the dependent side could be clearly labeled as general principal leadership (factor loading = 0.58). It appeared that principals' contextualized decision making would center around general principal leadership.

Table 2

Correlations (Factor Loadings) of Dependent Measures to First Canonical Dimension

Dependent Measures	First Canonical Dimension
Principal Leadership	0.54
Orientation for School Renewal	-0.06
School Renewal Principles and Practices	-0.38
Percent of Variance Explained (Dependent)	14.54
Percent of Variance Explained (Independent)	2.40

Table 3, meanwhile, presents the factor loading of each contextual variable to the independent side of the first canonical dimension. We note again that both the linear effects and the quadratic effects of each variable were examined on the independent side of the first canonical dimension. Again, using the common baseline value of 0.40, it was clear that there were two important "builders" to the first canonical dimension on the independent side. One was the proportion of female students, with similar linear and quadratic effects (factor loading = 0.41 and 0.40 respectively); the other was the proportion of minority students, also with similar linear and quadratic effects (factor loading = 0.45 and 0.49 respectively). The independent side of the first canonical dimension could be clearly labeled as combined accelerated gender and racial compositions of a school. A quadratic function indicates either acceleration (if the quadratic term is positive) or deceleration (if the quadratic term is negative). It appeared that principals would make leadership decisions based on an accelerated consideration of both proportion of female students (to a slightly less degree) and proportion of minority students (to a slightly more degree).

Table 3

Correlations (Factor Loadings) of Independent Measures to First Canonical Dimension

Independent Measures	CD1
School (Enrollment) Size	-0.13
School (Enrollment) Size Squared (²)	-0.17
Proportion of Female Students	0.41
Proportion of Female Students Squared (²)	0.40
Proportion of Low Socioeconomic Status Students	0.25
Proportion of Low Socioeconomic Status Students Squared (²)	0.30
Proportion of Minority Students	0.45
Proportion of Minority Students Squared (²)	0.49
Proportion of Special Education Students	-0.11
Proportion of Special Education Students Squared (²)	-0.01
Proportion of English as a Second Language Students	0.27
Proportion of English as a Second Language Students Squared (²)	0.26
Percent of Variance Explained (Independent)	9.45
Percent of Variance Explained (Dependent)	1.56

Note. CD1 = first canonical dimension.

Finally, concerning the dependent and independent sides of the first canonical dimension, Tables 2 and 3 also contain information on how much variance the dependent (independent) side could account for among variables on its own side (i.e., the dependent (independent) side) and among variables on the other side (i.e., the independent (dependent) side). In Table 2 about the dependent side, this side explained 14.54% of the variance among variables on its own side and 2.40% of the variance among variables on the other side (i.e., the independent side). In Table 3 about the independent side, this side explained 9.45% of the variance among variables on its own side and 1.56% of the variance among variables on the other side (i.e., the dependent side). These percentages might not be as high as one desires but tend to be typical for canonical analysis.

Discussion

Summary of Major Findings

We employed canonical analysis to examine the relationship between the (dependent) set of variables measuring principals' leadership practices (i.e., general principal leadership, orientation for school renewal, and school renewal principles and practices) and the (independent) set of variables measuring schools' contextual characteristics (i.e., school size, proportion of female students, proportion of low SES students, proportion of minority students, proportion of special education students, and proportion of students with English as a second language). Among the three dimensions of the relationship, the first canonical dimension with a canonical correlation of 0.41 was deemed practically meaningful (based on rubrics used in fields close to education science). General principal leadership was identified as the key variable representing the dependent side of the first canonical dimension, while the linear and quadratic effects of both proportion of female students and proportion of minority students were identified as the key variables representing the independent side of the first canonical dimension.

Principals' Contextualized Decision Making

In terms of the first canonical dimension of the relationship representing (evaluating) principals' contextualized decision making, the dependent side could be clearly labeled as general principal leadership, indicating that principals' contextualized decision making would center around general principal leadership, whereas the independent side could be clearly labeled as combined accelerated gender and racial compositions of a school, indicating that principals would make leadership decisions based on an accelerated consideration of both proportion of female students (to a slightly less degree) and proportion of minority students (to a slightly more degree). Overall, principals appeared to make general principal leadership decisions based on school contextual characteristics of both gender composition and racial composition in an accelerated manner.

