Exploring Relationships between Professional Development, Teacher Practice, and State Content Standards

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Introduction

Fifteen years ago, interest in systemically collecting, analyzing and reporting data on the activities of teachers and students 'behind the classroom door' was largely confined to education researchers. Most commonly that information was collected through case studies and ethnographies and focused on a relatively small number of classrooms and teachers. Large-scale data collection on classroom practice, using systematic measures across a large number of teachers was relatively rare. For most researchers the intricacies of classroom dynamics and the interplay of pedagogical skills necessary for high quality instruction called for the kind of intense focus on classroom behavior that case-studies and ethnographies facilitated.

Such methodologies are not however suited to large-scale data collection, due to the sheer magnitude of effort that would be required. Survey instruments, which are better suited to large-scale data collection, were seldom attractive to these researchers, partly because of the relative bluntness of the measuring tool, and partly due to the self-report nature of survey instruments. There were of course other reasons that contributed to the limited use of survey data to explore teaching practice. Surveys, though deployable on a large-scale basis, are not without administrative burden. Not the least of these burdens is the need to 'sell' building administrators on allowing researchers access to teachers for administering the surveys, and selling the teachers on the value of the survey itself. In addition there are the distribution, administration, collection, entering, processing and management functions that must be supported. No surprise then that historically; survey approaches to examining classroom practice represented a fairly small proportion of the research on teachers' practice.

Today the picture is somewhat different; indeed in some ways vastly different (though not necessarily in the tone and tenor of education research itself). One difference is that the demand for research today is up. Federally and state funded programs now routinely require program initiatives to be 'research-based' and assessed through program evaluations that make use of best research practices. Nor is it simply that the demand for research is up. Demand for information, and particularly classroom data has increased, largely as the result of interest among educators and administrators for information to support data-driven decision making. The information explosion of the twenty-first century is well upon us, and the interest in data-driven decision-making has never been stronger, and continues to grow. This growing appetite for information is no doubt largely the result of the very technology that made the information explosion possible. Nonetheless, high stakes demands for student performance has made both state and local level administrators keenly aware of the need for information about policy effects and instructional practice. Even teachers are beginning to see value in taking a systematic and reflective look at their own practice to inform their classroom decisions.

It has been this groundswell of interest by educators at all levels of the system for systematic information about classroom practice, as well as other key components of the standards-based system that has contributed to the popularity of one particular set of

survey instruments, known as the Surveys of Enacted Curriculum (SEC). It is from this data-set that the results reported here are drawn.

The purpose of the data and discussion presented here is to provoke questions about the relationships between the professional development opportunities of teachers and their instructional practice in order to highlight the contribution that SEC measures can make in exploring these relationships. At the same time it is important that it be understood that these data are incomplete. The indicator measures represented by SEC data are only one source of data; whether the purpose is basic research, program evaluation, or informing school improvement efforts. Additional measures, including classroom observations, teacher interviews and other qualitative measures are important adjuncts to any analysis of classroom practice. The discussion here is focused on highlighting the contribution of SEC data to such analyses, with the understanding that a full-fledged analysis of the impact of professional development on classroom practice would include other data sources as an essential part of the analysis.

It is well beyond the scope of this paper to trace the history of the development of the instruments and measurement tools that are the SEC. The interested reader is referred to Smithson & Porter (2004), for a thorough account of that history. Suffice it to say that the instruments grew out of the research interests of Andrew C. Porter and our eventual collaboration with Rolf Blank of the Council of Chief State School Officers (CCSSO) and made possible through funding from the National Science Foundation (Blank, et.al., 2004). That collaboration, now seven-plus years old, was largely fueled by interest among state assessment and curriculum directors for data, preferably large-scale, that addressed opportunity to learn.

Drawing from the work of Andy Porter, and modifying to suit the interests and perceived information needs of state educators, the SEC instruments were developed and modified over a period of several years. The resulting surveys are leviathan instruments; taking the typical teacher ninety minutes, and others more than two hours to complete a single survey covering a single subject and classroom. Surveys are currently available for mathematics, science and language arts.

