Nurturing innovation: how much does collaborative management help?

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Innovation, Management styles, Participative management, Schools, Teachers, Training

Abstract
Collaborative decision making and site-based management have been proposed as essential foundations for reform of classroom instruction. Using data from the nationally-compiled PROSPECTS Data Survey, this study analyzes the data for key variables pertaining to school organization, teacher characteristics, and classroom instruction. The purpose is to determine the degree to which innovative practice relates to collaborative decision-making process, individual teacher background characteristics, or another combination of factors. The results surprisingly downplay the impact of collaborative management on instructional practice, identifying instead sustained in-service programs and teacher belief in student ability to learn as potentially more promising directions for future research and practice aimed at the question of instructional reform.

The policy issue
Improving the academic performance of low-achieving students is a foremost concern of educators and policy makers. Toward meeting this goal, restructured school management and collaborative decision making have been proposed as measures which promote instructional practices that benefit underachieving students (Fullan, 1991). Collaborative management can be defined as any school governance process for shared decision-making among administrators, teachers, and parents on matters relating to instruction, personnel, student conduct, and budget. The underlying assumption is that instruction will improve because collaborative relationships empower and motivate site personnel to find instructional solutions for the educational problems that students face. Nonetheless, the linkage between collaborative management and innovative instruction for low-achieving students lacks extensive empirical evidence to validate the perceived connection (Sarason, 1990; Murphy, 1991; Elmore, 1992). It remains primarily speculation whether more democratic power relationships actually engender instructional change at schools serving low-achieving students.

At the same time, there is growing concern for this group of students (Carnegie Forum on Education and the Economy, 1986), variously identified by the terms “economically disadvantaged”, “underserved”, “low-achieving”, or “at-risk”. The consequences of under-education for the increasing numbers of these students affect larger society (Hodgkinson, 1989) and include the emergence of a dual society, with a large and poorly educated underclass, disruption to higher education, reduced economic competitiveness for industries impacted by the growing number of workers with low educational attainment, and increased costs to provide public services to those living in poverty. The polarization of society which results from economic inequality intensifies political conflict and instability as well (Levin, 1990).

This article furthers current research by providing valuable empirical knowledge about the relationship between collaborative management and innovative instruction in schools serving large populations of underserved students. By exploring the question of whether innovative instruction can be “bred” in a collaborative school environment, this research could inform policy makers and practitioners who seek to reform school by restructuring features of school organization and instruction. While not establishing a causal link between collaborative management and innovative practice, the research will reveal whether a statistically significant relationship exists between the two variables. Organizational features and instructional methods in elementary schools receiving supplemental federal funds through the Chapter I program are the focus of the research because these schools serve high populations of economically disadvantaged, low-achieving students as a condition for participation in this compensatory program.

Background literature
Much of the research examines two background factors which influence decisions affecting instructional practice. The first focuses upon individual teacher characteristics, such as educational attainment, years of teaching experience, or the degree of teacher involvement in professional development activities (Richardson, 1990; Little, 1981a). The second group of factors tend to be contextual, and include school size, the socioeconomic level of the students, leadership of the principal, combined experience and stability of the teaching staff, involvement with schoolwide in-service programs, or the teacher’s sense of efficacy (Lee et al., 1993; Rowan et al., 1991; Newmann et al., 1989; Rosenholtz et al., 1986; Smylie, 1988; Lee et al., 1991; Richardson, 1990; Raudenbush et al., 1992; Friedkin and Slater, 1994).

As a means of influencing the outcome of instructional practice, two approaches to reform have been explored. The first approach can be classified as systemic reform, that is, modifications of school leadership in order to improve schooling (McLaughlin and Talbert, 1990; McLaughlin, 1987). The central...
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As an alternative to systemic reform, programmatic reform has emerged as a fundamentally different approach to school change, involving sustained inservice training to implement innovation and improve instructional quality (Spady, 1988; Slavin et al., 1989). Examples of the instructional innovations proposed to assist low-achieving students include cooperative learning, continuous progress learning programs, bilingual education (for students learning English as a second language), computer assisted instruction, and one-to-one tutoring. The purpose is to increase student motivation through stimulation of critical thinking skills and increased time in engaged learning, that is, the time students spend learning academic content (Slavin et al., 1989; Hakuta, 1986). A repeated theme is the emphasis upon high expectations for student learning outcome when provided appropriate instruction (Stevenson and Stigler, 1992).

