

Perspectives on Instructional Improvement in Literacy and Mathematics

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The term “content-driven reform” has been used to describe educational reform in which districts or schools place the consideration of subject-matter at the core of their improvement efforts (Elmore & Burney, 1999). Organizations engaging in content-driven reform create initiatives, policies and organizational structures which are designed to provide support for improved instruction in a content area. To do so, reformers study research on learning and examples of best practices in the content area in order to identify features of good instructional practice. They then develop examples of those practices in their school or district. As they develop these examples, they take note of the supports needed in order for teachers to learn such practices. The final step consists of designing a professional development system to provide that support on a broad basis with the goal of reaching all classroom teachers.

Providing support for teaching and learning in content-driven reform efforts is not the purview of teachers and staff developers alone. Supervisory administrators, such as principals and superintendents, are also involved. They serve as instructional leaders for their staffs and make decisions about the organization, resources, and supports needed to provide strong instruction in the content area. In this way, content-driven reform re-shapes the educational organization around the teaching and learning needs of the content area in question.

Content-driven reform is a powerful model and a compelling one, but its implementation raises a key question. Can a single school or district engage in content-driven reform in more than one subject area at a time? No school or district has only one subject to teach and each subject on its own would probably drive the structure of the educational organization in unique directions. Students' capacities to learn are related to their prior knowledge in particular subject matter domains (Glaser & De Corte, 1992) and what constitutes knowing and understanding is deeply related to the epistemology of specific subject matters (Greeno & Goldman, 1998; Johnston, 1999). Similarly, teachers' dispositions toward and knowledge of the subjects they teach exerts a strong influence on the quality of instruction they provide (Brophy, 1991; Stein, Baxter, &

Leinhardt, 1990), so strong in fact that subject matter knowledge has been called the missing paradigm in research on teaching (Shulman, 1986). Finally, there are a set of cultural norms associated with each subject area which shape the way students, teachers, parents and administrators think about them and the kinds of institutional and material infrastructure which have grown up around them (Grossman & Stodolsky, 1995; Stodolsky & Grossman, 1995). Any combination of these factors may have a profound influence on the form classroom instruction takes in each subject area. Therefore, each subject may require different institutional supports for improving that instruction. If a school or district wishes to engage in content-driven reform in more than one subject, it must be able to balance and weigh the needs for supporting teaching and learning in each subject they deem important, and make hard decisions or compromises when those needs are in conflict.

The High Performance Learning Communities Project is a five year study of New York City's Community School District #2, a district which is currently facing this set of challenges. They have been committed to content-driven models of reform for over ten years, but have a longer history in literacy than in mathematics. Shortly after Anthony Alvarado took over as superintendent in 1987 district leaders began to implement their improvement strategy in the area of reading and writing. With a district-wide Literacy Initiative well on its way, in 1995-96 the district began to mobilize their efforts in mathematics. The newer Mathematics Initiative had to be integrated within a district infrastructure which for the past eight years had been designed around the needs of producing strong literacy instruction district-wide. That infrastructure supported the new Mathematics Initiative in some ways and hindered it in others. For example, a district-wide learning community focused on continuous improvement was already in place, as well as various foci for maintaining it (e.g. monthly principals' conferences, a professional development lab, etc.). This community provided the Mathematics Initiative with a strong foundation. At the same time, the district's ten year tradition of allocating many resources, such as time, money and personnel, to the Literacy Initiative presented tensions. District #2 thus provides us with a rich context for exploring the issues of balancing content-driven reform in more than one subject area.

In our early work on content-driven reform in District #2, we studied the ways in which their Literacy Initiative shaped their conception of professional development within the system (Stein, D'Amico, & Johstone, 1999b) and the content knowledge needed by school administrators to support that initiative (Stein, D'Amico, & Israel, 1999a). Our more recent work has explored the ways in which subject matter differences in mathematics and literacy have provided new challenges and the need for a somewhat different approach with their mathematics initiative (Stein & D'Amico, 1999). Our previous studies were based largely on interview and observation data

collected in a small number of schools within the district. The current study extends this research by comparing the perceptions of key district leaders with that of principals and teachers from a wide range of schools on various aspects of the two initiatives. These data, collected largely through questionnaires and structured interviews, portray the participants' with respect to key aspects of the two initiatives, including: (1) the quality of instructional leadership in each subject, (2) the strength of the professional community in each school; (3) the focus and quality of professional development associated with each subject; and finally, (4) the quality of instruction in each area and it's alignment with the district's programs and curricula in each subject.

Our findings reflect the history and district policy with respect to each initiative and confirm the indications found in previous work (Stein & D'Amico, 1999). In general, the principals are seen to be providing stronger instructional leadership in literacy than mathematics and most schools have made more improvements in the quality of literacy instruction than mathematics instruction. However, questionnaire responses on these aspects of the initiatives were generally not consistent across the district. In most cases, there were differences in the teachers', principals' and district leaders' responses based on the school in which they worked or on which they were commenting. Finally, teachers, principals and district leaders tended to agree more on their judgments of school professional community and instructional leadership than they did about the quality and focus of professional development or the quality and alignment of classroom instruction. The rest of this report explores these findings in detail.

METHODS

Data Sources

In early May of the 1999-2000 school year, questionnaires were sent to all principals and teachers at all 44 schools in Community School District #2. By the end of the school year, questionnaires had been received from 270 teachers and 25 principals. During the same time period, interviews were conducted with key district leaders associated with the Literacy and Mathematics Interviews. The leaders were asked to rate all the elementary schools in the district on several dimensions associated with each initiative. A summary of who (teachers, principals and district leaders) provided judgments on each of the key topic areas is provided in Table 1. The specifics of the data collected from each of these sources is described in the sections which follow.

Table 1: Data sources and variables for the 1999-2000 study

Variables	Data Sources		
	Teachers	Principals	District Leaders
Classroom Instruction			
Quality		X	
Alignment w/District #2 programs		X	X
Relevance of BL/TERC to instruction	X		
Professional Development			
Focus	X		
Alignment with BL/TERC	X	X	
Quality	X	X	X
Instructional Leadership			
Principals' subject matter knowledge	X		X
Professional Community of School	X	X	X
School and District relationship			X

Ratings produced by District #2 leaders

Bea Johnstone, Deputy Superintendent of District #2 in 1999-200 and Director of Professional Development for a number of years, was asked to provide ratings of each school with respect to the Literacy Initiative. Johnstone played a central role in the development of that initiative and has been providing supervision to schools with respect to literacy instruction for a number of years. Lucy West, Director of the Mathematics Initiative in 1999-2000, was asked to provide ratings for each school with respect to the Mathematics Initiative. West is the key architect of District #2's mathematics initiative and has been its director since 1995. West and Johnstone were each interviewed in June 2000. A follow-up interview to complete the work was conducted with Johnstone in September of 2000. In both cases, only the 28 elementary schools (PK/K-5 and PK/K-8) were rated.

Early research on District #2 noted a great deal of variation across the district's schools with relation to a number of key dimensions, including students' prior achievement levels, expertise of teachers and experience of leaders (Elmore & Burney, 1997). Elmore and Burney noted that a key challenge for the district was to create a coherent plan for instructional improvement that was nonetheless responsive to this wide variation across schools. To do so, they created a centralized instructional model and then individualized the way in which the model was implemented in the

various schools. Elmore and Burney identified four categories of interaction patterns between the district leaders and schools which emerged from this process. A short description for each category is described below. (For full descriptions, see Elmore and Burney, 1997, pp. 25-28):

- With-the-drill* With-the-drill schools are models of the District #2 core theory of professional development and teaching quality and they follow the district's recommendations closely.
- Free-agent* Free-agent schools do things somewhat differently from the recommended district framework, but have high student achievement and are considered to be leading the way in inventing new forms of instruction and are valued for this leadership.
- Watch-list* Watch-list schools are working within the District #2 framework but receive more oversight and support, usually because they have a larger at-risk student population, many new teachers, and/or new school leadership.
- Off-the-screen* For a variety of reasons, Off-the-screen schools are not working within the District #2 framework. While student achievement in some cases is fairly strong, the district leadership has concerns about the quality of instruction and or leadership in these schools.

Elmore and Burney's original categorization of schools occurred at a time when literacy was still the central focus of District #2's work. Moreover, as time has passed, changes have occurred in the school leadership and teaching faculty at some schools. Johnstone and West were each given a description of Elmore and Burney's categories and asked to categorize each of the schools with respect to them. Johnstone was asked to make the categorizations based on the relationship between the district leaders and school with respect to literacy instruction, while West was asked to make them with respect to mathematics instruction. West used all four of Elmore and Burney's categories, but Johnstone used only three of them—no school was categorized as Off-the-Screen with respect to literacy. This, according to the district leadership, is due to the progress made in the Literacy Initiative since the schools were categorized in 1997.

Johnstone had difficulty rating three of the schools. These schools had either weak teaching faculty or weak school leadership or both in literacy, but also had a middle-class student body with low levels of at-risk students. The students at these three schools scored fairly well on tests mandated by New York City and New York State, but Johnstone felt they could do better with the right leadership and/or faculty. She tentatively labeled them as Watch-List schools because they were receiving similar oversight to other Watch-List schools. We performed our analyses treating these schools both as a separate group and as part of the larger Watch-List category. Because the mean

ratings on these three schools were most similar to that of the other Watch-List schools, we report our findings with the three schools folded in with the other Watch-List schools.

In addition to the categorization of each school, Johnstone and West were asked to rate the performance of each school with respect to the initiatives along a number of dimensions. Originally there were ten dimensions, but during the course of Johnstone’s interview these were reduced to six. (See Table 2.) For each of these six dimensions, Johnstone and West provided a rating on a scale of one to ten where “1” meant the school was doing very poorly and “10” meant they were doing very well.

West felt too unfamiliar with the professional community of 10 of the 28 elementary schools to rate them on this dimension. The vast majority of these (8) were in her Watch-List category, the other two she categorized as With-the-Drill. Thus, analyses done with West’s ratings on this dimensions are somewhat skewed due to the large amount of missing data in the Watch-List category.

Table 2: Dimensions for which ratings were supplied by district leaders

<u>Literacy Ratings (Johnstone)</u>	<u>Mathematics Ratings (West)</u>
1. Quality of literacy instruction	1. Quality of mathematics instruction
2. Alignment of instruction with the Literacy Initiative	2. Alignment of instruction with the Mathematics Initiative
3. Quality of instructional leadership in literacy	3. Quality of instructional leadership in mathematics
4. Principal’s knowledge of literacy	4. Principal’s knowledge of mathematics
5. Quality of professional development in literacy	5. Quality of professional development in mathematics
6. Quality of the professional community in the school	

Teacher questionnaires

270 questionnaire from teachers in 37 of District #2’s 44 schools were returned. 28 of the schools represented served students in grades K-5 or K-8, while 9 served primarily middle and/or high school students. In most cases only a few teachers from each school sent in a questionnaire, however in a few schools, more than 10 teachers returned questionnaires. (See Table 3.) 218 of the questionnaires were from classroom teachers in academic subjects—76 teach in grades K-2, 88 in grades 3-5, 22 in grades 6-8 and 22 in grades 9-12. The rest of the respondents were specialists

of various kinds—such as Reading Recovery teachers, gym teachers or music teachers—or did not provide enough information for us to ascertain what grades or subjects they taught. We base our analyses on the 218 teachers in grades K-12 that have teaching responsibilities in literacy, English language arts, and/or mathematics.

Table 3: Number of teacher questionnaires returned from each school

Number of questionnaires returned by teachers	Number of schools
1 to 5	19
6 to 10	13
More than 10	5

The questionnaire is divided into several sections. (See Appendix A.) Teacher responses to four sections of the questionnaire form the core of the analyses and findings discussed in this paper: Your Principal; Professional Community in Your School; Professional Development in Literacy; and Professional Development in Mathematics. In the section entitled, *Your Principal*, teachers rated the instructional leadership of their principal in literacy and mathematics and his/her ability to communicate with teachers. In the section entitled, *Professional Community in Your School*, they responded to six Likert-type items which asked them to rate the quality of different aspects of their school community.

In the section on *Professional Development in Literacy*, teachers were asked to make judgments about the focus and quality of the professional development they had received in literacy and the role that the Balanced Literacy program in District #2 played in their professional development and teaching experiences. Teachers were asked to rate the quality of professional development they received in each of five topic areas. They were also asked to rank each of these items according to which topic received the most focus and which the least in their professional development. Finally, those who taught in grades K-5 were asked to provide a rating for the influence of the Balanced Literacy program in their work in four areas.

In the section on *Professional Development in Mathematics*, the teachers were asked a parallel set of questions in mathematics. Likewise, the K-5 teachers were asked to indicate the role that the TERC *Investigations* curriculum played in their professional experience in mathematics in four areas parallel to those about the role of Balanced Literacy in their professional experiences.

All ratings provided by the teachers were based on a five-point Likert scale in which a “5” indicated a very positive opinion on the part of the teacher and a “1” indicated a negative one. Single constructs were created from the ratings of related items (e.g., all six items on the school professional community) based on factor analyses. These constructs—School Professional Community; Quality of Professional Development in Literacy; Quality of Professional Development in Mathematics; Relevance of Balanced Literacy to Instruction; and Relevance of TERC’s *Investigations* to Instruction—were then used in the analyses presented here.

Principal questionnaires

25 principals returned questionnaires, 20 from elementary schools and 5 from middle and/or high schools. The principal questionnaires consisted of a subset of the questions on the teacher questionnaire and a few additional questions. (See Appendix B.) In particular, they were asked to rate the quality of professional development received by their teachers in both literacy and mathematics on the same topics and using the same scale as the teachers did. They were also asked to indicate to what extent those professional development experiences were tied to the Balanced Literacy program and TERC’s *Investigations* curriculum. They were not asked to indicate which of those topics were focused on most, nor were they asked about their familiarity with Balanced Literacy or *Investigations* or their usefulness to their work. Moreover, they were not asked to rate their own performance as instructional leaders. Instead, they were asked to rate each teacher in the school with respect to the quality of their literacy and mathematics instruction and (for K-5 teachers) the alignment of that instruction with Balanced Literacy and the *Investigations* curriculum. Such ratings were made for 453 teachers, 135 of whom sent in teacher questionnaires. 20 of the 25 principals who returned questionnaires completed the teacher ratings. 16 of these were elementary school principals.