A quadratic acceleration bears the characteristics of a curve with slow progression at the beginning (along the X axis) and when the progression reaches a certain point (on the X axis), a sharp acceleration occurs (i.e., the curve shoots upwards both quickly and dramatically). For example, when the proportion of minority students starts to increase, the corresponding general principal leadership remains rather stable until the proportion of minority students increases to a certain point. After then, increase in the proportion of minority students would trigger a rather sharp increase in general principal leadership; during this phase, the more proportion (of minority students), the shaper increase (in general principal leadership).

Overall, the major contributions of this study to the research literature were twofold. First, we confirmed (by means of a practically meaningful canonical correlation) that principals do appear to make contextualized leadership decisions. Second, as we discussed above, this study identified the quadratic nature of principals' contextualized decision making; that is, principals do appear to make general principal leadership decisions based on their schools' gender composition and racial composition in an accelerated manner.

Implications for Educational Policy and Practice

The quadratic nature of principals' contextualized decision making has some interesting implications for educational policy and practice. Because principals make leadership decisions based on an accelerated consideration of both school gender composition and school racial composition, there may need to be effective ways to help principals measure and monitor gender composition and racial composition of their schools. Any assistance to help principals operationalize this consideration is likely to help them make effective decisions because such a consideration is often data informed, and data informed decision making has long been praised as a scientific way of making decisions (e.g., Wilcox et al., 2021).

Because principals' contextualized decision making centers around principal general leadership, there may need to be increased professional development to boost the quality of principal general leadership. As its major components, principal general leadership emphasizes curriculum development, instructional leadership, teacher participation in leadership, and instructional improvements and professional development. When principals have a deeper understanding of these leadership components, they can better connect these components with contextual characteristics of their schools and better specify their contextual consideration. As a result, principals' contextualized decision making may become more fruitful.

Limitation and Further Research

The major limitation of this study was a lack of measures on school climate. As discussed earlier, space limitations made us avoid seeking information beyond principals' leadership practices (from both teachers and principals). It was fortunate that the State of Michigan has public databases on essential school contextual variables (e.g., proportion of female students). That was why our data analysis was limited to the use of school contextual variables without any inclusion of school climate variables. This lack would make our empirical insights tentative, and we encourage researchers to carry on with this line of research using a fuller range of school-level variables that would provide a better measurement of school environmental characteristics including both school contextual variables and school climate variables. Such a canonical model is in the best position to reveal principals' decision making in relation to school environmental characteristics.

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Appendix A

General Principal Leadership

CD	Curriculum Development
01	The principal uses student performance results to develop the school's educational goals.
02	The principal makes sure that the professional development activities of teachers are in accordance with the teaching goals of the school.
03	The principal ensures that teachers work according to the school's educational goals.
04	The principal discusses the school's academic goals with teachers at faculty meetings.
IL	Instructional Leadership
05	The principal promotes teaching practices based on recent educational research.
06	The principal praises teachers whose students are actively participating in learning.
07	The principal draws teachers' attention to the importance of pupils' development of critical and social capacities.
TP	Teacher Participation in Leadership
08	The principal provides staff with opportunities to participate in school decision-making.
09	The principal engages teachers to help build a school culture of continuous improvement.
10	The principal asks teachers to participate in reviewing management practices.
PD	Instructional Improvements and Professional Development
11	When a teacher has problems in his/her classroom, the principal takes the initiative to discuss matters.
12	The principal pays attention to disruptive behaviour in classrooms.
13	When a teacher brings up a classroom problem, we solve the problem together.

Scale: 1 = Did not occur, 2 = 1-2 times during the year, 3 = 3-4 times during the year, 4 = Once a month, 5 = Once a week, 6 = More than once a week.

Appendix B

Orientation for School Renewal (SR)

