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School Context, Principal Leadership, and Achievement: The Case of Secondary Schools in Singapore

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The purpose of this study is to explore the relationship among school contextual indicators in Singapore, principal leadership in managing the secondary school's governance and work structures, and achievement outcomes. Already established is that the context may enable or constrain how the school as a workplace affects student learning. Less clearly understood, however, is how the principal may contribute to the link between the school's context and important school processes that influence student achievement. The results of the study are discussed in terms of their theoretical and practical significance.

Recent demands calling for increased educational accountability and restructuring schools to solve educational problems have focused attention on the principal's role in facilitating change that produces academic improvement. While previous research has identified a number of variables, including principal leadership, that have an effect on school academic achievement, the relationship among these variables, the context of the school, and student outcomes is more complex than originally thought (Bossert, Dwyer, Rowan, and Lee, 1982; Hallinger and Murphy, 1986; Heck, Larsen, and Marcoulides, 1990). Principal leadership is thought to depend upon both the person and the specific organizational variables (e.g., the type of decision making, school climate and culture, teacher expectations for performance, and instructional organization) and contextual variables (e.g., size, characteristics of teaching staff, community characteristics, and school level) associated with the school. The interaction of these variables shapes in-school processes and resulting school outcomes (Heck et al., 1990; Leithwood, Jantzi, Silins, and Dart, 1993).

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Despite the existence of several theoretical models of how principal leadership affects school processes and resulting outcomes, however, empirical work that identifies and estimates the strength of these interrelationships is still needed. As Wimpelberg, Teddlie, and Stringfield (1989) argue, future research on school effects, including principal leadership, must show greater sensitivity to schools in their organizational and environmental contexts. Such information can provide clues about why schools produce particular types of outcomes. Already established is that the context of the school shapes students' classroom experiences (Dreeban and Barr, 1983; Virgilio, Teddlie, and Oescher, 1991) and the allocation of resources (Bossert, 1988; Barr & Dreeban, 1988). What is less clear is how principals as organizational leaders may contribute to the links among the school's context, important in-school processes, and student outcomes. Because measures of demographic composition, school organization, school effects, and achievement outcomes are all correlated, it has been difficult to unravel and isolate the effects of any particular set from the others (Rowan, Bossert, and Dwyer, 1983). Few studies to date, therefore, have posited and tested models that can provide evidence about the interrelationships among these critical sets of variables.

CONCEPTUAL FRAMEWORK

For the early 1990s, the focus on the role of the principal appears to be shifting from the effective-schools model that dominated the 1980s to the leadership role required in restructured schools. In contrast to the "strong" leader view of the principal who defines the school's vision along rather narrow lines (from early effective-schools research), the principal in the emerging leadership metaphor must lead far more subtly and collegially than in years before (English and Hill, 1990). Principals must be accountable to a variety of constituent groups and willing to exercise control within a context of shared decision making. Such leadership has been termed *transformational* (Burns, 1978; Leithwood, 1992), because it seeks to build within all school constituents the pursuit of some "higher" common goals. In terms of governance, this emerging view highlights the principal's role in reducing bureaucratic control, building collaboration, and teamwork, and, as a result, in empowering others to share in the leadership of the school.

Despite a shift in the conceptualization of the role, one important subset in the principal's leadership is the types of activities that he or she uses to influence goal attainment in the school (Ebmeier, 1991). Leithwood (1992) suggests that these are "first-order" activities aimed at instructional improvement. The activities associated with improving school performance are an important focus of the principal's role because of the increased emphasis on educational accountability, especially in light of the parent involvement in site-based management in the 1990s. The sum of these activities was previously termed the "*in-*

structional leadership" role of the principal (e.g., Bossert et al., 1982; Hallinger and Murphy, 1987; Heck et al., 1990) because of its focus on improving school achievement outcomes. Such models acknowledge that principals do not affect individual students directly as teachers do through classroom instruction, but that activities of the principal directed at school-level performance have trickle-down effects on teachers and students (Boyan, 1988; Heck et al., 1990).