Analyses

The data available from the three groups of respondents— teachers, principals and district leaders — were treated and analyzed separately rather than combined into a single model. The school categorizations provided by the district leaders and the rankings of professional development focus provided by teachers were simply tabulated into frequency tables. ANOVA and t-test analyses were used with the participants’ Likert responses to questions about the quality of professional development, quality of instructional leadership and role of instructional programs and curricula, to ascertain to what extent the participants responses differed by subject matter (literacy and mathematics) and by school category (Free Agent, With-the-Drill, Watch-List, Off-the-Screen and

Middle/High School). Results from the three data sets (teachers, principals and district leaders) were examined in order to ascertain similarities and differences. In addition, the relationships between ratings produced by the teachers, principals district leaders were explored through the use of correlation and factor analysis.

The data available for these analyses are largely in the form of Likert responses on five point (teachers and principals) or ten point (district leaders) scales. In order to account for the ordinal nature of the data, non-parametric (Kruskal-Wallis H and Spearman's rho) analyses were conducted in addition to the more familiar parametric analyses (ANOVA and Pearson's r). In general, the parametric and non-parametric analyses provided similar results and so we report the parametric findings. However, in those cases where they do not provide similar results, we report the non-parametric statistics as they are more appropriate for this kind of data.

Data Issues

Before continuing, we acknowledge difficulties with four data issues. The first involves the use of self-report measures like the teacher and principal questionnaires. These instruments often have important limitations that can compromise the validity of the information provided by respondents (Babbie, 1992). For example, self-report measures may promote socially desirable responses. Principals may not feel comfortable assigning poor ratings to their teachers, or district leaders may not feel comfortable assigning poor ratings to schools struggling to improve. In fact, there was little variation in the principal questionnaire data largely because they all gave high ratings for most of the items. Another possible limitation is that respondents must accurately recall and/or judge their perceptions of events stretching over a period of time. For example, teachers were asked to characterize the quality and focus of their professional development experiences during the 1999-2000 school year, which may have varied greatly throughout that eight-month period. Creating a single characterization of those experiences may be difficult for teachers to do.

A third difficulty stems from aggregating data and mostly affects our correlational analysis. The district leaders supplied one rating per school on each dimension. As a result, all correlation analysis comparing the responses of district leaders, principals and teachers are done at the school level. In order to acquire a single teacher rating per school, we averaged the ratings supplied by the teachers at that school. As was demonstrated in Table 3, the number of teachers responding from each school varied widely and was most frequently five or less. These school aggregates of teachers' responses were then correlated with that of the district leaders and principals. Likewise, in those cases where principals supplied one rating per teacher (e.g. for quality of literacy

instruction), the ratings were averaged to provide a single score per school. Again, the number of ratings which made up each school aggregate varied widely, depending on the size of the school. Aggregates such as these can mask variation among teacher's ratings with a school or a principal's ratings of teachers with a school.

Finally, the Middle/High School category creates some conceptual difficulty in the interpretation of the ANOVA analyses. Unlike the others, this category does not represent the districts' relationship with the schools with respect to literacy and mathematics. Rather, it indicates a group of schools that were *not* categorized by Johnstone and West. However, the Middle/High schools do present a class of schools that are treated differently than the elementary schools, largely because both their structure and mission is somewhat different. We thus conducted all ANOVA and t-test analyses on principal and teacher questionnaire data both with the Middle/High schools included as their own category and with the responses from those schools excluded entirely. The inclusion of the Middle/High schools had little effect on the results of the data analyses. In the interest of completeness, we include the Middle/High schools in all analyses reported here, unless (a) their responses are irrelevant (some middle/high school teachers answer questions labeled only for K-5 teachers); or (b) the number of respondents for a particular question is too low to warrant their inclusion.

RESULTS

School Progress with Respect to Each Initiative

In general, more schools appear to have made significant progress in literacy than in mathematics. Of the 28 elementary schools categorized by Johnstone and West, 61% (n = 17) were considered by Johnstone to be Free Agent or With-the-Drill schools in literacy, while West felt only 36% (n = 10) could so be designated in mathematics. (See Table 4.) With-the-Drill is the largest category of schools with respect to literacy, whereas Watch-List is the largest category with respect to mathematics. Moreover, it's rare for Johnstone to slot a school in a weaker category than West (4 schools), while it is fairly common for West to slot a school into a weaker category than Johnstone (14 schools).

Johnstone and West give the same categories to 10 of elementary schools (36%). These schools display a similar level of progress in both subject areas. While the categories for the rest of the schools do not match exactly, they are generally close to one another. None of the schools that either Johnstone or West rate as a Free-Agent is rated as Off-the-Screen or Watch-List by the other.

Johnstone categorized all four of the schools West considered Off-the-Screen in mathematics as Watch-List schools in Literacy. These schools are struggling in literacy and West still doesn't have a solid plan for them in Mathematics. All three of the Watch-List schools that Johnstone had a tough time categorizing were considered either Watch-List (2) or Off-the-Screen (1), by West. In other words, despite the typically average to above average scores of the students in these three schools, neither Johnstone nor West thinks of them as providing strong instructional support.

Table 4: Number of schools in each category for literacy and for mathematics

Mathematics	Literacy			total
	Free-Agent	With-the-Drill	Watch-List	
Free-Agent	2	2		4
With-the-Drill	1	3	2	6
Watch-List		9	5	14
Off-the-Screen			4	4
total	3	14	11	28

Their ratings of each school on specific dimensions related to each initiative were consistent with these categorizations. On all dimensions, their mean rating for the Free-Agent schools was higher than the mean rating for all other schools. With-the-Drill schools received the next highest rating on all dimensions, followed by the Watch-List schools and then (in mathematics), the Off-the-Screen schools. (See tables 5 and 6) The correlations between the five ratings in each subject area were generally high ($r=0.43$ to 0.81 in literacy and 0.30 to 0.87 in mathematics) and in all but two cases statistically significant. (See tables 7 and 8.) The median correlation for Johnstone's ratings in literacy was 0.72 while the median correlation for West's ratings in mathematics was 0.57 , indicating that the relationship between the dimensions is stronger in literacy than in mathematics. Nonetheless, the high level of consistency in both Johnstone's and West's ratings on the various dimensions with their categorizations of the various schools suggests that the categories encapsulate how the district leadership thinks about and interacts with the schools.

In summary, Johnstone and West indicate through both their overall categorizations of District #2's elementary schools, as well as their ratings on specific dimensions related to the two initiatives, that most schools have made more progress in literacy than they have in mathematics.

Table 5: Mean of Johnstone's literacy ratings by school category

Rating Dimension		School Category		
		Free-Agent (n = 3)	With-the-Drill (n = 14)	Watch-List (n = 11)
Quality of literacy instruction	mean	8.667	6.643	4.364
	sd	0.577	1.447	1.362
Alignment of instruction with the literacy initiative	mean	8	7.071	6.209
	sd	0	1.269	1.772
Principals' knowledge of literacy	mean	8.767	7.214	6.091
	sd	0.404	1.188	1.921
Quality of instructional leadership in literacy	mean	8.767	7.864	5.755
	sd	0.681	1.156	1.955
Quality of professional development in literacy	mean	9.333	7.307	6.182
	sd	0.577	1.451	2.089
Quality of school professional community	mean	9.533	7.593	6.091
	sd	0.404	1.578	2.212

Table 6: Mean of West's mathematics ratings by school category

Rating Dimension		School Category			
		Free-Agent (n = 4)	With-the-Drill (n = 6)	Watch-List (n = 14)	Off-the-Screen (n = 4)
Quality of mathematics instruction	mean	7	5	3.929	3.25
	sd	0.816	1.095	0.997	0.957
Alignment of instruction with the Mathematics Initiative	mean	8.75	6.667	4.429	3.25
	sd	0.5	1.751	1.222	0.957
Principals' knowledge of mathematics	mean	5.5	4.667	3.867	3.5
	sd	1	0.816	1.512	0.577
Quality of instructional leadership in mathematics	mean	9	7.667	4.786	4.25
	sd	0	0.816	1.578	1.893
Quality of professional development in mathematics	mean	8.5	5.333	5	3.75
	sd	1	2.944	1.414	1.708
Quality of school professional community*	mean	8.25	5.5	2.5	1.75
	sd	0.5	2.517	1.225	0.5

***Note:** While West rated 28 schools on most dimensions, she only rated 18 on quality of school professional community, the break-out is: Free-Agent = 4; With-the-Drill = 4; Watch-List = 6; and Off-the-Screen = 4.

Table 7: Correlations between Johnstone's ratings of each school's status with respect to the literacy initiative

	Quality of literacy instruction	Alignment of instruction with Literacy Initiative	Principals' Knowledge of Literacy	Instructional Leadership	Quality of Professional development	Quality of School community
Quality of literacy instruction	1.000					
Alignment of instruction with the Literacy Initiative	0.67**	1.000				
Principals' knowledge of literacy	0.72**	0.59**	1.000			
Quality of instructional leadership in literacy	0.78**	0.73**	0.81**	1.000		
Quality of professional development in literacy	0.60**	0.43*†	0.63**	0.78**	1.000	
Quality of school community	0.73**	0.68**	0.70**	0.76**	0.72**	1.000

Notes: N = 28 for all correlations.
 Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)
 † Spearman's rho used

Table 8: Correlations between West's ratings of each school's status with respect to the Mathematics Initiative

	Quality of mathematics instruction	Alignment of instruction with Math Initiative	Principals' Knowledge of Mathematics	Instructional Leadership	Quality of Professional development	Quality of School community
Quality of mathematics instruction	1.000					
Alignment of instruction with the Mathematics Initiative	0.84**	1.000				
Principals' knowledge of mathematics	0.44*	0.35†	1.000			
Quality of instructional leadership in mathematics	0.62*	0.72**	0.73**	1.000		
Quality of professional development in mathematics	0.57**	0.54**	0.32	0.49**†	1.000	
Quality of school community	0.87**	0.81**	0.30	0.59*	0.50*†	1.000

Notes: N = 18 for those correlations that include quality of school community; N=28 for all other correlations.

Pearson's r used unless otherwise specified.

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

† Spearman's rho used

Quality of School Professional Community

District leaders, principals and teachers all provided rating on the quality of the professional communities in each school. District leaders provided a single rating for each of the elementary schools, while teachers and principals rated their own school communities on several dimensions. A factor analysis was conducted on the teachers' responses to these questions. The factor-analytic results of the teacher questionnaire items indicated that the first eigenvalue of 4.087 accounted for 68% of the variance in the teacher's responses; the second eigenvalue was < 1 . The factor loadings for the six items ranged from .51 to .75. In other words, a single factor, *Quality of School Professional Community*, could be said to underlie each of these sets of items. An average score over the set of six items was computed for each teacher to represent this construct.¹ The number of principal respondents was too small to warrant a similar factor analysis. Instead, we created a single variable representing the average response of each principal across the professional community items. All teacher and principal findings are based on these means.

In general, Johnstone saw the school communities as stronger (mean = 7.106, SD = 2.36) than West did (mean = 4.278, SD = 2.886). This difference was both statistically significant ($t(17) = 4.973$, $p = 0.001$) and meaningful, with 59% of the variance in the school community ratings based on how Johnstone and West viewed them through their individual subject matter lenses. Nonetheless, the district leaders agree in their estimation of how different these communities are across the elementary schools. In particular, both felt that the professional community was strongest in the Free-Agent schools in their subject area. Johnstone felt Watch-List schools had the weakest professional communities, while West rated the Off-the-Screen schools as weakest. These differences based on school category are significant in both literacy ($F(2, 28) = 4.91$, $p = 0.016$) and mathematics ($F(3, 18) = 18.94$); $p = 0.001$) and account for 59% of the variance in Johnstone's ratings and 80% in West's.

¹ Actually, two versions of each construct were created, one based on the factor loadings and one based on a simple average of the item responses, and further analyses conducted with both. Results were similar and so we report the findings based on the average item response as they are simpler to describe.

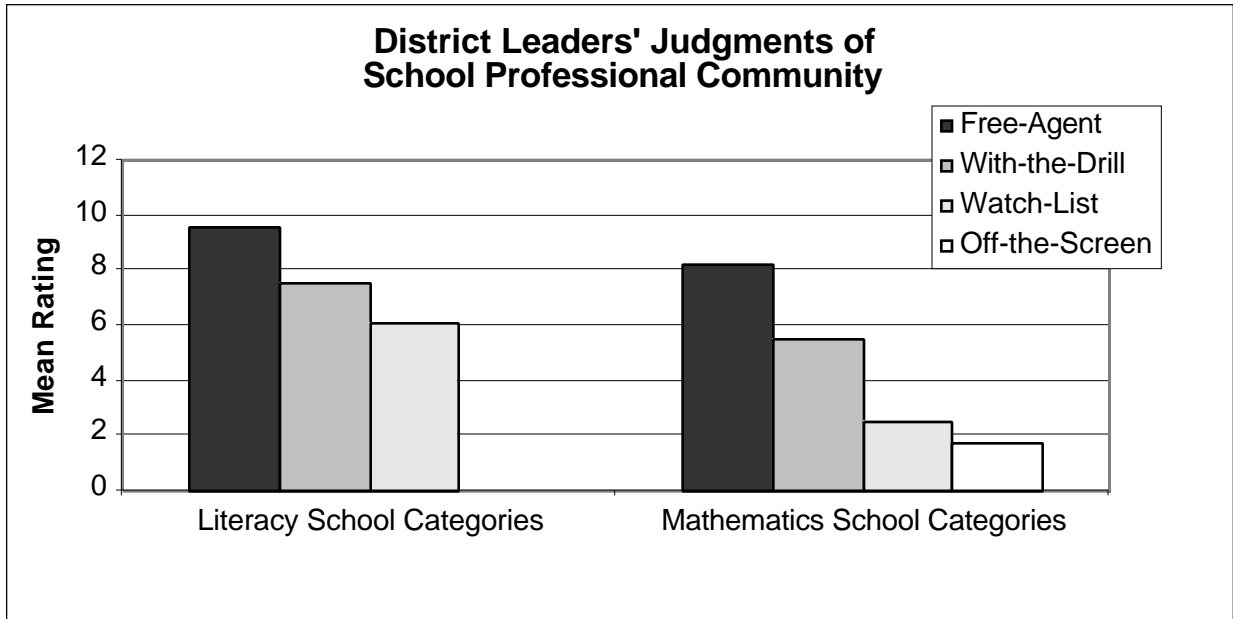


Figure 1: Mean ratings by district leaders on the professional community in District #2 schools (scale of 1 to 10).