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- | | |
|-----|--|
| SR1 | Focus on students and their achievement |
| 01 | Our school improvement process is guided strongly by the goal of improving student achievement. |
| 02 | Our school truly has high expectations for all students. |
| 03 | All teachers have a clear, shared vision about expectations for all students. |
| SR2 | Continuous school improvement |
| 04 | Our school has a continuous focus on teaching and learning. |
| 05 | All our teachers continuously seek ways to enhance the teaching and learning processes. |
| 06 | Our school consistently uses a continuous improvement process/strategy, rather than starting from scratch for each initiative. |
| SR3 | Balance between the internal and external influences |
| 07 | We openly welcome ideas and input on school improvement from all stakeholders. |
| 08 | We successfully balance external pressure and internal initiative for school improvement. |
| 09 | We successfully prioritize our school improvement efforts despite competing priorities. |
| SR4 | The dialogue, decision, action and evaluation (DDAE) process |
| 10 | We consistently dialogue in our school about our school improvement priorities. |
| 11 | Our school improvement strategies are well coordinated within the school. |
| 12 | Our school successfully monitors the progress of our school improvement initiatives with data. |
| SR5 | Implementation integrity |
| 13 | We consistently monitor our data and develop school improvement initiatives accordingly. |
| 14 | We have a clear process in place to continuously generate new ideas for school improvement. |
| 15 | We consistently re-prioritize school improvement efforts based on continuous data updates. |
| SR6 | Implementers as active developers |
| 16 | Our school really decides our school improvement priorities. |
| 17 | We usually develop our own programs for school improvement (rather than buying from an external vendor). |
| 18 | We consistently adapt and adjust existing programs based on our outcome data. |
| SR7 | Internal responsibility and professionalism |
| 19 | We all hold ourselves and each other accountable. |
| 20 | We all hold our students accountable for their own achievement. |
| 21 | Continuous reflection on school improvement is part of our professional culture. |
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Scale: 1 = Strongly disagree, 2 = Moderately disagree, 3 = Slightly disagree, 4 = Slightly agree, 5 = Moderately agree, 6 = Strongly agree.

Appendix C

School Renewal Principles and Practices (PP)

PP1	Developing and Sustaining the school's Positive Core
01	We use our school mission and vision to prioritize focus areas for student success
02	We use an appreciative approach to assess our school's current status in a focus areas
03	We identify current strengths we can leverage to achieve student success in priority focus areas
04	We focus on growth opportunities in priority areas for student success.
PP2	Developing and Sustaining Collective Ownership
05	Principal and teachers share leadership roles for student success
06	We feel that we are collectively responsible for student success
07	We cultivate an environment of mutual trust, inclusion, and safety
08	We work interdependently to co-create ways for achieving student success
PP3	Making Evidence-based Decisions
09	We practice routines of collaborative inquiry in our professional activities
10	We maintain current profiles of our school strengths and growth opportunities
11	We monitor implementation of evidence-based practices for student success
12	We use data dashboards with multiple indicators to track student growth
PP4	Fostering and Supporting Organizational Learning
13	We routinely practice reflective dialogue informed by evidence of student and school growth
14	We use probing questions to gain deeper understandings of our strengths and growth opportunities
15	We align school resources, processes, and systems to support student success growth targets
16	We engage in professional learning at different levels including knowing, doing, and reflecting

Scale: 1 = Strongly disagree, 2 = Moderately disagree, 3 = Slightly disagree, 4 = Slightly agree, 5 = Moderately agree, 6 = Strongly agree.

Appendix D

Descriptive Statistics of Dependent and Independent (Sets of) Variables

	Mean	SD
Dependent (Set of) Variables		
Principal Leadership (Scale: 1 to 6)	4.32	0.73
Orientation for School Renewal (Scale: 1 to 6)	4.42	0.79
School Renewal Principles and Practices (Scale: 1 to 6)	4.34	0.83
Independent (Set of) Variables		
School (Enrollment) Size	3.54	1.73
Proportion of Female Students	0.49	0.03
Proportion of Low Socioeconomic Status Students	0.67	0.13
Proportion of Minority Students	0.28	0.20
Proportion of Special Education Students	0.17	0.05
Proportion of English as a Second Language Students	0.06	0.08

Note. School (enrollment) size is measured as the number of units with 100 (students) as one unit.

Appendix E

Strength of Correlation

Correlation (in absolute value)	Dancey & Reidy (2007) (for Psychology)	Quinnipiac University* (for Political Science)	Chan (2003) (for Medicine)
1.0	Perfect	Perfect	Perfect
0.9	Strong	Very Strong	Very Strong
0.8	Strong	Very Strong	Very Strong
0.7	Strong	Very Strong	Moderate
0.6	Moderate	Strong	Moderate
0.5	Moderate	Strong	Fair
0.4	Moderate	Strong	Fair
0.3	Weak	Moderate	Fair
0.2	Weak	Weak	Poor
0.1	Weak	Negligible	Poor
0.0	Zero	None	None

Note. *The Political Science Department, Quinnipiac University. Cited in Akoglu (2018).