Leithwood (1992) notes that effective principals are involved in "second-order" changes, too, that is, facilitating the growth of teachers through creating school vision, developing high expectations, and emphasizing a collaborative approach to decision making and governance processes. The movement toward local school restructuring is an example of the principal's role in facilitating second-order changes. Leithwood, Jantzi, Silins, and Dart (1993) investigated many of these processes and found that principal leadership had strong direct effects on in-school processes and indirect effects on outcomes. In addition, in-school processes were the strongest predictors of school outcomes.

Heck et al. (1990) tested several previous theoretical propositions about aspects of the principal's leadership role that are related to school outcomes. They confirmed a model of principal leadership comprising three in-school processes through which school leaders may influence others within the school environment: governing the school (e.g., determining who is involved in problem solving and decision making), building or maintaining school climate and culture, and organizing the school for instruction to take place. Heck et al. were able to link this model of elementary- and secondary-school principal-leadership processes to school academic performance. More specifically, the empirical support of this model of principal leadership demonstrated the simultaneous relationship between a multivariate set of in-school leadership processes and the school's higher or lower academic performance, where such evidence has not been overwhelming (Deal, 1987; Hallinger & Murphy, 1986; Lee, 1987).

It should be noted that the majority of previous studies (e.g., Hallinger & Murphy, 1986; Heck et al., 1990) focused on outliers and therefore compared the best and worst among several thousand schools. As the authors noted, there remains a need to replicate such studies in settings that include a more average range of schools. Furthermore, an emerging concept in educational administration is the need for the comparison of theory across school settings (Hallinger and Murphy, 1986; Heck and Marcoulides, 1989) and cultural contexts (Austin and Reynolds, 1990; Heck, Marcoulides, and Lang, 1991; Hughes, 1988). Empirically testing theoretical propositions across a diversity of settings and contexts is an important activity in the process of theory confirmation or modification. When groups are compared, assumptions are generally made that the constructs being measured are similar for all groups examined. The value of a proposed theoretical model of principal leadership processes is enhanced if it can be identified in responses from different populations. Studies developed in

other settings or cultural contexts, therefore, may be an effective means of extending our understanding of how principal leadership practices indirectly affect school outcomes.

Hallinger and Murphy (1987) cautioned us not to generalize findings from previous research on elementary-school settings to the secondary level, however, because there is a lack of systematic studies of secondary principals, and there are specific differences in the context of secondary schools. Because of the multiple and competing goals of secondary schools (Farrar, Neufeld, & Miles, 1984) and conditions limiting the joint work among teachers, some researchers argue that neither administrative leaders nor teacher leaders could exert much influence on instruction (Cusick, 1983). Heck (1992) noted some variation in leadership practices associated with school level. Specifically, secondary principals do not appear to mirror the same "direct-intervention" type of leadership often associated with effective leadership in elementary schools. Yet, differences exist between principals in high- and low-achieving secondary schools. Primarily, these differences are more indirect, including emphasizing the solving of instructional problems, using test data to solve instructional problems, developing systems to monitor student progress, and protecting faculty from external pressures (Heck, 1992). In contrast, though, Louis and Miles (1991) note that urban high schools can succeed in implementing changes that lead to instructional improvement and improvement in outcomes, particularly where there is support of key stakeholders and an empowered management group that monitors the change process.

The purpose of this research is to explore the impact of contextual variables on principal leadership processes and, in turn, of these two sets of variables on school outcomes. The study draws upon past theory and research (Andrews & Soder, 1987; Bossert et al., 1982; Boyan, 1988; Heck et al., 1990; 1991; Leithwood, 1992; Teddlie, Kirby, and Stringfield, 1989) which suggests that principals can exercise important control over aspects of the school's governance and work structures. More specifically, the study is directed at understanding how secondary-school principals, who have been less studied than their elementary-school counterparts, may influence important in-school processes associated with academic performance. Furthermore, investigating principal leadership across national or cultural contexts may be an important step in extending theory about school administration.