Other studies have suggested important relationships among the roles of organizational design, teacher background, and school characteristics, and their effect upon teacher morale, sense of efficacy, and job satisfaction (Friedkin and Slater, 1994; Rowan et al., 1991). These studies also frame the need for empirical investigation into the connection between collaborative management and innovative instruction, and not just teacher perception and attitude. If teacher sense of efficacy can be affected by organizational design, what precisely is the relationship of organizational design to teaching practice?

Moreover, current research leaves several questions unanswered. The direction of causation between collaboration and self-efficacy is unclear; it could be the case that self-efficacy leads to greater inclinations for collaborative management. Second, it is not clear how strong the role of the principal is in bringing about change at the school site, as Rosenholtz (1985) suggests in her research on effective schools. Nor does research speak to the degree to which teacher training and experience blend with organizational features to produce greater inclination towards changing and improving teaching practice (Richardson, 1990).

The main limitation of empirical research in this area is the difficulty of linking instructional innovation to any one variable or sets of variables. There is a need to examine more carefully the relationship of management practice and classroom innovation, especially as it pertains to the instruction of economically disadvantaged students. This interaction is especially timely in light of the policy and research effort being placed in the school decentralization and restructuring movements, two changes which emphasize the importance of collaborative management features at the site level. The need for this research is particularly keen at the elementary school level. The urgency to make change is particularly great at low-income or Chapter I schools, where there is room for the greatest improvement in academic performance.

Approach and method

These issues lead to the questions which will be studied in this research article. They are:

- What instructional practices do teachers in Chapter I elementary schools report that they use?
- What are the organizational features of Chapter I elementary schools as reported by their teachers and administrators?
- What effect do organizational features, teacher background, and school characteristics have on the reported use of innovative instruction?

Hierarchical Linear Modeling (HLM) is used in this study to examine the linkages between school management, teacher characteristics, and instructional practice at the elementary school level. Since conventional statistical models, such as multiple regression, can only account for the variation of single-level observations, either at the individual or at the organizational level, the HLM statistical model is preferable because it allows us to examine the complex influences that school characteristics and teacher characteristics have upon instruction between individual teachers within a school while also examining the mean instructional differences among schools (Paterson, 1996; Burstein, 1980). Although some warn of inferential problems which accompany use of HLM, there has yet to be found a more comprehensive alternative strategy (Raudenbush and Bryk, 1986).

Data source

This study uses data from PROSPECTS, a research project conducted by Abt Associates. Data were collected from 372 schools in
167 different districts serving 42,461 students. Cohorts of students in the first, third, and seventh grades were tracked over a six-year span beginning in 1991 and ending in 1996. Data collection consisted of a self-administered survey taken by district Chapter I coordinators, school principals, Chapter I teachers, classroom teachers and aides, bilingual and ESL teachers, parents, and students. Survey questions included school characteristics, teacher background, instructional practice, school environment, and student academic performance. The data are distributed by census region – northeast, south, midwest, and west – and by urbanization category: urban, suburban, or rural. In addition, a qualitative study was conducted in 24 schools which employed innovative teaching strategies for underserved students (Stringfield, 1991).

The schools selected for this study were a subset of the 372 schools which reported data in 1991, and was restricted to those schools reporting English Teacher and Principal data for third grade. The third grade cohort was selected because teachers at this level generally employ a greater range of elementary school basic skill and critical thinking instruction than first grade teachers. The initial sample for the study consisted of 919 teachers, 207 principals, and 241 schools reporting third grade data for this year of the study. The final sample consisted of 669 teachers who had valid responses at 172 schools. Comparison between the final sample and the initial sample, reported later in this section, did not reveal large differences.

### Variables

**Dependent variable**

The construct of innovative instructional practice is measured by a nine-item scale covering such varied methods as cooperative learning, computer-assisted instruction, whole language approach to reading, teaching the writing process, one-to-one tutoring, language experience approaches, grouping practice, main approach to language arts instruction, and continuous progress learning programs. These items closely correspond to the dimensions of effective instruction for economically disadvantaged learners outlined by Slavin *et al.* (1988), Means *et al.* (1991), Hakuta (1986), and Bain and Herman (1990).

On the survey form from which these data were collected, teachers were to indicate whether they employed each of the nine innovative practices within their classrooms. The total number of affirmative responses were tabulated for each teacher and recorded as a single composite score for innovative instructional practice. These measures will be aggregated for discussion at the individual and between-school levels. The means and overall distribution for this variable are found in Table I.