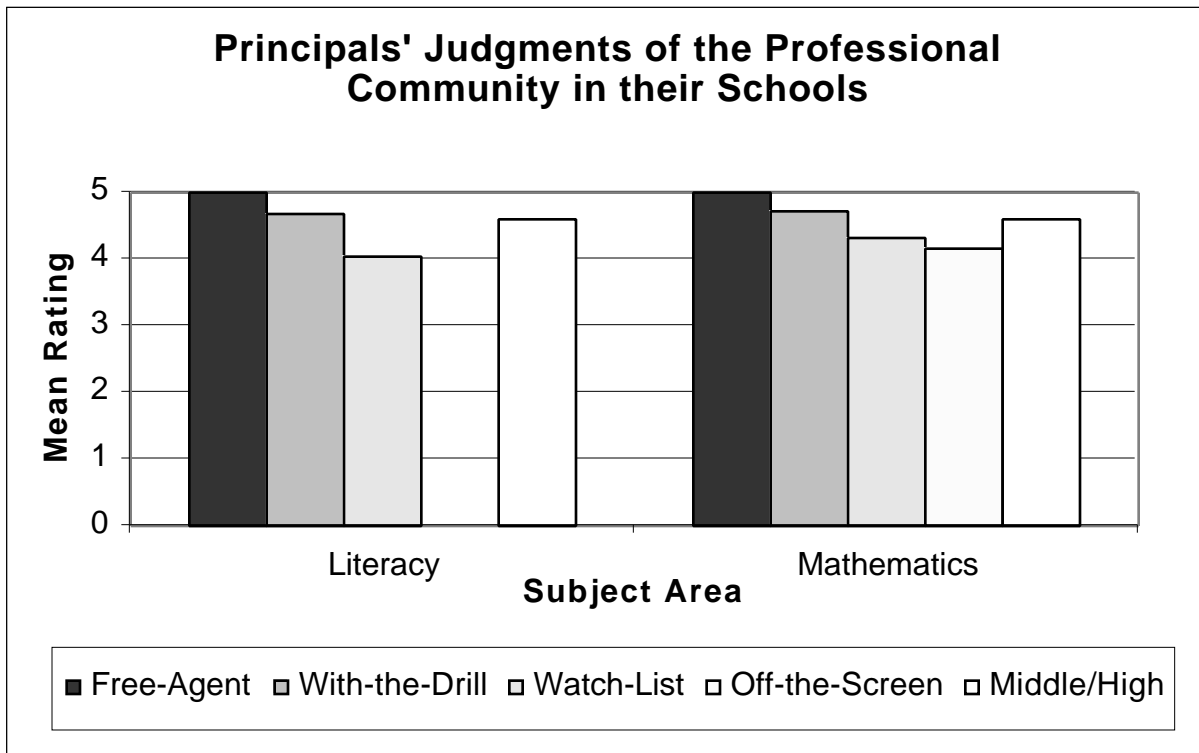


Figure 2: Means principal ratings of the professional community in their schools (scale of 1 to 5)

On average, principals gave high ratings to the professional community in their schools (mean = 4.53, SD = 0.58), but whether their ratings differ by school category depends on whether or not the literacy or mathematics categories are used to form the comparison. (See Figure 2.) While there were statistically significant differences by literacy school category ($F(3, 21) = 3.482, p = 0.034$), there were not when the mathematics school categories were used for the comparison ($F(4, 20) = 1.342, p = 0.289$). Principals in schools that function as Free-Agents with respect to literacy tended to give the highest ratings for the quality of the professional community among their faculty and staff, while principals from literacy Watch-List schools gave the lowest ratings. Principals from Middle/High schools and those considered With-the-Drill with respect to literacy provided similar ratings. These literacy school category differences are meaningful ones and account for 33% of the variance in the principals' ratings. Moreover, the basic trend is consistent with Johnstone's ratings for professional community, in which Free-Agent elementary schools receive the highest rating, while the With-the-Drill schools receive the lowest.

Like the principals, the teachers generally gave high ratings of the quality of the professional community in their schools on average (mean = 4.32, SD = 0.72). These ratings did vary somewhat when compared using both the literacy ($F(3, 210) = 7.072, p = 0.001$) and mathematics ($F(4, 209) = 7.768, p = 0.001$) school categories. As can be seen in Figure 3, school category differences tend to follow the same pattern as seen in the district leader and principal ratings. Teachers from Free-Agent schools give the highest ratings, while those from With-the-Drill schools provide the next highest ratings, followed by those in the Watch-List schools, and finally by those from the Off-the-Screen schools in mathematics. Teachers from Middle/High schools give similar ratings to the literacy Watch-List schools. While these differences by school category are statistically significant, they are rather small. The mathematics school categories accounted for 13% of the variance in teachers' ratings of the professional community in their schools. However, if the literacy categories are used for the comparison, school category only accounts only 9% of the variance in the teachers' ratings.

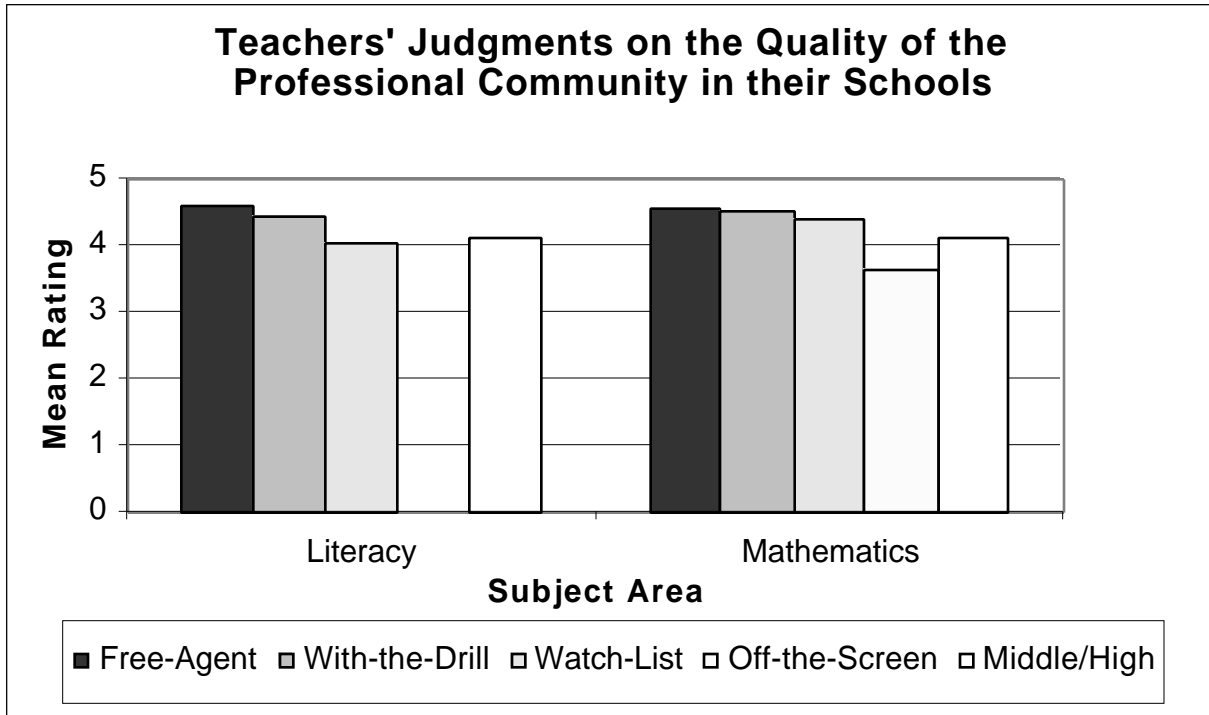


Figure 3: Mean teacher rating on the quality of the professional community in their schools by school categories (scale of 1 to 5)

Table 9: Correlations between the ratings of school professional community provided by teachers, principals and district leaders.

	Johnstone's ratings	West's ratings	Principals' ratings	Mean teacher rating by school
Johnstone's ratings	1.000			
West's ratings	0.593**	1.000		
Principals' ratings	0.792**	0.672**	1.000	
Mean teacher rating by school	0.443*	0.617*	0.531**	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)

Correlation analysis was done to explore the extent to which district leaders, principals and teachers agreed about the professional community at the various schools. Correlations were computed using school, and mean teacher ratings. As Table 9 shows, teachers', principals' and district leaders' ratings were all correlated with one another, in some cases quite strongly. For example, the correlation between Johnstone's ratings and that of the principals is 0.792. In other

words, the schools which Johnstone and West tend to give low ratings for professional community are also likely to receive lower ratings from their principals and their teachers than schools which Johnstone and West give high ratings.

In summary, district leaders, principals and teachers tend to agree on which schools have strong professional communities. The correlations between their ratings were all moderate to high and statistically significant. In general, they describe the professional communities of Free-Agent schools as the strongest ones, while Watch-List and Off-the-Screen schools have the weakest ones.

Quality of Instructional Leadership

Ratings of the quality of instructional leadership and subject matter knowledge of principals in District #2's elementary schools were provided by Johnstone in literacy and West in mathematics. (See figures 4 and 5.) In addition, teachers provided ratings of instructional leadership in both subjects. (See Figure 6.)

On average, Johnstone's ratings of instructional leadership of District #2's elementary principals in literacy (mean = 7.13; SD = 1.86) were higher than West's ratings of instructional leadership in mathematics (mean = 5.93; SD = 2.21). The mean difference between their ratings is statistically significant ($t(27) = 2.649$; $p = 0.013$) and meaningful, with 21% of the variation in the ratings accounted for by these subject matter differences. The district leaders' ratings of principals' subject matter knowledge show a similar pattern with stronger effects. Johnstone's ratings of the principals' subject matter knowledge in literacy (mean = 6.94; SD = 1.66) were also higher than West's ratings in mathematics (mean = 4.21, SD = 1.34). The mean difference between their ratings principal's is statistically significant ($t(27)=6.59$; $p = 0.001$) and meaningful, with 62% of the variation in ratings accounted for by these subject matter differences.

Differences in the average ratings given to principals from schools of different types are also significant and meaningful. As can be seen in figures 4 and 5, Johnstone and West both gave the strongest ratings on both instructional leadership and subject matter knowledge to the principals of Free-Agent schools, followed by those from With-the-Drill schools, followed by the Watch-List schools, and in West's cases, the Off-the-Screen schools. The differences in the mean ratings given to these school categories are significant for the quality of instructional leadership in both literacy ($F(2,25) = 8.048$; $p = 0.002$) and mathematics ($F(3,24) = 14.714$; $p = 0.001$). The

amount of variation in the ratings explained by these school categories is quite high, particularly in mathematics (39% in literacy; 65% in mathematics).

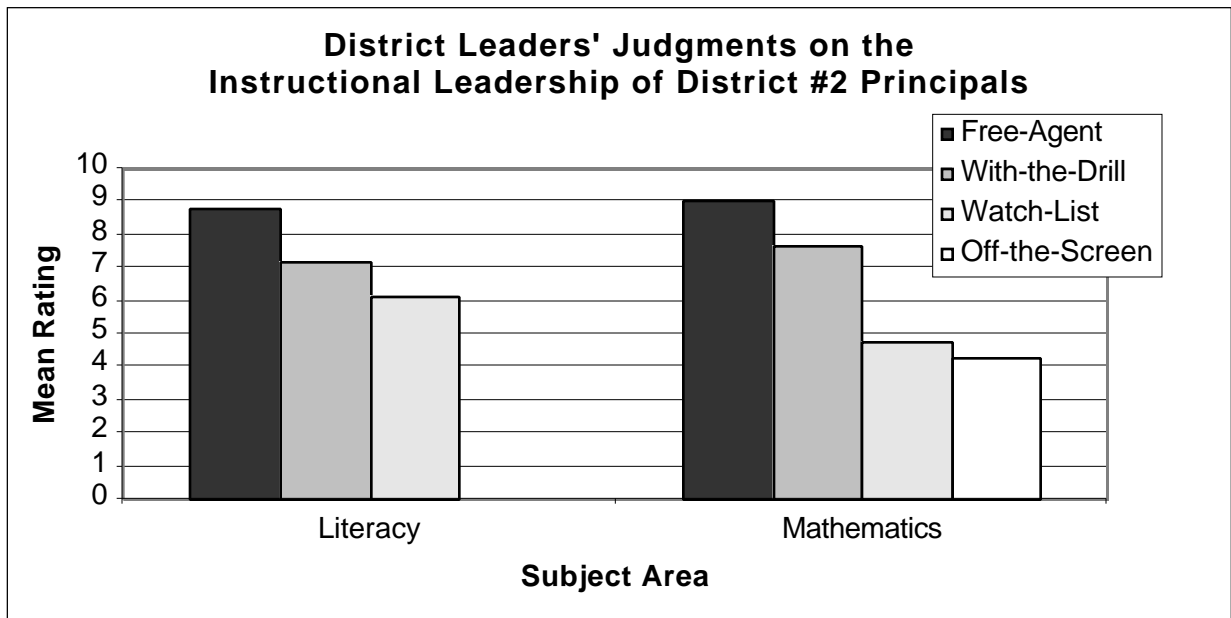


Figure 4: Mean ratings by district leaders on District #2 elementary principals' instructional leadership in literacy and mathematics (scale of 1 to 10)