METHOD

Subjects

The sample included 156 upper and lower secondary-school teachers selected at random from 26 secondary schools in Singapore. While individuals within each school ($N = 6$) were selected at random, it was not possible to

sample at random from the complete population of secondary schools in Singapore. Generalizability is therefore limited to the extent that the schools (and teachers) in the sample may not represent all schools in the country.

One hundred thirty-eight (88%) usable questionnaires were included in the analysis. Background data on the teachers who participated in the study are as follows (coding of variables is indicated in parentheses):

Teaching experience: 1–4 years (1), 8%; 5–10 years (2), 38%; over 10 years (3), 54%
Education: Less than bachelor's (1), 33%; bachelor's degree (2), 52%; master's or above (3), 13%
Gender: Female (1), 73%; male (2), 27%
Ethnicity: Chinese (1), 79%; Indian (2), 9%; Malay (3), 8%; other (4), 4%

Singapore is a compact island state. Most, if not all, parts of the island are organized into housing estates that are replete with essentially similar amenities and features so that they are almost uniform (Kok, 1990). Rural-urban distinctions that are made in U.S. studies (as well as differences in socioeconomic status) are therefore not as marked in this data set as in similar U.S. studies. Other demographic information collected about the schools is summarized as follows (with variable codings in parentheses):

School size: Less than 40 teachers (1), 3%; 40–65 teachers (2), 43%; over 65 teachers (3), 54%
Achievement level: Below national norm (1), 19%; at national norm (2), 27%; above national norm (3), 54%
School type: Government (1), 80%; government-aided (2), 15%; independent (3), 5%

Instrumentation

The instrument used in this research was designed to be consistent with previous research and to measure 42 strategic interactions (job tasks) between principals and teachers focusing on how the school is structured and governed, how it is organized instructionally, and how teachers perceive elements of its climate and culture. The instrument was developed through a comprehensive review of the literature on principal leadership (e.g., Andrews & Soder, 1987; Bossert et al., 1982; Hallinger & Murphy, 1986, 1987; Heck et al., 1990), school climate (e.g., Kottcamp, Mulhern, and Hoy, 1987), and organizational culture (e.g., Hofstede, Neuijen, Ohayv, and Sanders, 1990; Marcoulides and Heck, 1992). To assess the degree of implementation of each type of interaction between principals and teachers, participants were asked the following: "Circle the number on the scale below that reflects the accuracy of the following statement." The scales were conceived as 5-point Likert-type ranging from

1 (highly inaccurate) to 5 (highly accurate). A pilot test of the instrument indicated that it took approximately 15–20 minutes to complete.

RESULTS

Confirming the Structure of Principal Leadership

A confirmatory factor analysis was conducted to assess the adequacy of the variables used in defining the principal leadership model, using the LISREL analytic paradigm (Joreskog and Sorbom, 1989). Three underlying (or latent) leadership processes were defined: school governance, school culture/climate, and instructional organization. Because such latent variables cannot be directly observed, they cannot be directly measured. Researchers must therefore indirectly define the constructs in terms of measuring some observed variables. Each latent leadership process, therefore, was defined as a set of observed variables consisting of teachers' perceptions about their principal's leadership role. Once the model is defined, statistical tests can be performed to determine whether the data (in this case, a set of variance–covariance matrices) confirm the theoretically generated model.

In contrast to exploratory factor analysis, the logic of confirmatory factor analysis forces one to clarify the conceptual reasons for allowing the observed variables to be grouped with the particular latent leadership domains they are hypothesized to measure before the model is actually tested with the data. While the questionnaire included 42 items, in specifying the final factor model only the 21 tasks most strongly identified conceptually and methodologically with principal leadership processes and school performance were used. Observed variables that may be associated with other leadership purposes, therefore, were not included in this analysis.