While over 50 percent of the teachers report that they use whole language teaching methods, the writing process, or cooperative learning strategies, there was less reported use of instructional methods such as grouping students for reasons other than ability level, the use of computers, and the language experience approach to teaching reading. These latter methods allow students of varied skill levels to work together to ensure equitable access to the core curriculum while improving the academic performance of at-risk students.

The outcome variable, Innovative Instruction, concludes that teachers in the data set employ on average a combination of roughly three of the nine possible methodologies which current research suggests to promote the performance of low-achieving students.

**Independent variables**

The outcome measure of instructional practice depends heavily upon individual, organizational, and contextual factors. Individual background can affect the method used by that teacher, just as the socio-economic level of students or school management features may contribute to the choice of teaching methodology. In order to test these ideas, several independent variables are used, some at the individual level and some at the school level.

A first set of variables refers to the background characteristics of teachers that could affect their instructional approach. Previous research has shown that these variables include years of experience (number of years taught), educational level (bachelor’s degree, Master’s, or advanced training beyond the Master’s degree), race, belief in students’ ability to learn, and involvement with professional development activities (Richardson, 1990).

The second set deals with measurement of school characteristics. These variables include school size (total number of students enrolled), the SES level (as measured by percentage of students receiving the federal free lunch program), the percentage minority (the percentage of Black and Latino students enrolled) and sector (urban, suburban, or rural).

Additional school-level variables were identified from studies which address school organizational features (Newmann *et al.*, 1989; Rowan *et al.*, 1991; Raudenbush *et al.*, 1992; and Lee *et al.*, 1991). Research suggests...
considerable variation between schools in management design (Rosenholtz, 1985), and these variables measure the degree to which collaborative management features are implemented within a school. These features are: staff influence over school policy, opportunities to participate in decision making (on curriculum, discipline policy, and program), level of staff collegiality (time spent working together, uniformity of goals and beliefs, and willingness of teachers to help one another), and parental influence on school policy.

Two additional aggregate variables were constructed to examine environmental factors at the school level. These variables recorded whether an individual school had more than one-half of its teachers report a strong belief that remedial students could learn given appropriate instruction, and whether more than one-half the teachers at the site had been involved in an in-service program for more than 35 hours of instruction during the past year. Those schools which had more than 50 per cent agreement or participation levels were recorded as a value of one within two dummy variables, each representing the presence of these features at a school.

The results of these scales will be reported at two levels of analysis: the individual and between-school levels. Figure 1 diagrams the variables and their interactions. Descriptive statistics for the individual variables are presented in Tables II-IV.

**Descriptive differences among variables**

On the school-level, an interesting contrast is found in the reports for participatory decision making between the principal survey and the teachers’ survey. Seventy-eight percent of principals expressed strong agreement that staff and administration worked well together while only 24 percent of teachers reported strong agreement that principals consulted them concerning decisions affecting teachers. Furthermore, only 32 percent of teachers strongly agreed that high levels of collegiality are found at their school sites. The contrast shows a stark difference in perception based upon job title.

Moreover, it is noteworthy that less than 10 percent of parents were reported to be involved in making policy decisions. Despite principal reports of good working relations at the school sites, teachers and parents are either less involved or less satisfied with their involvement in decision-making process or collegial relationships.

Finally, few schools have widespread staff involvement with sustained inservice programs or belief in the ability of remedial students to learn. Only 15 percent of schools have staffs in which over half the teachers report strong belief in student learning ability, and only 19 percent of schools have over one-half the staff involved with inservice training of more than 35 hours in the past year.

**Sample bias**

Sample bias is reduced in the study because schools and districts were required to participate as a condition of Chapter I funding. Nonetheless, missing data were higher for teachers and schools in areas of the greatest poverty or lowest achievement. To provide a descriptive view of possible response bias, Table V presents the results of a comparison of means for the study sample and for schools
excluded from the analysis due to incomplete information in the data files at the individual and school levels.

The means for the sample group and schools dropped from the sample are quite similar, with two exceptions. There is a modest variation in the mean for educational attainment for teachers in participating schools and those not included in this study. This difference, statistically significant at the 0.10 level, may reflect the interest of teachers with Master's or doctoral degrees for taking part in studies which could improve schooling. Another discrepancy is the mean for the standardized composite for instructional innovation. Although not statistically significant, the disparity between groups for this variable may show that schools which participate in research are in general more disposed toward changes in instructional practice, or reflective analysis which could generate instructional change. Whatever the cause, it can be speculated that greater variation in the outcome variable could have been registered had more schools fully completed the PROSPECTS survey.