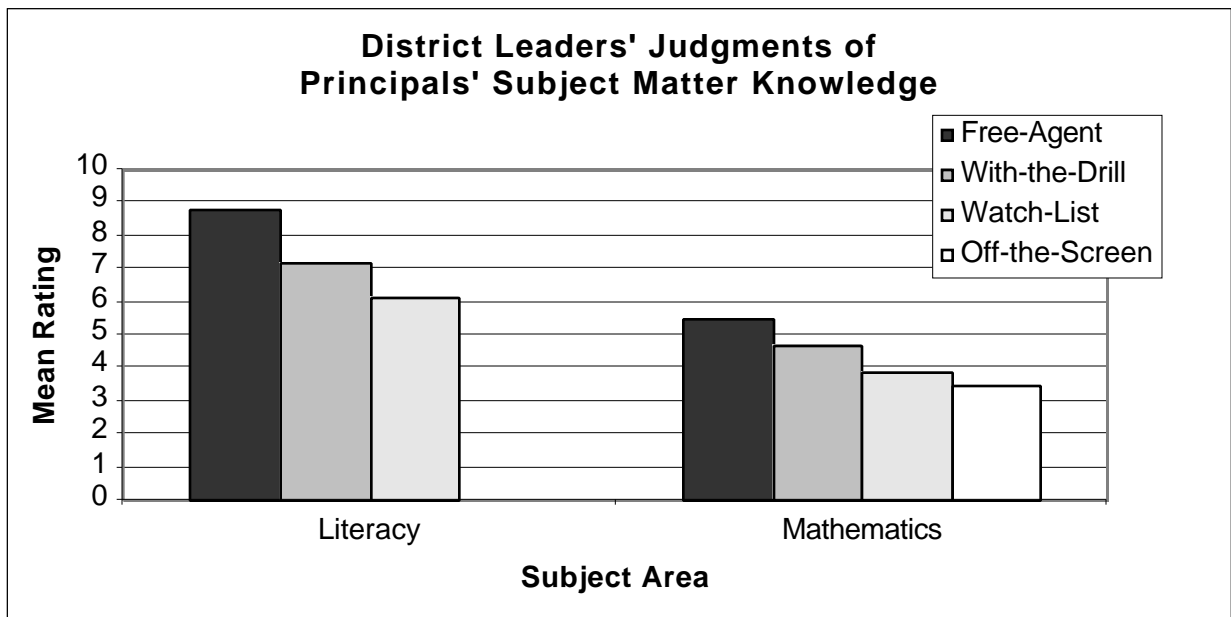


Figure 5: Mean ratings provided by district leaders of District #2 elementary principals' subject matter knowledge in literacy and mathematics (scale of 1 to 10)

The ratings of principals' subject matter knowledge do not vary quite as much by school category and, in fact, do not constitute a statistically significant difference in mathematics ($F(3, 24) = 2.519$; $p = 0.082$). Overall, West seems to believe that the vast majority of the principals have either weak or mediocre knowledge of mathematics. Johnstone on the other hand rates several of her principals as having strong knowledge in literacy and most with at least mediocre knowledge. The differences between her ratings by school category are significant ($F(2,25) = 4.271$; $p = 0.025$) and meaningful, with 25% of the variation in her ratings accountable by school category.

The patterns in the teachers' ratings of their principals' instructional leadership in literacy and mathematics are similar to those of the District #2's leaders. (See Figure 6.) Since most of the responding teachers taught in grades K-5, they rated their principals' instructional leadership in both subjects. Middle and High school teachers only rated their principal for those subject areas in which they teach. In general, the responding teachers were very satisfied with the instructional leadership provided by their principals, particularly in literacy. On average, they gave higher ratings for their principals in literacy (mean = 4.26, SD = 1.07) than mathematics (mean = 3.77; SD = 1.24). These differences are both statistically significant ($t(172) = 7.634$, $p = 0.001$) and meaningful, with 25% of the variance in ratings accounted for by subject matter differences.

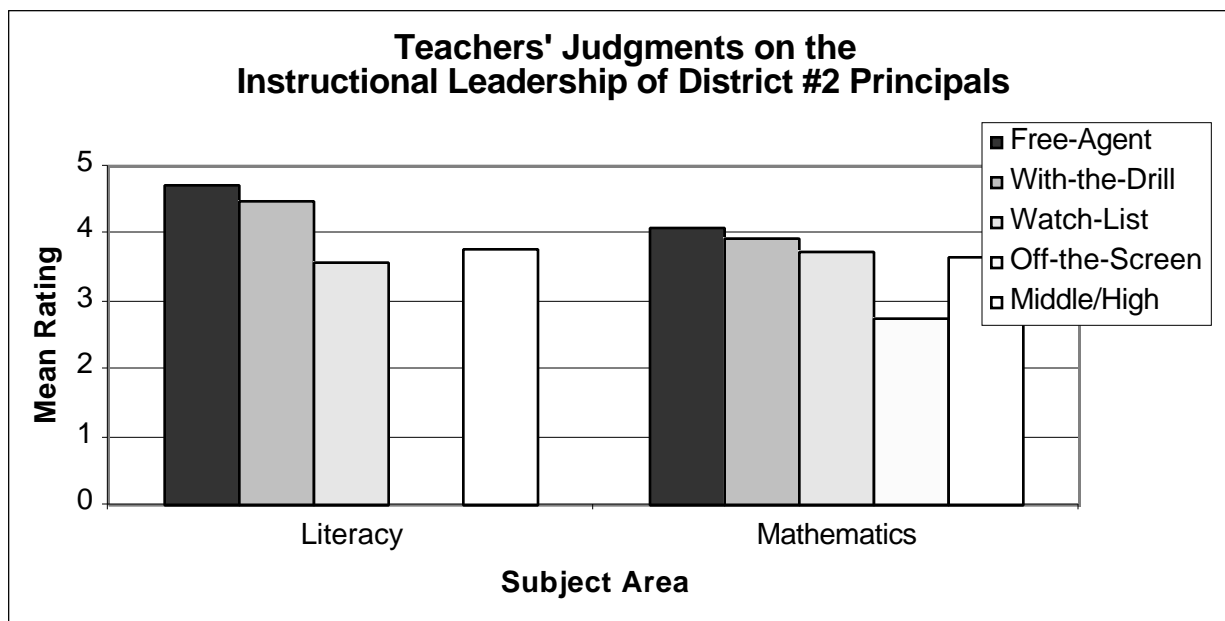


Figure 6: Mean teacher rating on the quality of their principals' instructional leadership in literacy and mathematics by school category (scale of 1 to 5)

While the differences between the ratings given by teachers from the different categories of schools were statistically significant ($F(3, 204) = 13.76$, $p = 0.001$ in literacy; $F(4, 177) = 3.698$, $p =$

0.006 in mathematics), they were not quite as large as they were for the district leaders. In literacy, school category accounted for 17% of the variance in teachers' ratings, while in mathematics it only accounted for 8%. In both subjects, the elementary teachers' ratings of instructional leadership followed similar school category trends as those provided by the district leaders' ratings. Teachers from Free-Agent schools were most satisfied with their principals' instructional leadership while teachers from literacy Watch-List schools and mathematics Off-the-Screen schools were least satisfied.

Table 10: Correlations between the ratings of instructional leadership in literacy provided by teachers and district leaders.

	Literacy			Mathematics		
	District Leaders Instruct. Leadership	Subject Knowledge	Teachers Instruct. Leadership	District Leaders Instruct. Leadership	Subject Knowledge	Teachers Instruct. Leadership
Literacy						
District Leader Instruct. Lead	1.000					
District Leader Subj. Know.	0.813*	1.000				
Teachers Instruct. Lead	0.311	0.431*	1.000			
Mathematics						
District Leader Instruct. Lead	0.310	0.280	0.340	1.000		
District Leader Subj. Know.	0.077	-0.050	-0.025	0.729**	1.000	
Teachers Instruct. Lead	0.222	0.265	0.774**	0.238	0.018	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)

Correlations done between the mean teacher rating for instructional leadership in each school and the district leaders' ratings for that same school show only marginal agreement. (See Table 10.) Neither West's ratings of the principals' instructional leadership in mathematics, nor their knowledge of the subject correlated significantly with the mean teacher rating for instructional leadership of their principal. Likewise, the mean teacher rating of the quality of instructional leadership in literacy did not correlate with the ratings Johnstone gave for instructional leadership. However, the teachers' ratings did correlate with Johnstone's rating for the depth of subject

knowledge the principal had in literacy ($r = 0.431, p = 0.05$). This finding indicates that principals which Johnstone sees as strong in literacy knowledge are more likely to receive high ratings from their teachers for the quality of their instructional leadership in literacy.

In summary, data from district leaders and teachers indicate that the principals' instructional leadership and subject matter knowledge are stronger in literacy than in mathematics. Findings also show that district leaders' ratings differed significantly and meaningfully between the school categories in all cases but subject matter knowledge in mathematics. Teachers' ratings also differed somewhat by school category, but not as strongly as did the district leaders. Teachers' ratings appeared to follow similar trends as that of the district leaders by school category. However, correlations between the district leaders' rating and the mean teacher rating per school are weak and only statistically significant for subject matter knowledge in literacy.

Focus and Quality of Professional Development

Teachers, principals and district leaders all provided ratings on the quality of professional development in literacy and mathematics in the schools with which they work. In addition, teachers provided information on which topic areas in mathematics and literacy received the most attention during the professional development they had received in 1999-2000. Finally, both elementary teachers and principals rated the extent to which the professional development was tied to Balanced Literacy and TERC's *Investigations*.

Focus of professional development

Teachers ranked five possible general foci for professional development in literacy and a parallel five for professional development in mathematics according to which received the most and least attention. In both literacy and mathematics, just over half the respondents indicated that "How to teach students to read or write" or "How to teach students to do and understand mathematics" were the topics that received the most attention within the professional development they received during the 1999-2000 school year. (See tables 11 and 12.) Likewise, the vast majority of teachers thought that learning more about the content area as an adult learner was the topic that received the least attention in both subjects — 80% of the teachers ranked it as a "5" in literacy and 73% did so in mathematics. The teachers were somewhat more varied in the rankings they gave to the other three topics areas. In both cases "How to plan based on assessments of students proficiency" and "How to assess students' proficiency" tracked fairly closely together. In literacy, they are the

second and third highest ranked topics respectively. In mathematics, “How students learn to do and understand mathematics” is ranked before both of them.

Table 11: Number of teachers who ranked each professional development topic in literacy as receiving the most or least attention

	1 (Most attention)	2	3	4	5 (Least attention)
How to teach students to read/write	53	19	11	10	4
How to plan instruction based on assessed proficiency	20	26	26	22	3
How to assess students' reading/writing proficiency	9	25	37	24	2
How students learn to read/write	11	22	19	37	10
How to write/respond to literature as an adult learner	4	5	6	4	78

Note: Modal responses for each question indicated in bold

Table 12: Number of teachers who ranked each professional development topic in mathematics as receiving the most or least attention

	1 (Most attention)	2	3	4	5 (Least attention)
How to teach students to do/understand mathematics	54	16	9	7	6
How students learn to do/understand mathematics	19	40	10	16	7
How to assess students' proficiency in mathematics	5	14	34	28	11
How to plan instruction based on assessed proficiency	6	20	32	33	1
How to engage in mathematics as an adult learner	8	2	7	8	67

Note: Modal responses for each question indicated in bold

Quality of professional development

The teachers' mean ratings of the quality of professional development in literacy and mathematics parallel the trends seen in the rankings of professional development focus. In general, they give the highest quality ratings to those topics they perceive as receiving the most attention. In both subjects, “How to teach students to” read/write or do/understand mathematics receives the highest quality rating (mean = 4.19, SD = 0.96 in literacy; mean = 3.92, SD = 1.09 in mathematics), while

engagement in the content as an adult learner receives the lowest quality rating (mean = 3.37, SD = 1.28 in literacy; mean = 3.28, SD = 1.38 in mathematics).