The proposed model was tested with LISREL 7 (Joreskog & Sorbom, 1989) using a covariance matrix as input. Table 1 presents the LISREL parameter estimates of the confirmatory factor analysis. As seen in the table, the observed variables load quite well (i.e., above .30) on the leadership processes they were hypothesized to measure. The adequacy of this model can be determined by several statistical and practical means. The coefficient of determination (COD) is one index that indicates how well the observed variables measure the underlying leadership constructs. It is basically a general measure of the reliability of the measurement model (Heck et al., 1989). Values above .9 are considered evidence of an acceptable fit between observed variables and underlying factors. For this model, the COD was .971, suggesting a good model. Another indicator of the fit of the model to the data is the chi-square/degrees-of-freedom ratio (i.e., ratios less than 5:1 are often seen as indicating an acceptable model fit). The observed ratio (less than 2.6:1) indicated a plausible model. Internal consistency coefficients (Cronbach's alpha) were calculated for each underlying

TABLE 1.
Parameter Estimates of Variables Included in the Model of Principal Leadership

Variable	Governance	Climate/ culture	Instructional organization
Administrator knows and understands school problems	.78		
Principal stresses teamwork and works as a team	.73		
Principal buffers teachers from outside pressures	.69		
Teachers have input into making important decisions	.52		
The school is not tightly controlled; rules are flexible	.40		
Teachers can take action without supervisor approval	.36		
Principal behavior toward staff is supportive and encouraging		.91	
Teachers approach principal with problems they have		.82	
Effective two-way communication between principal and teachers		.79	
Principal has vision/purpose and communicates it to staff		.67	
Teachers receive clear information about school-related matters from the principal		.66	
Principal communicates with all staff about problems		.65	
School is a nice place—I feel needed and wanted		.63	
Teachers can get help with problems from other teachers		.43	
Teachers support each other; positive working relationships		.42	
Principal assists teachers with class problems			.79
Adequate resources are available			.65
Teachers share ideas and materials			.58
Teachers participate in determining appropriate methods of instruction			.56
Teachers participate in developing staff development and discussions			.41
Teachers are familiar with course content/goals throughout school			.31

leadership factor and were judged to be sufficient for the purposes of subsequent analyses (ranging between .7 and .9). Together, the various statistical tests and practical indices indicate that the proposed leadership model fairly accurately accounted for the variability in the data.

Exploring School Context and Leadership Processes

Once the underlying dimensions composing the leadership model were satisfactorily defined through confirmatory factor analysis, the model was tested against demographic and contextual indicators for whether these variables exerted any influence on perceptions of principal–teacher interactions. Multivariate analysis of variance (MANOVA) was used to test whether there were mean differences in teachers' perceptions of school governance, school climate/culture, and instructional organization with respect to the specific contextual predictors. These analyses indicated no significant differences in perceptions of principal/teacher interactions for the three underlying dimensions in the model for the following contextual indicators: school level, school size, school type, teacher education, and teacher experience. Overall, this result suggests that the particular set of in-school leadership processes developed in this model is relatively independent of contextual indicators.

To determine whether these leadership process variables and school contextual indicators were related to the achievement level of schools, a discriminant function analysis was performed. The goal of discriminant analysis is to find a linear combination of variables that maximizes the differences among groups in the sample and therefore allows efficient group-membership prediction according to the pertinent characteristics. Mean scores in the three principal leadership domains and contextual indicators were used as the classifying variables.

Individual teachers in the study were categorized into three groups based on their schools' achievement scores: those in high-, average-, and low-achieving schools. It should be noted that the limited number of schools ($N = 26$) prohibited the aggregation of data to the school level in this study. Rowan, Raudenbush, and Kang (1991), however, suggest that the organizational design features of schools can be reliably measured at both the individual and the aggregate levels of analysis. In fact, they argue that, because there is substantial heterogeneity in teacher ratings within schools, individual-level analyses are an important part of any analysis of organizational design features. In addition, Heck et al. (1990, 1991) and Heck and Marcoulides (1992) reported consistent results of individual- and school-level analyses concerning organizational processes. Individual-level analyses may actually capture more "within-school" variability in perceptions of teacher and principal interactions. Much of this variability is lost when responses are pooled at the school level (Heck et al., 1990). The analysis of data in the study was therefore conducted at the individual level, recognizing that this may or may not introduce some bias in

the results (Heck et al., 1990; Rowan et al., 1991; Sirotnik and Burstein, 1985).