**Statistical models**

Statistical models used in this study are discussed in the Appendix.

**Results**

**Regression results**

Linear regression is used to assess the significance of teacher background characteristics on instructional practice, and to determine the degree to which the teacher level model relates to the use of innovative instructional measures. Through multivariate analysis, only three variables produce T-scores of great significance. These variables were: nine years' or less teaching experience, 35 hours or more of in-service training in the past year, and holding a strong belief that remedial students can learn given appropriate instruction. The positive effect for each of these three variables was strengthened when analysis was taken from the univariate to the multivariate level, as demonstrated by the increased coefficient for each of the variables shown for the two levels of estimates (see Table VI).

While three variables show significance in estimating the predicted instructional practice at the teacher-level, it is noteworthy that the teacher-level model accounts for very little of the variation in teaching method among teachers. The adjusted $R^2$ value for the multivariate estimate was 0.054, meaning that a large measure of variation – over 90 percent – is unexplained by this model. The purpose of this study, however, is to examine variables which administrators and policy makers can manipulate to influence the use of innovative teaching methodologies at the school level. For this reason, the HLM models which follow are of greater importance, for they show the degree to which instruction can be affected by variables at the school level.

**Analytic models**

The outcome measure considered in the HLM analyses is instructional practice. The teacher level model regresses instructional practice as a function of years of teaching experience, teacher ethnicity, teacher educational attainment, time spent in recent in-service training, and the teacher’s belief in the ability of remedial students to learn given appropriate instruction. Between school differences are characterized in terms of six
models to estimate the distribution of instructional practice according to the influences of individual teacher characteristics, school features, student characteristics, aggregated teacher characteristics, and school organization. The output for Models I, II, V, and VI are shown because of their significance to the results of the study.

HLM results

Model I: Examining variability among schools

The first HLM model tests the hypothesis that innovative instructional practice varies across schools. This model is the null model. It permits estimation of the mean level of innovation across schools.

Using the standardized outcome variable for instructional practice, a mean coefficient of 0.039 is observed for all schools. More important is the conclusion that differences in instructional practice can be found among schools, and that approximately 22 percent of this variation can be accounted for by differences between schools in contrast to 78 percent of the variation accounted for by differences among individual teachers. Table VII shows the results for Model I.

Model II: The teacher level (Level I) model

Having found in Model I that mean instructional practice differs among schools, the remaining models attempt to explain these differences. Model II asks the extent to which these differences can be accounted for by individual teacher background characteristics. Within this model, the estimated coefficients for several variables exceed the grand mean for instructional practice. Belief in the ability of remedial students to learn, in-service programs of six hours or more per year, attainment of a Master’s degree or higher, and less than ten years’ teaching experience all tend to yield higher average levels of innovative practice. At the same time, only two variables are statistically significant in their effect:

1 Belief in the ability of remedial students to learn (p = 0.032); and
2 In-service training of 35 hours or more in the past year (p = 0.004).

While these variables account for some of the variance in instruction at the teacher level, more variability remains to be explained. The results of the Teacher Level Model are given in Table VIII.

Model V: The aggregated teacher characteristics model

The next step involved modeling of the distribution of instructional practice as a
function of two teacher characteristics aggregated at the school site:
1 belief in the ability of remedial students to learn with appropriate instruction; and
2 participation in in-service training for 35 hours or more during the past year.

These variables were selected because of their significance at the individual teacher level. In turn, schools at which more than 50 percent of the third grade staff responded affirmatively to these dummy variables were selected to estimate the effect of these parameters on instructional practice.

The relative effects of these variables were quite strong. The coefficients for instruction (Belief = 0.411; In-service = 0.398) were the highest for any of the variables in the study. In addition, each variable was statistically significant at the 0.01 level. As will be seen later in the results for variance by each model, Model V also explains almost one-fifth of the variance in instructional practice between schools. This model accounted for more of the variability between schools than any other model. Results for Model V are given in Table IX.