Despite these differences in the mean ratings for each question, factor analyses done separately on the literacy items and the mathematics items reveal they each appear to have a single underlying factor (only one eigenvalue was greater than 1 in each case) and that the factor loadings of each of the five items on that single factor are high (between 0.48 and 0.76 for the literacy items and 0.56 and 0.84 for the mathematics items). Each teacher's responses were then averaged over the five items to create a single variable to represent their ratings of professional development in literacy. The same was done with the five items related to the quality of professional development in mathematics. All subsequent analyses are done using these means.²

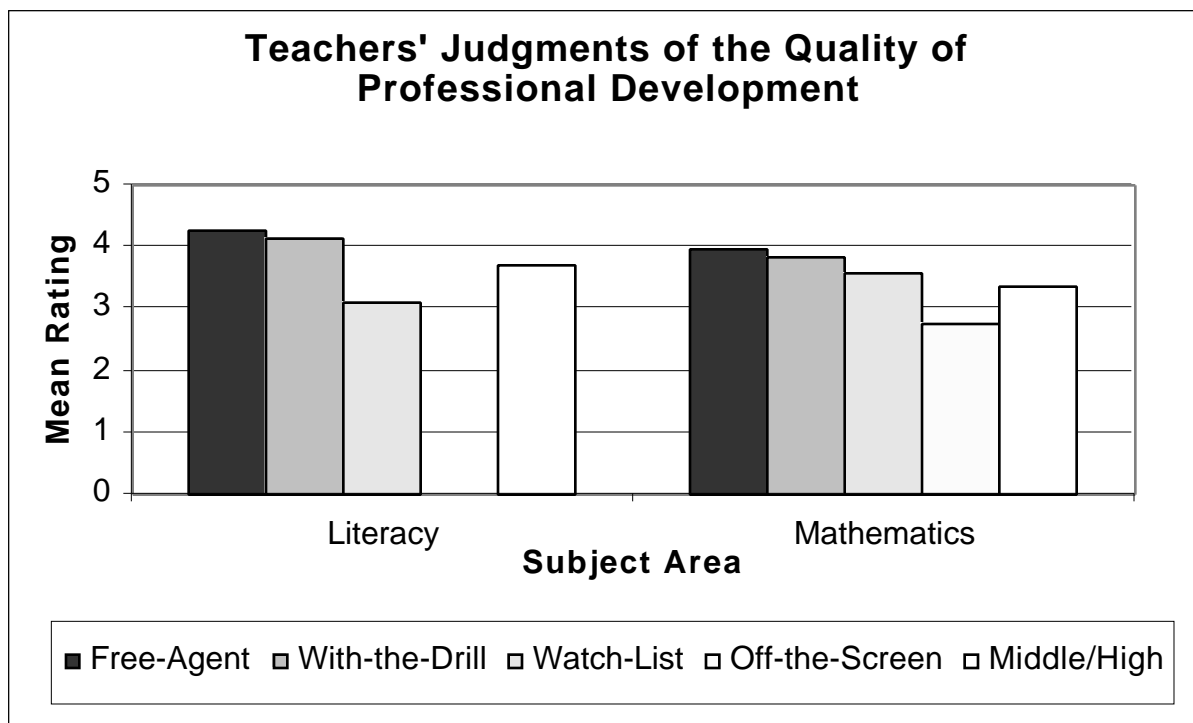


Figure 7: Mean teacher rating on the quality of professional development in literacy and mathematics (scale of 1 to 5)

In general, the teachers felt rather positive about the professional development they received both in literacy (mean = 3.83, SD = 0.95) and mathematics (mean = 3.74, SD = 1.02), and there was no statistically significant difference between the ratings they gave in the two subjects ($t(118) = 0.932, p = 0.353$). Their responses did vary by school category, however, for both quality of

² As with the school professional community variables, two versions of the construct were actually created, one based on the factor loadings, the other based on average item response. Results were similar so we report the findings based on the average item response.

professional development in literacy ($F(3, 140) = 14.885, p = 0.001$) and mathematics ($F(4, 144) = 3.704, p = 0.007$). As can be seen in Figure 7, teachers from Free-Agent and With-the-Drill schools were most likely to give high ratings for the quality of the professional development they received in 1999-2000. In literacy, teachers from the Middle/High schools rated the professional development they had received the lowest. Those from Watch-List schools gave ratings just barely behind teachers from the With-the-Drill schools. In mathematics, teachers from the Off-the-Screen schools were by far the least satisfied with the quality of professional development they had received. These school level differences are strong in literacy, accounting for 24% of the variance in teachers ratings, but relatively small in mathematics, accounting for only 9% of the variance in teachers' ratings.

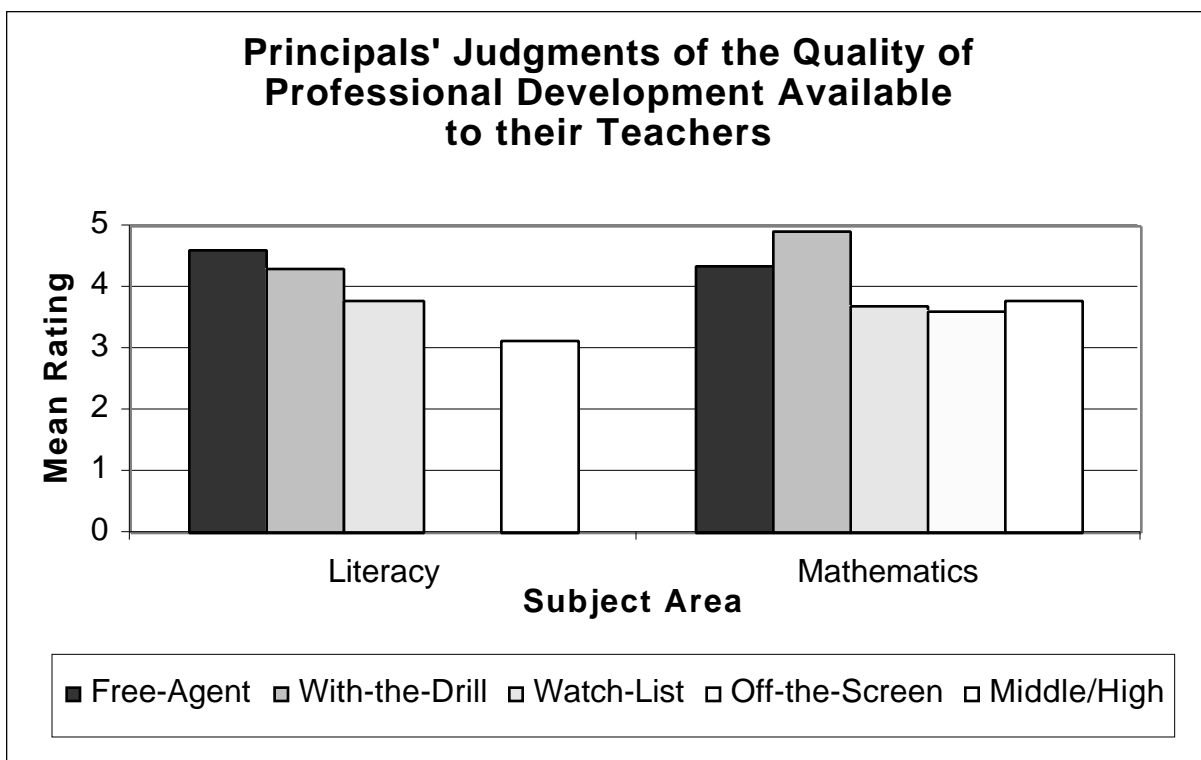


Figure 8: Mean principal rating on the quality of professional development in literacy and mathematics available to the teachers in their schools (scale of 1 to 5)

The principals were asked the same questions about literacy and mathematics professional development, but in reference to that provided to their teachers during the 1999-2000 school year, rather than themselves. The number of principals providing responses ($n = 25$) was too small to perform factor analyses similar to those done with the teacher data. A variable was created representing each principal's average response to the five items on professional development

literacy and another representing their average response to the five items on professional development in mathematics were created. These means are used in the rest of our analyses.

The principals' responses do not follow the same trends as the teachers'. In general, the principals tend to give very high ratings to the quality of professional development in both literacy (mean = 4.19, SD = 0.70) and mathematics (mean = 4.17, SD = 0.18). While Figure 8 suggests that their responses may differ somewhat based on school category, these differences are not statistically significant in either subject ($F(3, 20) = 1.909, p = 0.161$ in literacy; $F(4, 19) = 2.101, p = 0.121$ in mathematics). Moreover, there is no statistical difference in the quality ratings between each subject ($t(18) = 0.148, p = 0.884$).

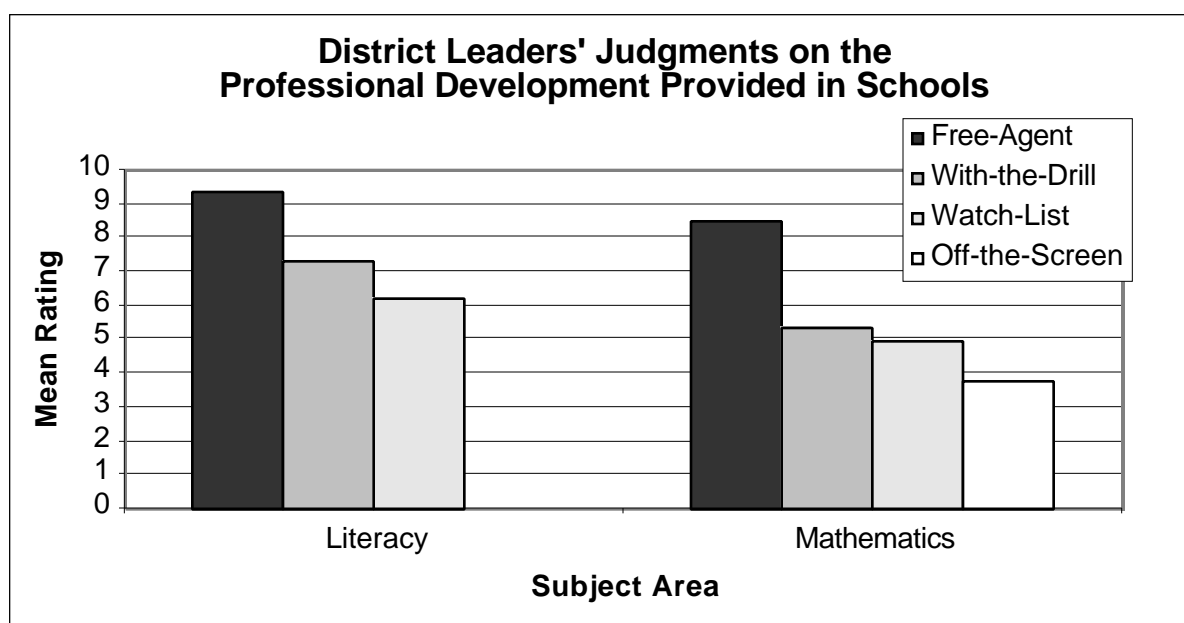


Figure 9: Mean district leader ratings on the quality of professional development in literacy and mathematics available in the schools

The district leaders provided a single rating on the quality of professional development—Johnstone provided one for literacy and West provided one for mathematics. (See Figure 9.) The subject matter differences between their ratings across all 28 schools was significant ($t(27) = 4.068, p = 0.001$) and meaningful, accounting for 38% of the variation in their scores. Differences in their ratings according to school categories were also significant ($F(2, 25) = 4.33, p = 0.024$ in literacy; $F(3, 24) = 5.091, p = 0.007$ in mathematics) and meaningful. The school categories account for 26% of the variation in Johnstone's ratings and 39% in West's. As with their ratings for instructional leadership, both Johnstone and West give their highest ratings to the Free Agent schools, next highest to the With-the-Drill schools, followed by the Watch-List and then Off-the-

Screen schools. Interestingly, the district leaders see a big difference in the average quality of professional development provided at Free-Agent schools compared to With-the-Drill schools. In contrast, teachers from With-the-Drill schools give ratings almost exactly as high, on average, as those of teachers from Free-Agent schools.

Alignment of professional development with District #2 programs and curricula

Elementary teachers who responded to the questionnaire indicated the extent to which the professional development for teachers in K-5 was tied to the Balanced Literacy program and TERC's *Investigations* curriculum. These serve as the instructional core used at the elementary level of the Literacy Initiative and Mathematics Initiative respectively. (See Figure 10.) Elementary school principals answered a similar question about the professional development provided to their teachers. (See Figure 11.)

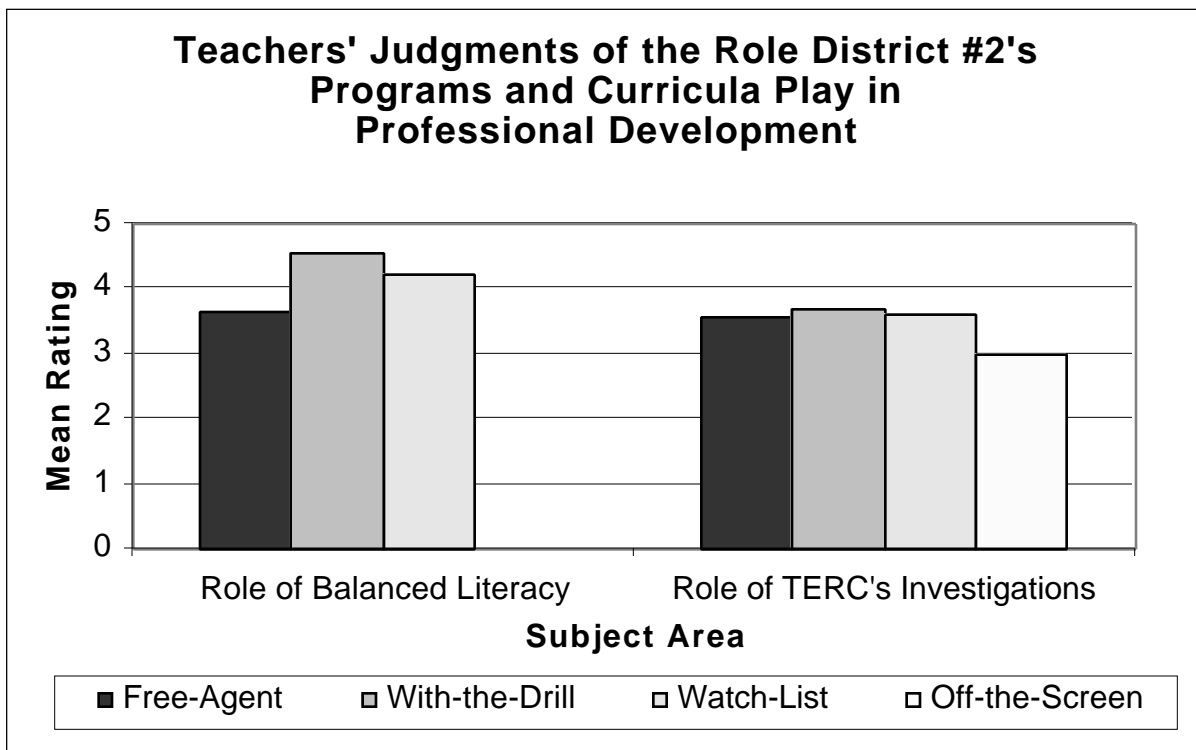


Figure 10: Elementary teachers' mean ratings of the role the Balanced Literacy program and TERC's *Investigations* curriculum play in the literacy and mathematics professional development (scale of 1 to 5)

The teachers' responses indicated that their professional development in literacy was tied more closely to the Balanced Literacy program (mean = 4.22, SD = 1.04) than their professional development in mathematics was tied to TERC's *Investigations* curriculum (mean = 3.55, SD =

1.46). This difference is statistically significant ($t(153) = 4.843, p = 0.001$), but only moderate in size, accounting for just 13% of the variance in the teachers' ratings. In contrast, the principals rated the role of Balanced Literacy and TERC's *Investigations* as essentially the same in the professional development their teachers' received ($t(18) = 1.24, p = 0.23$), and they indicate both play a strong role (mean = 4.42, SD = 1.07 for Balanced Literacy; mean = 4.74, SD = 0.56 for TERC's *Investigations*).