Two discriminant functions were calculated, with a combined X^2 (18) = 42.09, $p < .001$. The two discriminant functions accounted for 84% and 16% of the between-group variability, respectively. However, only the first function was statistically significant. The group centroids (i.e., means) on the first discriminant function, which indicate where the three types of schools lie in multivariate "space" (i.e., low = −.98; average = .03; high = .29), suggest that the model nicely separates individuals in low-achieving schools from those in average- and high-achieving schools (i.e., the latter two centroids are closer together in terms of the classifying variables).

The standardized discriminant-function coefficients presented in Table 2 indicate that school achievement among the three groups differs most sharply according to school size (.64), school type (.61), and teacher expectations of student ability (−.57). The size of the coefficients indicates the importance of each, while controlling for the effects of the other variables in the model. The positive or negative standardized coefficients also suggest substantial variation in how the variables in the model discriminate among the groups. For example, large positive coefficients in this case indicate how individuals in high-achieving schools (one outlier) are classified primarily by school size (i.e., larger) and type (i.e., government-aided, independent), while individuals in low-achieving schools (the other outlier) are primarily identified by their less favorable attitudes about children's academic ability (represented by the negative coefficient).

Also important in separating these groups of teachers by their schools'

TABLE 2.
Variables Contributing to the Prediction of School Achievement

	Standardized discriminant-function coefficients	
Predictors	Function 1	Function 2
School size	.64	.20
School type	.61	.43
Teacher expectations	−.57	.69
Teacher experience	.37	.35
Governance	.31	−.15
School culture/climate	−.30	.62
Instructional organization	−.27	−.47
Gender	.12	−.18
School level	.04	.13

achievement patterns are teacher experience (.37), the manner in which their schools are perceived to be governed (.32), and their perceptions of school culture/climate (−.30). With respect to the latter two in-school leadership processes, the positive coefficient indicates that school governance (see Table 1) helps classify higher-achieving schools (e.g., more democratically governed and focusing on teamwork), and the negative coefficient suggests that teachers in lower-achieving schools perceive generally less satisfactory conditions (see Table 1) in school climate/culture (e.g., communication and social relationships).

A second discriminant function, which separates high-achieving from average- and low-achieving schools, may provide some additional information about how these groups of schools differ. Although insignificant, this function suggests that some variance, especially in high-achieving schools, may be due to teachers' positive perceptions of student academic ability (.69) and more favorable attitudes about organizational culture/climate (.62). It should be noted that these latter coefficients show up as negative with respect to the first (significant) discriminant function.

Importantly, the set of predictors used in the model correctly classified 62% of the individuals in the sample by achievement level in their schools (i.e., against 33% by chance). Thus, the observed classification represents a substantial improvement in predictive ability over chance.

DISCUSSION

The purpose of this study was to investigate the relationship among contextual variables, in-school processes that focus on principal and teacher interactions, and school outcomes. Despite variation in how the role has been conceptualized, most theoretical models suggest that principal actions have indirect effects on school outcomes, mainly through activities that coordinate, monitor, and enable teachers to work more effectively with students. These social interactions have trickle-down effects through classrooms that nurture student performance (Bossert, 1988; Heck et al., 1990). The leadership model developed in this study provides a view of the contribution of 21 identified in-school interactions between principals and teachers within three distinct domains that contribute, at least indirectly, to the overall classification of teachers by the student achievement in their schools.