Model VI: The school organization model
As discussed earlier, collaborative management or participatory management structures have been postulated as reforms which could breed instructional innovation. Model VI estimates the effects of variables pertaining to these elements on instructional methods. The results support the views of researchers Sarason (1990), Weiss (1993), and Newmann (1993), in that statistical significance cannot be found among the key variables concerning collaborative management. Among the variables, only parent participation in policy decisions and

<table>
<thead>
<tr>
<th>Table IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meanings, standard deviations, and descriptions of school-level variables</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents participate in policy decisions</td>
<td>172</td>
<td>0.09</td>
<td>0.29</td>
<td>D</td>
<td>1 = strongly agree</td>
</tr>
<tr>
<td>Staff and principal work well together</td>
<td>172</td>
<td>0.78</td>
<td>0.42</td>
<td>D</td>
<td>1 = strongly agree</td>
</tr>
<tr>
<td>Principal consults staff for important decisions</td>
<td>172</td>
<td>0.24</td>
<td>0.31</td>
<td>D</td>
<td>1 = strongly agree</td>
</tr>
<tr>
<td>High staff cooperation</td>
<td>172</td>
<td>0.32</td>
<td>0.30</td>
<td>D</td>
<td>1 = strongly agree</td>
</tr>
<tr>
<td>High schoolwide belief in remedial student ability to learn</td>
<td>172</td>
<td>0.15</td>
<td>0.35</td>
<td>D</td>
<td>1 = 50 percent or higher, staff belief in remedial students’ ability to learn</td>
</tr>
</tbody>
</table>

50 percent or higher, staff participation in in-service program, 35+ hours, past year | 172 | 0.19 | 0.39 | D |

Note: Means represent proportions for each category. Variable type is dummy (D) or composite (C)

<table>
<thead>
<tr>
<th>Table V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means and standard deviations for schools in final sample and for schools excluded</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Final sample (N = 173)</th>
<th>Excluded sample (N = 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience 1-9 yrs</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Experience 10-20 yrs</td>
<td>0.305</td>
<td>0.265</td>
</tr>
<tr>
<td>Experience 21-38 yrs</td>
<td>0.238</td>
<td>0.261</td>
</tr>
<tr>
<td>Education</td>
<td>0.452</td>
<td>0.538</td>
</tr>
<tr>
<td>Minority background</td>
<td>0.382</td>
<td>0.801</td>
</tr>
<tr>
<td>Innovative Instruction</td>
<td>0.055</td>
<td>0.712</td>
</tr>
</tbody>
</table>

Note: *Significant difference between groups at the 0.10 level

<table>
<thead>
<tr>
<th>Table VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression analysis: teacher characteristics and instructional practice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate estimates</th>
<th>Multivariate estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>T</td>
</tr>
<tr>
<td>Experience 1-9 yrs</td>
<td>0.197</td>
<td>2.77</td>
</tr>
<tr>
<td>Experience 21-38 yrs</td>
<td>-0.018</td>
<td>-0.230</td>
</tr>
<tr>
<td>Education</td>
<td>0.070</td>
<td>1.00</td>
</tr>
<tr>
<td>In-service, 6-35 hrs</td>
<td>-0.227</td>
<td>-3.14</td>
</tr>
<tr>
<td>In-service, 35+ hrs</td>
<td>0.463</td>
<td>5.73</td>
</tr>
<tr>
<td>Belief in remedial student ability</td>
<td>0.240</td>
<td>2.64</td>
</tr>
<tr>
<td>Minority background</td>
<td>0.064</td>
<td>0.801</td>
</tr>
</tbody>
</table>

Note: **Multivariate adjusted R square: 0.054
principal consultation of staff on decisions affecting them approach statistical significance (parents, \( p = 0.130 \), consult, \( p = 0.142 \)), but neither achieves this designation at the 0.10 level. Moreover, variation among schools cannot be explained using HLM estimates for this model. Results for model VI are given in Table X.

**Explained parameter variance**

Table XI presents the central findings of the study. It shows the estimated parameter variances for the individual and school distributive effects for Models II through VI.

The Table shows the substantial proportion of variance explained at the school level for the aggregated teacher characteristics model (19 percent). The teacher characteristics model, school features, and school organization models each account for 3 percent of the variability at the teacher level, while student characteristics and aggregated teacher characteristics account for 2 percent of the variation at the teacher level.

Among the models, only school features and aggregated teacher characteristics have any effect on between school variability. The comparatively large influence of aggregated teacher characteristics noted above is much greater than the 2 percent effect noted for school features. In conclusion, the aggregated teacher characteristics model is the best for explaining difference for schoolwide instructional practice. Causation is not proven, however. Estimated school effects may be a function of teachers working at the school site, and actually reflect unidentified differences among teachers working at those schools (Friedkin and Slater, 1994). Other potential limitations and the implications of these results for practitioners and researchers are discussed below.