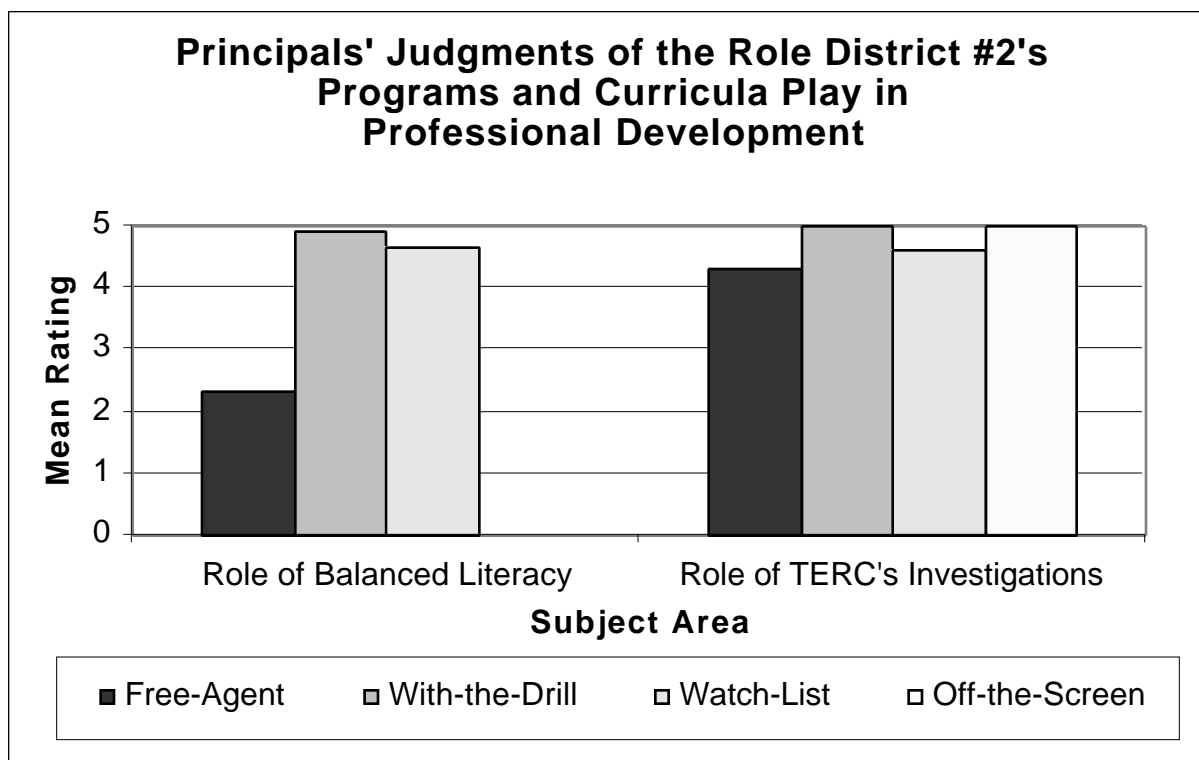


Figure 11: Elementary principals' mean ratings of the role the Balanced Literacy program and TERC's *Investigations* curriculum play in the literacy and mathematics professional development their teachers' receive

There are no school category differences in either the principals' ratings ($F(3, 15) = 1.26, p = 0.32$) or the teachers' ratings ($F(3, 151) = 0.89, p = 0.45$) of the role of TERC's *Investigations* plays in professional development in mathematics based on mathematics school category. However, there are differences in both teachers' and principals' ratings of the role Balanced Literacy plays based on literacy school category. Both teachers and principals from Free-Agent schools report the Balanced Literacy program as playing a much weaker role in their literacy professional development than do teachers from the other school categories ($F(2, 16) = 25.684, p = 0.001$ for the principals' ratings; $F(2, 157) = 12.296, p = 0.001$ for the teachers' ratings). This difference is particularly strong among the principals', such that school category accounts for 76% of the variance in their ratings, in contrast to only 13% for the teachers' ratings.

Correlations among teachers', principals' and district leaders' ratings

Correlations of the ratings on both quality and alignment of professional development in literacy and mathematics show little agreement between district leaders, principals and teachers. (See tables 13 and 14.) There are no significant correlations between the district leaders, principals and teachers on their ratings of the quality of professional development in mathematics or its alignment with TERC's *Investigations* curriculum. (See Table 13.) Moreover, the mean teacher rating for quality of professional development in mathematics for each school does not correlate with the mean teacher rating for the role TERC's *Investigations* plays in that professional development. Likewise, principals' ratings of the quality of professional development in mathematics available at their schools does not correlate significantly with their perception of the role TERC's *Investigations* plays.

Table 13: Correlations between the ratings of the quality and alignment of professional development in mathematics provided by teachers, principals and district leaders.

Mathematics Professional Development	District Leader	Quality		Alignment	
		Principals	Teachers means	Principals	Teachers means
Quality					
District Leaders	1.000				
Principals	0.114	1.000			
Teachers means	0.072	0.125	1.000		
Alignment					
Principals	-0.255	0.143	0.131	1.000	
Teachers means	0.091	0.308	0.279	-0.183	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)

There are two statistically significant correlations in literacy, however. First, Johnstone's ratings of the quality of professional development in literacy does correlate with the mean teacher rating in each school on this dimension ($r = 0.517$, $p = 0.05$). In other words, teachers are more likely to give high ratings for professional development in schools that Johnstone also sees as strong on this dimension. In contrast, the principals' ratings of professional development quality do not correlate either with those of the teachers or Johnstone. Second, the mean teacher rating in each school of the role the Balanced Literacy program played in their professional development does correlate with similar judgments made by their principals ($r = 0.468$, $p = 0.05$). Finally, the professional

development quality rating provided by the teachers in each school does not correlate with their mean alignment rating. Neither do the principals' ratings for quality and alignment of professional development correlate.

Table 14: Correlations between the ratings of the quality and alignment of professional development in literacy provided by teachers, principals and district leaders.

Literacy Professional Development	Quality			Alignment	
	District Leader	Principals	Teachers means	Principals	Teachers means
Quality					
District Leaders	1.000				
Principals	0.409†	1.000			
Teachers means	0.517*	0.206†	1.000		
Alignment					
Principals	-0.387	0.136	-0.161	1.000	
Teachers means	0.014	0.323	0.318†	0.468*	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)
 † Spearman's rho used

In summary, neither teachers nor principals see a difference in the quality of professional development provided in literacy and mathematics during 1999-2000. The district leaders, however, do. In particular, West rates the professional development provided in mathematics at the schools to be weaker than Johnstone rates that provided in literacy. The ratings of both district leaders and teachers differ based on school category, although those differences are not as strong among the teachers' responses. Principals are rather uniform in their opinions about professional development across both subject matter and school category and give it high marks all around. In addition, while teachers see subject matter differences between the role played by District #2's core programs in literacy and mathematics in professional development, principals do not. Both principals and teachers from Free-Agent schools describe Balanced Literacy and TERC as having a smaller role in their professional development than it does in schools for other literacy categories. Finally, despite some similar trends, the ratings supplied by teachers, principals and district leaders on the quality of professional development and its alignment with the district's programs and curricula do not generally correlate with one another. The only two exceptions are in literacy. Johnstone and the teachers tend to agree about the quality of professional development in the

schools, and the principals and teachers tend to agree about the strengths of its ties to the Balanced Literacy program.

Quality and Alignment of Instruction

Quality of instruction

Both district leaders and principals supplied ratings on the quality of instruction in mathematics and literacy in District #2 elementary schools. While the district leaders provided overall ratings for the quality of instruction in each school as a whole, the 16 elementary school principals³ who provided ratings did so for each individual teacher in their schools. Johnstone rated the quality of literacy instruction in each school, while West rated the quality of mathematics instruction. (See Figure 12.) The principals rated each teacher in both subjects. (See Figure 13.)

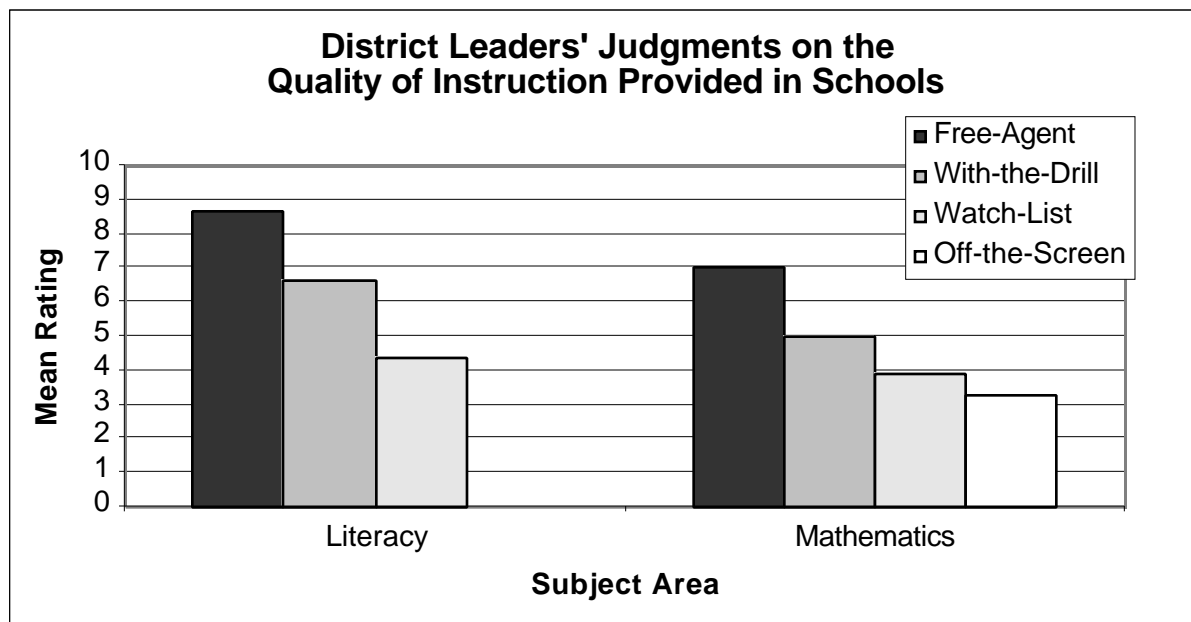


Figure 12: Mean ratings on the quality of literacy and mathematics instruction in District #2 as reported by district leaders (scale of 1 to 10)

On average Johnstone's ratings of the quality of literacy instruction (mean = 5.96; SD = 1.95) were higher than that of West's ratings of the quality of mathematics instruction (mean = 4.5; SD = 1.5). The mean difference between their ratings is statistically significant ($t(27) = 4.589$; $p = 0.001$), and accounts for 44% of the variance in their ratings.

³ Because there were so few ratings of teachers' instruction provided by middle/high school principals, we report only the ratings supplied by the elementary principals.

Differences in the average ratings of instructional quality between the various school categories are also both statistically significant and meaningful. As can be seen in Figure 13, Johnstone and West both gave the strongest ratings for instructional quality to Free Agent schools, followed by those from With-the-Drill schools, followed by the Watch-List schools, and in West's cases, the Off-the-Screen schools. The differences in the mean ratings given to these school categories are significant for the quality of both literacy instruction ($F(2,25) = 15.22$; $p = 0.001$) and mathematics instruction ($F(3,24) = 12.609$; $p = 0.001$). The amount of variation in the ratings explained by these school categories is quite high in both subjects (55% in literacy and 61% in mathematics).

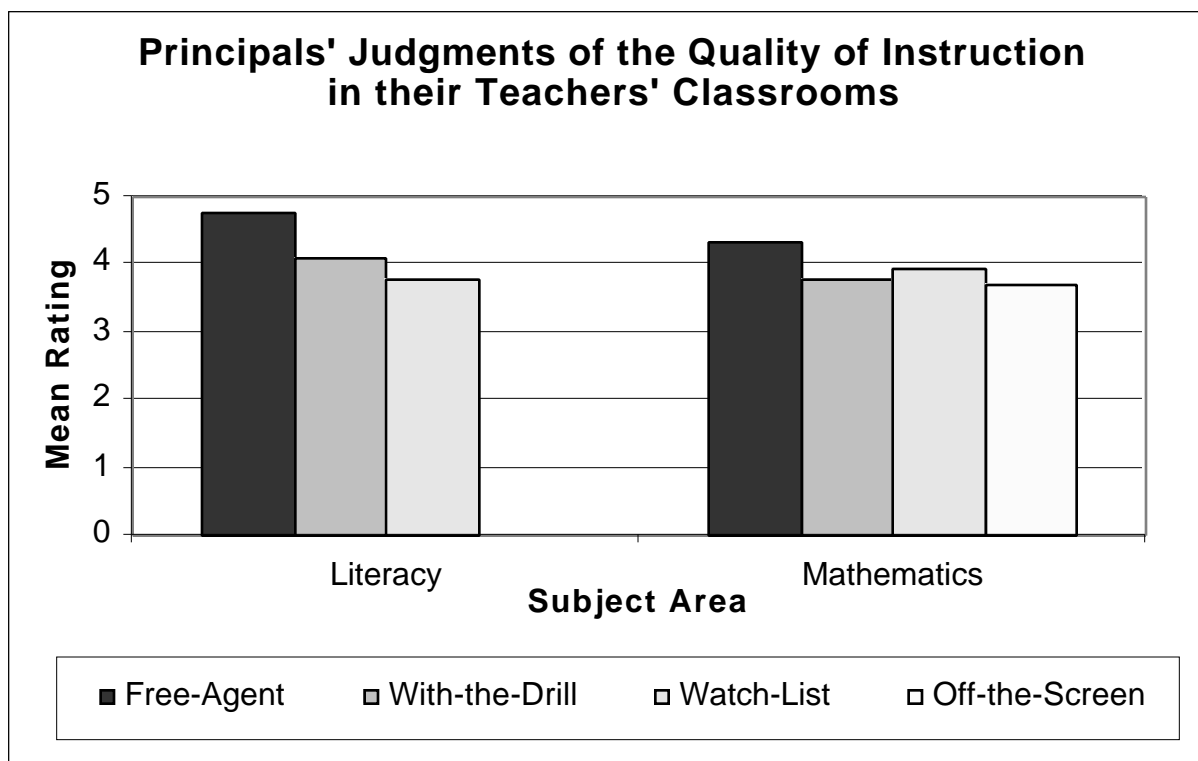


Figure 13: Mean elementary principal ratings of the quality of their teachers' instruction in literacy and mathematics (scale of 1 to 5)

Overall, the elementary principals gave their teachers high ratings for the quality of their instruction in literacy and mathematics. On a scale of one to five, where a "1" indicated "poor" and a "5" indicated "excellent", 75% of the teachers received a rating of a 4 or 5 on the quality of their literacy instruction, while 71% received a 4 or 5 for the quality of their mathematics instruction. Nonetheless, like the district leaders, their ratings of their teachers' literacy instruction (mean = 4.08, SD = 0.95) are on average somewhat higher than they are for mathematics instruction (mean = 3.86, SD = 0.86). (See Figure 14.) This difference is statistically significant ($t(361) = 6.51$, $p = 0.001$), but only accounts for a modest portion of the variation in their ratings (11%).