One important result of this study is that a set of school context measures were found to be related to school achievement, suggesting the need to better understand how the school's context influences outcomes regardless of cultural setting. These variables are school size, the type of school, and teacher experience. Some of the contextual indicators used in this study have been found in previous research to affect school outcomes, including school size (Benson,

1983; Mayor and Heck, 1992; Pallas, 1988), teacher experience (Mayor and Heck, 1992), and teacher expectations of student academic ability and attitudes (Conley, Bacharach, and Bauer, 1989; Neumann, Rutter, and Smith, 1989). The findings of this study also suggest that contextual indicators appear to predict differentially across achievement contexts. For example, government-aided and independent schools, larger schools, and more teaching experience primarily differentiate higher-achieving secondary schools, while less favorable teacher attitudes and expectations of students help differentiate low-achieving schools in Singapore. It is of interest to note that, in Singapore, socioeconomic status is probably not as important in defining achievement as in the United States. For example, in a similar type of study conducted in Hawaii, about 40% of the variance in school reading and math outcomes was due to contextual indicators of school socioeconomic status alone (Mayor & Heck, 1992).

A second finding of interest is that the various contextual indicators did not appear to influence perceptions of the principal's strategic interactions with teachers in the areas of governing the school, building school culture/climate, and instructional organization. Multivariate analyses of variance between the contextual variables and the model of leadership processes were insignificant ($p > .05$) with respect to main effects and interactions. This finding may suggest the presence of a school culture that develops somewhat independently of contextual indicators. This finding is corroborated by Snyder and Ebmeier (1993), who found that contextual indicators in general were not good predictors of in-school leadership processes.

More important, the specific mix of contextual indicators (i.e., "out-of-school" processes) and principal–teacher interactions were related to school achievement outcomes. Despite efforts to centralize and equalize previous distinctions between different types of schools in Singapore (Sim, 1988), there appears to be some difference in these contexts, which may be related in part to school culture. Rutter and Jacobson (1986) suggest that one key issue in school improvement is how to alter teachers' perceptions of student ability, which affect their engagement in teaching itself. The authors further note that these perceptions are tied to teachers' feelings of integration into school culture.

Despite the influence of context on outcomes, the in-school interactions between principals and teachers also help differentiate achievement in schools. The findings in the Singapore study similarly indicate that, especially in low-achieving schools, the link between less positive teacher attitudes about students and overall lower feelings of cultural integration is especially pronounced (e.g., the principal is less supportive and encouraging, the teachers do not feel they can approach the principal with problems, communication is more ineffective, and the principal lacks vision and communication skills). Variables associated with the school's contextual environment and its culture, including the

staff's expertise and commitment to teaching, affect the quality of the day-to-day experiences of the children. Together, these variables indicate a school's press for achievement (Oakes, 1989).

Governance processes also appear to differentiate individuals in high-achieving schools from the other two groups in this sample. To illustrate, high-achieving schools are perceived to be governed through greater democracy and teamwork (e.g., the school is more flexibly controlled, the rules are not rigid, the teachers can take action without the principal's approval, and teamwork is stressed). In addition, teachers indicate that they are more involved in making important decisions and are more protected from external problems by their principals, and that their administrators are more able to understand the problems in the school. This finding is corroborated by Heck et al. (1990), who noted that governance processes were indirectly related to school outcomes.

IMPLICATIONS

This section draws implications from the study's findings that may be useful in understanding how principals contribute directly to in-school processes that may ultimately affect school outcomes. As Witte and Walsh (1990) noted, given the complex nature of educational systems and the difficulties of researching them, the results of any study must be limited in helping to resolve major debates about the effects of schooling (and personnel) on student outcomes. Measures of demographic composition, organizational school effects, and student performance have been difficult to unravel until recently. The use of mathematical models (e.g., path analysis, canonical analysis, and discriminant analysis), which has been a needed but neglected method of data analysis in the field (Willower, 1987), has begun to unravel the complexity of these interrelationships.

With this in mind, the results of this study are generally supportive of those that have found a nonchance relationship between the classroom behavior and attitudes of teachers; how the principal is perceived to monitor and contribute to important in-school processes, such as governance, school climate/culture, and instructional organization; and performance outcomes. For example, Snyder and Ebmeier (1993), using path-analytic techniques, recently proposed and tested a series of models of the effects of context and principal leadership on in-school processes. Contextual variables were found to affect both intermediate (i.e., teacher-related) and outcome variables, but not principal behavior. Similarly, in the present study, contextual factors failed to produce any significant differences in teachers' perceptions of principal and teacher interactions. Yet, both studies found that contextual variables and principal actions are linked to other in-school processes and outcomes, both directly and indirectly.