**Discussion and conclusions**

**Summary of findings**

Two surprising elements emerged from this study which hold importance to the study of collaborative management and innovative teaching practice. The first is that individual teacher background characteristics – such as years of teaching experience, educational attainment, or ethnicity – fail to produce significant results in explaining the introduction of innovative practice among individual teachers or differences in instruction among schools. The linear regression study demonstrates that the majority of the difference among teachers in the use of innovative practice can be explained at the teacher-level, another explanatory model should be developed and should reach beyond intuitively appealing variables such as experience, training, and teacher ethnicity.

A second finding is that school characteristics and organizational features examined in this study may be less important to explaining variations in the use of innovative practice than school reformers may believe. In this study, little variation was explained between schools by factors such as school size, the socio-economic level of student families, collegial staff relations, a principal’s consultation with staff concerning decisions affecting them, or parental participation in policy decisions. This
finding tends to confirm the work of Sarason (1990) and Elmore (1993).

Without a doubt, the major conclusion of this study is that two schoolwide environmental factors account for nearly one-fifth of the variation in the use of innovative practice between schools. The first element is having a majority of staff members who express a strong belief in the ability of remedial students to learn given appropriate instruction. This outcome makes sense. Positive attitudes among teachers most likely lead to positive actions which help children learn. This conclusion is supported by researchers such as Comer (1990) who assert that the quality of relationships and attitudes among school personnel and students are powerful factors in determining educational outcomes for low achieving students.

The second element bearing statistical significance was having greater than 50 percent of staff members participate in an inservice program which provides more than 35 hours of training per year. As this level of involvement and time commitment is achieved, statistically significant changes in instruction are observed. To this extent, the conclusions of researchers Richardson (1990) and Little (1981b) are supported by this study.

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### Table X

**HLM results for Model VI: School organization**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Coefficient</th>
<th>SE</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept 2, ( \theta_{00} )</td>
<td>-0.129</td>
<td>0.123</td>
<td>0.292</td>
</tr>
<tr>
<td>Parent participation in policy decisions, ( \theta_{01} )</td>
<td>0.262</td>
<td>0.173</td>
<td>0.130</td>
</tr>
<tr>
<td>Principal and teachers work well together, ( \theta_{02} )</td>
<td>0.038</td>
<td>0.124</td>
<td>0.763</td>
</tr>
<tr>
<td>Staff collegiality, ( \theta_{03} )</td>
<td>0.157</td>
<td>0.194</td>
<td>0.419</td>
</tr>
<tr>
<td>Principal consults staff about important decisions affecting staff, ( \theta_{04} )</td>
<td>0.283</td>
<td>0.192</td>
<td>0.142</td>
</tr>
</tbody>
</table>

**Final estimation of variance components:**

<table>
<thead>
<tr>
<th>Variance component</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1, ( \tau )</td>
<td>0.765</td>
</tr>
<tr>
<td>Level 2, ( \upsilon_{ij} )</td>
<td>0.231</td>
</tr>
</tbody>
</table>

**Note:** Fixed effects for in-service, 35+ hrs and belief in remedial students’ ability to learn not shown in above Table

### Table XI

**Summary of results for variance explained by hierarchical linear models**

<table>
<thead>
<tr>
<th>Innovative instructional practice</th>
<th>Level 1 variance estimate</th>
<th>Parameter explained</th>
<th>Level 2 variance estimate</th>
<th>Parameter explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-level model (Level 1)</td>
<td>0.768</td>
<td>3%</td>
<td>0.230</td>
<td></td>
</tr>
<tr>
<td>School features model</td>
<td>0.768</td>
<td>3%</td>
<td>0.220</td>
<td>2%</td>
</tr>
<tr>
<td>Student characteristics model</td>
<td>0.769</td>
<td>2%</td>
<td>0.240</td>
<td></td>
</tr>
<tr>
<td>Aggregated teacher characteristics model</td>
<td>0.774</td>
<td>2%</td>
<td>0.183</td>
<td>19%*</td>
</tr>
<tr>
<td>School organization model</td>
<td>0.765</td>
<td>3%</td>
<td>0.231</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** *Significant at 0.005 level

These researchers identify a key element – inservice training – that may yield positive effects upon a teacher’s use of innovative instructional practices.

### Implications for research

Several implications for further research can be identified. This study constructed an instructional variable based upon innovative strategies for teaching language arts (listening, speaking, reading, and writing), but it would be of interest to examine the outcome of a study in which innovative instruction characteristics were related to teaching mathematics. Another subject area may be affected differently by collaboration or teacher background characteristics. A second area would be to examine in greater depth the effects of parent involvement in policy decisions, or for principal consultation with staff. These two variables came close to achieving statistical significance in the HLM analysis. Perhaps a more detailed examination of these features could uncover a relationship to innovation untouched by this study.