There are also significant differences between the ratings provided by principals from the various school categories ($F(2, 392) = 18.03, p = 0.001$ in literacy; $F(3, 363) = 3.897, p = 0.009$ in mathematics). The quality of instruction ratings provided by the principals follow a similar pattern as those of the district leaders — those from Free Agent schools give higher ratings to their teachers on average than do the principals from the other school categories. However, the other school categories are not much differentiated from one another. Given the small differences in most of the school category means, it's unsurprising that the variance in these ratings accounted for by school category is small—only 8% in literacy and 3% in mathematics.

Alignment of instruction

District leaders, principals and teachers all provided ratings on the alignment of instruction with the Literacy and Mathematics Initiatives. Johnstone gave overarching ratings of the alignment of instruction in each elementary school with the Literacy Initiative, while West provided similar ratings for each school with respect to the Mathematics Initiative. In contrast, the principals and teachers provided ratings on specific aspects of each initiative. Principals supplied ratings of the alignment of individual K-5 teachers' instruction with the Balanced Literacy program and the *Investigations* curriculum. Finally, teachers provided ratings indicating their familiarity with Balanced Literacy and *Investigations*, the extent to which they are each useful for planning and carrying out instruction, and the messages they receive from their principals as to how important it is to align their instruction with them.

Factor analyses done separately on the three Balanced Literacy items and the three TERC's *Investigations* items responded to by the teachers reveal they each appear to have a single underlying factor (only one eigenvalue was greater than 1 in each case). The factor loadings of each of the three items on that single factor are fairly high (between 0.52 and 0.56 for the Balanced Literacy items and 0.32 to 0.54 for the TERC's *Investigations* items). An average score over each set of three items was computed for each teacher and these means used for further analyses. While these constructs do not represent the teachers' judgments of the extent to which their instruction aligns with Balanced Literacy or TERC's *Investigations*, they do indicate how *likely* it is that their instruction would be aligned. Teachers who are not familiar with the program or curricula, who do not find them useful to their work and/or feel no encouragement to incorporate them from their principal are less likely to implement either. Thus, we would expect high scores on these constructs to correlate with high levels of instructional alignment.

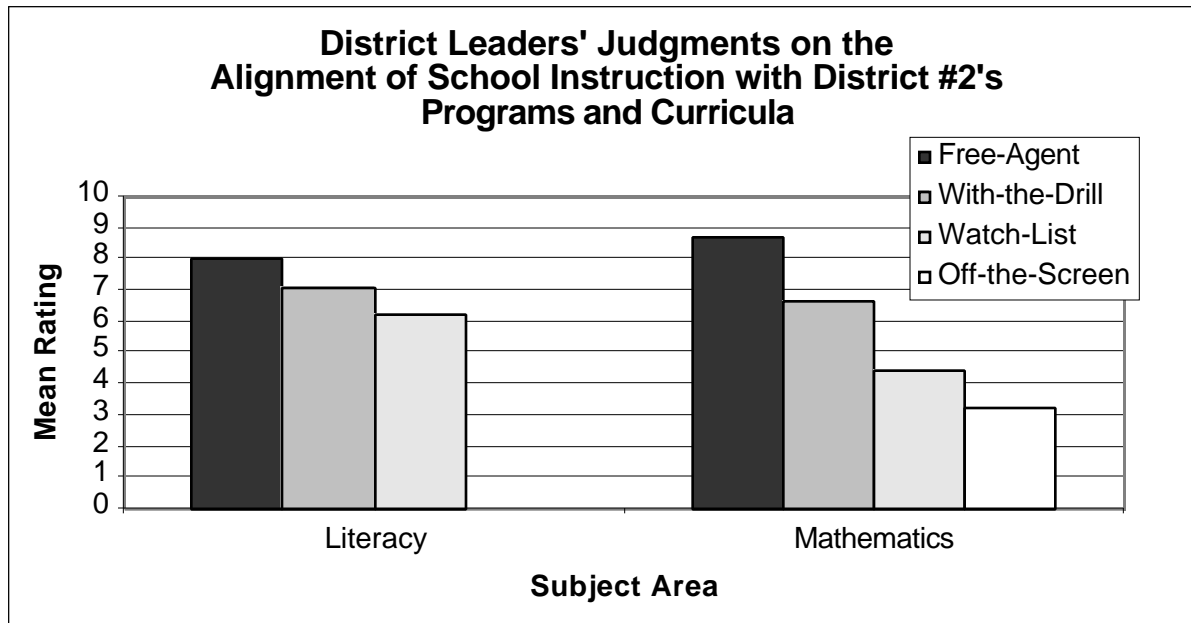


Figure 14: Mean ratings by district leaders on the alignment of instruction in District #2 elementary schools with the literacy and mathematics initiatives (scale of 1-10)

As with their ratings on other dimensions of the two initiatives, Johnstone's ratings of the alignment of literacy instruction (mean = 6.83; SD = 1.51) were on average higher than that of West's ratings of the alignment of mathematics instruction (mean = 5.36; SD = 2.15). The mean difference between their ratings is both statistically significant ($t(27) = 3.421$; $p = 0.002$) and meaningful, with 30% of the variance in the ratings accounted for by these subject matter differences. (See Figure 14.)

Differences in the average ratings of instructional alignment between the various school categories are statistically significant in mathematics ($F(3, 24) = 18.02$; $p = 0.001$), but not in literacy ($F(2, 25) = 2.19$, $p = 0.13$). As Figure 14 shows, Johnstone's ratings of alignment were very high overall and did not differ much by school category. West's ratings of instructional alignment with the Mathematics Initiative, on the other hand, followed the same pattern as her other ratings. On average she rated the instruction in Free Agent schools as most aligned with the initiative, instruction in With-the-Drill schools as next most closely aligned (mean = 6.67, SD = 1.75), followed by Watch-List schools. Finally, Off-the-Screen screen schools received the lowest alignment ratings. These differences by school category account for 69% of the variation in West's ratings of instructional alignment.

As with their ratings of the quality of instruction provided by individual teachers, the principals who provided ratings of the alignment of their teachers' instruction with District #2's core

instructional programs for elementary students were generally very positive. On a five point scale, where a “5” indicated “excellent” (in other words, “highly aligned”), 75% of the teachers received a 4 or a 5 from their principal for the alignment of their literacy instruction and 69% of them received a 4 or 5 for the alignment of their mathematics instruction. Despite these generally positive ratings, there were statistically significant differences in the principals’ ratings in the two subject areas and between principals from different categories of schools.

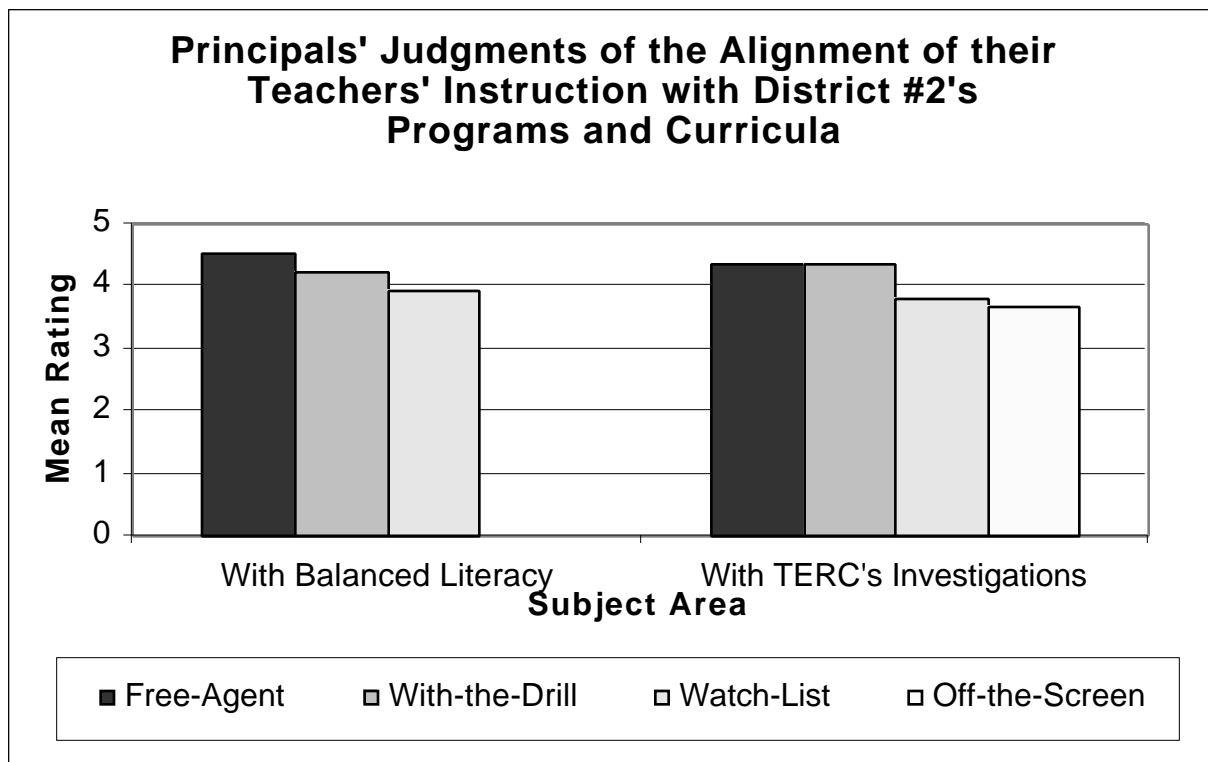


Figure 15: Mean principal rating on the alignment of instruction in their teachers’ classrooms with respect to Balanced Literacy and TERC’s *Investigations* (scale of 1 to 5)

Like the district leaders, the principals found their teachers’ instruction to be more aligned with the instructional core at the elementary level of the Literacy Initiative than that of the Mathematics Initiative ($t(349) = 5.001, p = 0.001$). (See Figure 15.) The mean difference between the ratings in each subject area received by any given teacher was 0.25 Likert points. This difference is a small one and accounts for only 7% of the variance in the principals’ ratings. The differences between principals’ ratings of instructional alignment by school category followed the same pattern as the district leaders — the ratings given to teachers by principals in Free-Agent schools were on average the highest, next highest in With-the-Drill schools, followed by those in Watch-List schools and finally those in Off-the-Screen schools. These differences were small overall,

however, and not particularly meaningful, accounting for only 3% of the variation in the alignment ratings of teachers' literacy instruction and 5.5% of the alignment of their mathematics instruction.

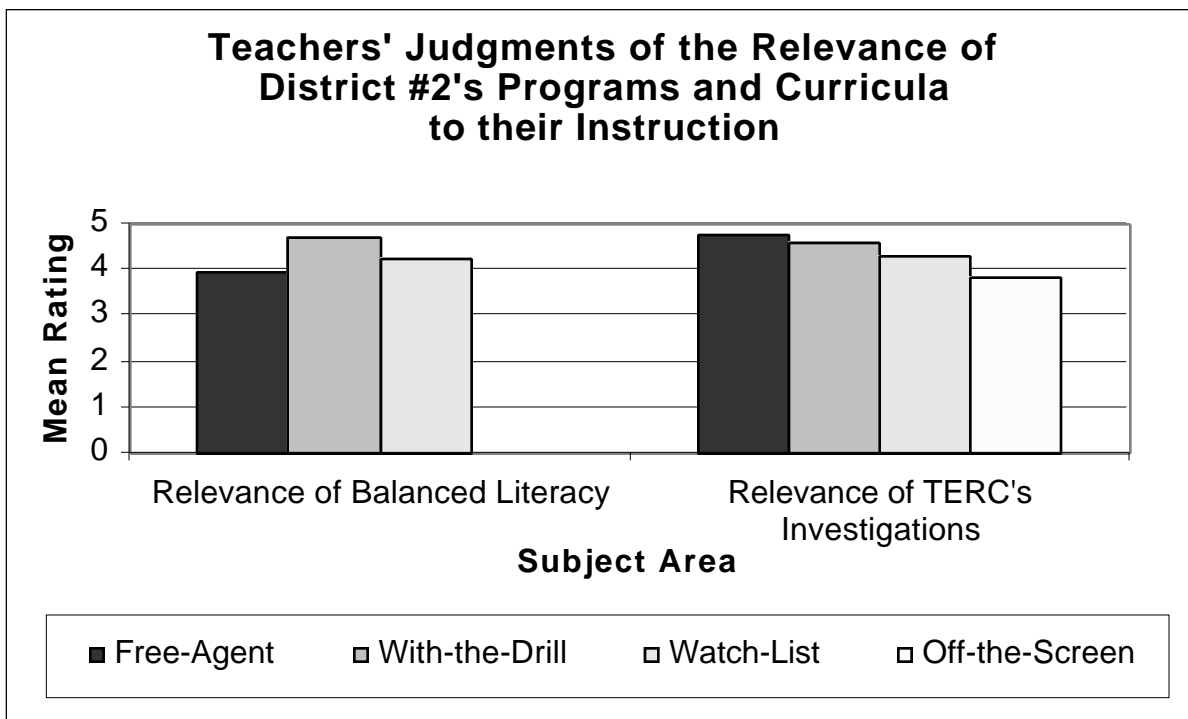


Figure 16: Mean teacher ratings on the relevance that Balanced Literacy and TERC's Investigations curriculum has for their classroom instruction

Finally, teachers' ratings of the relevance of Balanced Literacy and TERC's *Investigations* curricula to their classroom work differ by school category ($F(2, 155) = 12.604, p = 0.001$ for Balanced Literacy; $F(3, 155) = 11.024, p = 0.001$ for TERC's Investigations), but not by subject area ($t(154) = 0.901, p = 0.369$). (See Figure 16.) Teachers from With-the-Drill schools in literacy are most likely to indicate that Balanced Literacy is relevant to their literacy instruction, followed by those from Watch-List schools. Those from literacy Free-Agent schools are least likely to indicate that Balanced Literacy is relevant to their work. In contrast, Free-Agent schools in mathematics are most likely to consider TERC's Investigations relevant to their work in mathematics, while Off-the-Screen schools in mathematics are least likely to do so. These school category differences are moderate in size, accounting for 14% of the variance in teachers ratings of the relevance of Balanced Literacy and 18% of the variance in their ratings for the relevance of TERC's Investigations.