In another recent study, Leithwood et al. (1993) used canonical analysis

(which compares sets of interrelated variables) to explore the effects of contextual variables, principal leadership, and in-school processes on a series of outcomes. Leadership had strong direct effects on in-school conditions and processes. In addition, the direct effects of leadership activities yielded small, but significant, relationships to school outcomes. In the Leithwood et al. model, in-school processes and out-of-school (contextual) processes both produced significant direct effects on changes in teachers' behavior, programs and instruction, and outcomes.

The findings of this study are therefore consistent with the Leithwood et al. (1993) study, as well as Leithwood's (1992) view of effective leadership as transformational in the sense that it focuses on certain sets of activities that promote organizational development. Leithwood argues that these activities fall into three main areas: developing and maintaining a collaborative school culture which promotes empowerment, fostering the professional development of teachers, and improving group problem-solving strategies. The results of the present study therefore provide empirical support for the belief that secondary-school principals can exert important influences on the manner in which the school is governed, the types of activities that are directed at developing and maintaining the school's culture, and the manner in which the school is organized instructionally. The sum of these activities helps promote productive student outcomes.

Collectively, the results of this and several recent studies indicate the complexity of the principal's work. Leadership aimed at school improvement (i.e., with respect to test scores) is only one aspect of the school's environmental and social milieu that contributes to these outcomes. Conceptually, studies focusing on the social context of the school attempt to collect data on a variety of contextual conditions and in-school processes that are related to outcomes, as opposed to simple correlates between leadership and school achievement. This type of data collection appears to provide more valid and reliable measures of school processes and to improve predictive power. Estimating the effects of the principal's role in monitoring the governance and work structures of secondary schools in Singapore (within a centralized system) provides empirical support to a growing data base of cross-cultural studies (e.g., Canada, the United States, and Great Britain) that highlights the centrality of the principal's role in facilitating academic performance in schools.

Several cautions about the ability to generalize from this study are warranted. While the data were drawn from a sample of secondary schools in Singapore that included high-, average-, and low-achieving schools, the sample may not reflect the profile of all schools in Singapore. With respect to previous studies that have focused on outliers (e.g., Heck et al., 1990), this study attempted to assess a wider range of schools, for example, low-performing, performing at about average compared to national norms, and performing above

average. This is important to keep in mind in assessing the contribution of this model of principal leadership to explaining school outcomes. In this study, the differences in leadership practices are not nearly as large as in samples that focus only on extreme outliers. For example, Heck (1992) found sizable differences in leadership practices between roughly the "best 30" (after controlling for the effects of context on achievement) and the "worst 30" schools in California (out of approximately 5,000 schools).

While it would appear that the usefulness of the proposed model of leadership would be more limited in predicting school outcomes in the present case, despite the difference in how the schools in the two studies were sampled, the Singapore study found some important ways in which achievement patterns in schools may differ according to contextual indicators and perceptions of several in-school processes. From this standpoint, the study attends to one of the recommendations of previous research: that future studies be directed toward exploring the links between school principals and school performance with average schools as a third group.

Finally, the cultural setting of the study's schools, a country in Asia, may not be similar to school settings in the United States in terms of socioeconomic characteristics, purposes, abilities of teachers and administrators, and parent expectations. The overall relationship of principal leadership, in-school processes, and school outcomes, therefore, may be seen to vary according to the individual leader, the characteristics of the school (e.g., its size and type), and the teaching staff (e.g., its expectations and experience), as well as the cultural setting. Nevertheless, the results do demonstrate that schools that are high-achieving, despite these suggested variations, may be substantially different from their average- and low-achieving counterparts in terms of the type and effectiveness of the leadership provided by their principals.

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