Another topic for exploration would be a similar study using a different sample. Perhaps schools which serve students who come from more advantaged backgrounds operate differently, and these differences may affect how teachers teach. Furthermore, the data set used for this study was not necessarily intended for the analysis conducted, and it relies upon self-reported data. It is possible that a survey designed uniquely for this study purpose would have produced more significant relationships among teacher background, school features, and innovative practice. While cross-checking was done, in some cases the outcome for a specific variable may represent a self- affirming assessment of one’s own professional practice rather than an accurate reflection of management style or classroom practice (McDonnell and Hill, 1990). A qualitative study could help to validate or disconfirm the self-assessments in this survey data. Through sustained observation, interviews, and other data, a qualitative researcher may find results which lend greater support to the value of collaborative management.

Finally, an area unexamined by this study is the linkage of school features, teacher characteristics, and innovative teaching practice to student performance. Ultimately, the case for collaborative management will need to be supported by improved student learning outcomes. This study focused upon the connection between school and teacher variables and innovative practice because there was a gap in research evidence making
this first important connection. Clearly, one more step is needed to better understand the interactive effects of collaborative management, effective innovative practices, and student learning.

While these suggestions would further exploration of the issues identified by this study, a cautionary note is to be made that the linkages identified through HLM analysis are associative rather than causative. Although the degree to which the variables are associated may be found, this measurement alone fails to establish a causal link among them, for other unseen factors may also be responsible for the results obtained.

A second consideration is that cross-sectional data, such as the data set in this study, examine the complexity of collaborative management at a single point in time. An argument can be made that the effects of collaborative management should be studied over a greater span of time. While a different method could offer certain advantages, the data used for this research permits the use of HLM, a method which uniquely provides analysis of the multi-level effects that individual teachers and schools have upon instruction.

Conclusion

It is generally unwise to base educational policy or practice upon the outcome of one study. Nonetheless, the effort to analyze research results can lead to important new insights which in turn can help piece together the puzzle of effective school reform. In this respect, this study poses a good deal of hope for the future. The outcomes identify two specific features of schooling which account for nearly one-fifth of the difference in the use of innovative teaching practice between different schools. Given the enormous need to provide better schooling for low-achieving students, we could easily emphasize the factors associated with positive results. For example, only 15 percent of schools in this study registered strong staff belief in the ability of all students to learn, or only 20 percent are involved in in-service programs of sufficient duration to truly effect instructional change. Better results could be obtained with greater policy support of funding for sustained inservice programs and refinements in teacher recruitment and selection to better screen for belief in student learning ability.

The most promising of the other policy implications rests in the findings of results for variables relating to site-based decision making for teachers and parents. While less significant than in-service and collective staff belief in student ability to learn, the study supports further exploration of these practices at the policy level. Such policies could be designed at the local level, and could be reflected in the guidelines that school boards give to administrators with respect to job responsibilities, or the importance given to such school-based decision-making bodies as a school site council. There is cause for optimism in these observations. If intensified focus on specific measures leads to greater use of innovative instruction for low achieving students, then this optimism is justified. This study, and others which may follow, can lead to forward progress in the struggle to raise educational outcomes for underserved students.

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Appendix

Statistical models

This study employed hierarchical linear models to explain variation in instructional practice at two levels of analysis. The first equation estimates the relationship between individual teacher background and instructional practice within each school, while the second set of equations estimate the relationship between school characteristics and the mean level of instructional practice across schools. The purpose is to examine the degree to which teacher background, school organizational design, and school characteristics can be predictive of instructional practice at the individual (teacher) and group (school) levels. HLM estimates are generally derived through a series of equations. The first set of equations are referred to as teacher-level models.

\[ \text{INNOVATIVE INSTRUCTIONAL PRACTICE} = \beta_0 + \beta_1 \text{TEACHER BACKGROUND} + r_j \]

Where INSTRUCTIONAL PRACTICE is the instructional score for teacher in school j, \( \beta_0 \) is the mean score for school j, and \( r_j \) is a random error term for teacher in school j.