Correlations between teachers', principals' and district leaders' ratings

Correlation was used to explore the extent to which teachers', principals' and district leaders' ratings of the quality of instruction and its alignment with District #2 programs were similar to one another. (See tables 15 and 16) District leaders' ratings of instructional quality correlated significantly with their ratings of its alignment with the district's programs and curricula in both literacy ($r = 0.671$, $p = 0.01$) and mathematics ($r = 0.838$, $p = 0.01$). Likewise, the correlation between principals' ratings of instructional quality and alignment were statistically significant in both literacy ($r = 0.889$, $p = 0.01$) and mathematics ($r = 0.505$, $p = 0.05$). These findings indicate that both principals and district leaders are more likely to give high quality ratings to instruction that is closely aligned with the Balanced Literacy program in literacy and TERC's *Investigations* curriculum in mathematics.

Table 15: Correlations between the ratings of the quality and alignment of literacy instruction provided by teachers, principals and district leaders.

Literacy Instruction	Quality		Alignment		Teachers means
	District Leader	Principals	District Leader	Principals	
Quality					
District Leaders	1.000				
Principals	0.695**	1.000			
Alignment					
District Leaders	0.671**	0.506*	1.000		
Principals	0.537*	0.889**	0.481	1.000	
Teachers means	0.186	0.453	0.162	0.465†	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)
 † Spearman's ρ used

The mean teacher rating for the relevance of Balanced Literacy to their instruction and work in each school did not correlate significantly with any of the ratings provided by the principals and district leaders. However, principals and district leaders seemed relatively in accord about the quality of literacy instruction ($r = 0.537$, $p = 0.05$). Moreover, schools for which district leaders gave high ratings for instructional alignment in literacy were more likely to be given high quality ratings by their principals ($r = 0.506$, $p = 0.5$).

Table 16: Correlations between the ratings of the quality and alignment of mathematics instruction provided by teachers, principals and district leaders.

Mathematics Instruction	Quality		Alignment		
	District Leader	Principals	District Leader	Principals	Teachers means
Quality					
District Leaders	1.000				
Principals	0.455	1.000			
Alignment					
District Leaders	0.838**	0.259	1.000		
Principals	0.469	0.505*	0.342	1.000	
Teachers means	0.359	0.128 _[LD1] †	0.283	0.549*	1.000

Notes: Pearson's r used unless otherwise specified.
 ** Correlation is significant at the 0.01 level (2-tailed)
 * Correlation is significant at the 0.05 level (2-tailed)
 † Spearman's rho used

There was only one significant relationship between respondents with respect to mathematics instruction. Principals were more likely to give high ratings for alignment of mathematics instruction in schools where the teachers indicated that TERC's *Investigations* curriculum played a strong role in their work. None of the other ratings provided by the principals correlated with those provided by the teachers. Moreover, the district leaders' ratings did not correlate with those provided by the teachers or principals in mathematics.

In summary, principals and district leaders both perceive the quality of instruction and its alignment with District #2 programs and curricula to be stronger in literacy than in mathematics. They also generally judge the quality and alignment of instruction to be highest in Free-Agent schools and lowest in Watch-List and Off-the-Screen schools. The one exception is alignment in literacy instruction, which Johnstone does not see as varying significantly by school category. This may at least in part occur because she considers schools which follow the principles underlying District #2's literacy initiative to be aligned with it, even if they use different instructional forms (Stein et al., 1999a). In contrast, teachers do not see either Balanced Literacy or TERC as more relevant to their work than the other. However, these judgements of relevance do vary by school category. While With-the-Drill teachers see Balanced Literacy as most relevant to their work in literacy, Free-Agent schools see TERC's *Investigations* as most relevant to their work in mathematics. Finally, the ratings of district leaders and principals correlate fairly strongly in literacy, but not in mathematics, while the teachers' ratings of relevance rarely correlate with either.

DISCUSSION

Three streams of analyses informed the results described above: (1) direct comparisons between the respondents' judgments in literacy and mathematics; (2) comparisons of the respondents' judgments across literacy and mathematics school categories; and (3) comparisons of the district leaders', principals' and teachers' responses to one another. We frame our discussion along these three dimensions—differences by subject, differences by school category and differences in perspectives.

Differences by subject

Across nearly all measures, schools are further ahead in literacy than in mathematics. Ten of the 14 subject matter related comparisons indicated statistically significant differences between mathematics and literacy on the dimension in question. In all cases, literacy received the higher ratings. In general, subject matter differences accounted for a greater proportion of the variation in the district leaders' ratings than it did in either the teachers' or principals', and district leaders were more likely to see significant differences than teachers and principals were. Principals and teachers both did not see subject matter differences in the quality of professional development. This may either be because they honestly feel the quality is similar in each subject, or because they lack enough experience with the relatively young Mathematics Initiative to have a discriminating opinion on the professional development they are being provided. Moreover, while the principals did not see subject matter differences in the alignment of professional development with District #2's programs and curricula, the teachers did not see them in the relevance of Balanced Literacy and TERC's Investigations to their work. District leaders, on the other hand, saw subject matter differences on all the dimensions they considered.

It is possible that some of the large differences in the subject matter ratings provided by District #2 leaders are more a product of Johnstone and West as raters (perhaps West is simply more critical than Johnstone) than actual differences in the progress the schools they rated are making with respect to each initiative. However, our previous observation and interview work, as well as the ratings provided by teachers and principals, confirm the general trend in their ratings. Thus, while some of the effect sizes may need to be taken with a grain of salt, we think the overall picture provided by their ratings is a legitimate one.

The lack of progress in mathematics pointed to by the respondents reflects the general policy and history of the district with regards to instructional improvement. The district's Literacy Initiative

has been in place for over a decade. In contrast, the Mathematics Initiative is just five years old and only in its second year of district-wide expansion. In the early years of this newer initiative, schools were not encouraged to focus on mathematics until the district leadership felt their literacy instruction was fairly strong. In addition, many of the principals currently in the schools were chosen because of their strong backgrounds in and experience with literacy—some straight out of the staff developer ranks. Thus, it is not surprising that there are more Watch-List and fewer With-the-Drill schools in mathematics than in literacy, nor that while schools are often stronger in literacy than in mathematics, they are rarely stronger in mathematics than in literacy.

District #2's management and professional development system relies heavily on the role of principals as instructional leaders (Elmore, 1999; Elmore & Burney, 1999; Fink & Resnick, 1999; Stein et al., 1999a). Yet, while West gave low ratings overall to her estimates of the principals' subject matter knowledge in mathematics, she still gave some principals strong ratings for instructional leadership in that subject. This finding may be rooted in differences in how West feels about the instructional leadership role of principals in mathematics in contrast to literacy.

West has mentioned in interviews and informal conversations that the role of instructional leader in mathematics is a tricky one for most principals in District #2 (Hudson, 2000; Stein & D'Amico, 2000). Many of them simply do not have the background knowledge necessary. The district leaderships' expectations for instructional leadership in mathematics are thus somewhat different than they are in literacy. In literacy, principals are expected to be able to lead teacher meetings on aspects of literacy instruction and provide detailed feedback on the teachers' work in this area. West does not believe this is a reasonable expectation for most of District #2's principals in mathematics. Instead they need to form a close working relationship with the mathematics staff developer in their school. The staff developer will bring content knowledge to the table, while the principal brings a working knowledge of the professional community in his/her school and supervisory heft. The principal needs to know enough about mathematics and the curricula being used in their school to conduct this relationship with the staff developer effectively. Principals also need to coordinate with literacy staff developers, but they are generally not as dependent upon them for supplying content knowledge. Thus, West may feel that some principals are able to provide strong instruction leadership without necessarily having deep content knowledge in mathematics.

Differences by school categories

The school categories were originally used by Elmore and Burney to describe ways in which the district leadership varies its relationship with schools based on the composition and needs of that

school. While we could readily expect those categories to encapsulate the judgments district leaders made about the various schools, it was less apparent that they would (or should) have any relationship to the judgments made by principals, much less teachers, on similar dimensions. Nonetheless, the data reveal that these school categories often do explain at least some of the variance in the teachers' and principals' judgments, though rarely as much as they do the district leaders'.

In addition, the relationship between the school categories is often the same as that seen in West and Johnstone's ratings. In this "standard relationship", Free-Agent schools receive the highest ratings, followed by With-the-Drill schools, then Watch-List schools and finally Off-the-Screen schools. 32 analyses comparing ratings across school categories were conducted (16 in literacy and 16 in mathematics). In 22 of the 25 analyses which demonstrated significant differences by school category, this standard relationship held. The exceptions were all in literacy and they bear further comment.

In three cases, teachers or principals from With-the-Drill schools gave the highest ratings, while those from Free-Agent schools gave the lowest ones. All were dimensions associated with the alignment of professional development or instruction to District #2's Balanced Literacy program. Essentially, teachers from Free-Agent schools are "Free-Agents" partially because they are not responsible for closely adhering to the Balanced Literacy program. The district gives the teachers and principals in these schools more latitude in the design of their literacy programs because they have historically high achievement in literacy, few at-risk students, strong teaching faculty and strong school leadership. As long as they continue to perform well and conduct quality literacy instruction that adheres to the principles underlying Balanced Literacy (if not its actual form), the district gives them free reign. As a result, Balanced Literacy has less of an influence on their professional development or instructional work.

Of the seven school category analyses which did not indicate significant differences, three deserve close attention. First, neither teachers' nor principals' ratings of the alignment of mathematics professional development with TERC's investigations curriculum showed differences by school category. This finding contrasts with that of Balanced Literacy in which both principals and teachers indicated significant differences by school category. The perception that the mathematics curriculum plays a more consistent role in professional development across the district than does their literacy program may be due to a combination of the differences in the subject matter of mathematics and literacy, as well as the newness of the mathematics initiative. As we have described elsewhere (Stein & D'Amico, 1999), a combination of broader consensus about and

clearer delineation of the knowledge to be learned in mathematics, along with the insecurity many District #2 teachers feel about the subject, means they easily moved toward adoption of a curriculum to support their work in mathematics. In contrast, the literacy program seems less tightly specified and more malleable to school and individual teacher interpretation. Also, because they have been conducting their Literacy Initiative longer, some teachers — especially those in Free Agent schools — have moved beyond the original framework. These factors may lead to differences in the role Balanced Literacy plays in professional development across school contexts.

At the same time, Balanced Literacy is perceived by teachers overall to play a somewhat stronger role in literacy professional development than *Investigations* does in mathematics. This is probably due to the “voluntary” nature that TERC’s *Investigations* played in the first couple years of the Mathematics Initiative. Schools and teachers were initially encouraged to “phase in” work with *Investigations* when, and only when, they felt their literacy instruction was on firm footing. Only in the last year or so, has the district required *all* elementary teachers to begin implementing at least a portion of the curriculum. In contrast, as part of the much more mature Literacy Initiative, Balanced Literacy had been mandated in some form for most schools (with the obvious exception of the Free-Agents) for several years. As a result, its overall impact may be perceived as stronger than that of TERC’s *Investigations*.

The other non-significant result worth comment is the lack of variation in Johnstone’s ratings of instructional alignment with the Literacy Initiative across school categories. As mentioned earlier, Johnstone considers any school where the *principles* behind Balanced Literacy are being met as aligned, even if the form and structure of that program is not evident. She rated most of the schools as either moderately or well in line with these principles. Given the length of time the Literacy Initiative has been in place and the strong learning community which has formed around it in District #2, it is not surprising that many of the schools are at least trying to meet those principles, even if in some cases they are not always succeeding.

Perspectives of teachers, principals and district leaders

Teachers, principals and district leaders play very different roles in the District #2 community and its efforts at system-wide improvements in instruction. Their perspectives on key dimensions of the Literacy and Mathematics Initiatives that support those efforts might therefore be expected to differ. And they do.

There is strong agreement between district leaders, principals and teachers about which schools have strong professional communities, with moderate to high correlations between all respondent groups. However, there is less agreement between teachers and district leaders about which schools have strong instructional leadership, with only one relationship out of four between them showing a significant correlation. Only 3 of 16 relationships between teachers, principals and district leaders' ratings of quality and alignment of instruction show a significant correlation, and just 2 of the 16 relationships do so for their ratings in professional development. These findings indicate that for broad questions (e.g. subject matter differences and school category differences) the three types of respondents show similar trends, although on a school-by-school basis they are not much in agreement. Moreover, the responding groups agreed more often on the literacy dimensions (5 of 18 relationships) than the mathematics ones (1 of 18 relationships). The lower rate in mathematics may indicate that less community consensus has been built in that subject than in literacy.

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