This equation allows the HLM program to partition the total variance in instructional practice at the individual and between school
levels. The second within-school individual model is:

\[ \text{INSTRUCTIONAL PRACTICE}_{ij} = \beta_0 + \beta_1 \text{INSTRUCTIONAL PRACTICE}_{ij} + \\
\beta_2 \text{TEACHER CHARACTERISTICS}_{ij} + \epsilon_{ij} \]

Where INSTRUCTIONAL PRACTICE is the instructional score for teacher \( i \) in school \( j \), \( \beta_0 \) is the mean score for school \( j \), \( \beta_1 \) is a vector of coefficients measuring the effect of an array of teacher characteristics on instructional practice at school \( j \), and \( \epsilon_{ij} \) is a random error term for teacher \( i \) in school \( j \).

The individual teacher characteristic variables are:

- \( \beta_1 \) = one to nine years’ teaching experience
- \( \beta_2 \) = 21 to 38 years’ teaching experience
- \( \beta_3 \) = Master’s Degree or Doctorate
- \( \beta_4 \) = Teacher of minority background
- \( \beta_5 \) = High belief in the ability of remedial students to learn given appropriate instruction
- \( \beta_6 \) = In-service, 6-35 hours within the past year
- \( \beta_7 \) = In-service, 35 hours or more within the past year.

These variables were grand mean centered with the exception of the variables for in-service and belief in the ability of remedial students to learn given appropriate instruction. Grand mean centering adjusts the mean level of innovative instructional practice for each school by assuming that all schools had teachers with similar background characteristics – experience, advanced degrees, and minority status, for example. Adjusted means provide a better way to estimate the effects of school-level variables on mean levels of innovative instruction by controlling for teacher characteristics that may also affect innovative instruction, but which schools cannot control.

The variables for in-service training and belief were group mean centered so that mean levels of innovation across schools were not changed because of differences in the attributes of teachers across schools. The school-level model is:

\[ \beta_{0j} = \theta_{00} + U_{0j} \]

where the sample mean for teacher instructional practice is equal to the grand mean of all schools plus an error term for all schools.

The second between-school model estimated the effects of school characteristics on mean levels of innovative instruction among schools. Although HLM can be used to estimate the effects of school-level variables on the other within-school variables \( (\beta_{0j}, \beta_{2j}, \text{etc.}) \), in this study there were too few teachers in each school to reliably estimate other school-level equations. Thus, this study focused on simply estimating mean outcomes for each school, known as means-as-outcomes models (Bryk and Raudenbush, 1992).

\[ \beta_{0j} = \theta_{00} \] (sample mean of instructional practice) + \( \theta_{10} \) (measure of management features at the school site) + \( \theta_{20} \) (other school level characteristics) \( j + U_j \) (Error)

Where \( \theta_{00} \) is the sample school mean for instructional practice, \( \theta_{10} \) is a vector of coefficients which estimate the degree to which collaborative management practices are used at the school site, \( \theta_{20} \) is a measure of other school characteristics which may influence instruction, and \( U_j \) is a random error term for school \( j \).

In the between-school model, for \( \theta_{00} \) management features and school level characteristics are entered in various analytic categories which specify the exact variables indicated in the between-school model given above. The equations for each model are below. The models were estimated in a series of steps. The first model was tested, after which only significant coefficients were retained for the test of the next model.

**School features model**

\[ \beta_{0j} = \theta_{00} + \theta_{01} \] (school size, 325 students or less) + \( \theta_{02} \) (school size, 325 to 1,073 students) + \( \theta_{03} \) (urban school) + \( \theta_{04} \) (rural school) + \( U_j \)

**Student characteristics model**

\[ \beta_{0j} = \theta_{00} + \theta_{01} \] (0-25 percent of students on free lunch) + \( \theta_{02} \) (76-100 percent of students on free lunch) + \( \theta_{03} \) (white student population 0-25 percent of total) + \( \theta_{04} \) (white student population 76-100 percent of total) + \( U_j \)

**Aggregated teacher characteristics model**

\[ \beta_{0j} = \theta_{00} + \theta_{01} \] (schoolwide, 50 percent or more of teachers participate in 35 or more hours of in-service, past year) + \( \theta_{02} \) (schoolwide, 50 percent or more of teachers believe strongly that remedial students can learn given appropriate instruction) + \( U_j \)

**School organization model**

\[ \beta_{0j} = \theta_{00} + \theta_{01} \] (parents participate in making policy decisions) + \( \theta_{02} \) (principal and teachers work well together) + \( \theta_{03} \) (high level of staff collegiality) + \( \theta_{04} \) (principal consults staff concerning decisions affecting teachers) + \( U_j \)