Over the past three years, the Wisconsin Center for Education Research (WCER) has led and housed the development of an online data collection, processing and reporting engine for the SEC instruments. To date, more than 7,000 teachers from sixteen states have reported on their instruction using the SEC online website, the vast majority of these within the last twelve months. That number is expected to double by the end of the current school year.

While the amount of information one might report, and potential questions one might ask of this dataset are quite extensive, for the purposes of this discussion the focus will be upon the associations to be found between professional development, teacher practice, and state content standards. The results reported are primarily correlations found between key summary measures. They are meant to be evocative, and no claims or assertions are intended with respect to the role of causality in the relationships noted.

Nor is any claim made that the results are representative of any particular group of teachers beyond those represented by the data. Nonetheless, the results do provide a sense of the utility such data might serve, and will almost certainly beg questions deserving answers. The author's purpose will be served if either of these occurs for the reader.

The Sample

As previously mentioned, the full sample of teachers in the SEC database encompasses some 7,000 teachers across sixteen states, and reporting on the 2002-2003 or 2003-2004 school years. Of these, the majority of teachers (4,593), reported on mathematics instruction, 1,919 reported on science, and 1,449 teachers provided reports of language arts and reading instruction. While some high school teachers participated, the vast majority of respondents were from grades K-8.

For the purposes of this discussion, only mathematics will be considered. In order to provide comparison groups, five subsets of the mathematics data are considered. One sub-set represents baseline data for those mathematics teachers participating in the MSP-PD study, and include reports from teachers four 'sites', representing numerous districts across three states. Other comparison groups were selected by state. Four state comparison groups are included in these analyses. State pseudonyms (letters) are used to avoid any inappropriate attributions based upon a non-representative state sample (see Table 1). Two states are from the Midwest, one is a western state, and one state is from the east.

Table 1

Sample / Sub-sample	# of teachers
Full Sample	4593
MSP-PD study	211
State F	388
State I	853
State M	469
State O	338

The circumstances under which teachers completed the SEC surveys were quite varied. Some were part of a national or state funded math-science partnership or reading first initiative. Some represent teachers participating in a state effort to gather baseline indicator data on instructional practice. Others participated as a result of one or another professional development program being offered in their district. Still others were simply the result of district, or in some cases, school level leaders becoming aware of the resource, and asking to have their school or district participate.

The Measures

Each of the summary measures employed for these analyses have a history of use across a number of samples and studies, consistently showing strong measures of internal reliability. For a list of the definitions, or individual items that make up each scale measure, as well as the measure of internal reliability reported for the scale with this sample, see Appendix A.

Professional Development

Nine summary measures focused on characteristics of professional development are included in these analyses. These measures are summarized in Table 2.

Table 2

Variable	**Description**	*Rel. Coefficient*
PDfreq	Frequency of PD Activities Scale	0.56
PDhrs	# of PD Hours reported	0.62
PDactive	PD that involved active engagement of teachers in learning experience	0.83
PDcohere	PD that is part of a coherent professional development plan	0.93
PDcollec	PD with collective participation of teachers from school or department	0.89
PDcnt	PD with focus on subject matter content	0.86
PDdata	PD with focus on Student Data	0.89
PDstnd	PD with focus on Standards & Instruction	0.88
PDstlrn	PD with focus on Student Learning	0.88

Four of these summary measures are associated with characteristics of high quality instruction. Findings from the national evaluation of the Eisenhower Program (Garet, et.al., 1999), indicate that professional development that is part of an ongoing, coherent program (PDcohere) encouraging collective participation of teachers by school and/or department (PDcoll), that actively engages teachers in learning (PDactive), and offers a strong content focus (PDcnt) characterizes the type of professional development most likely to positively impact classroom instruction.

Climate

Two measures of climate are included in the analyses. These are 1) Professional Collegiality and Trust, and 2) Influence of Standards on Instruction. Both scales have a range of 0 (strong negative) to 5 (strong positive), with 3 representing No Opinion/Influence.

Table 3

Variable	Construct	Rel. Coefficient
CollTrust	Professional Collegiality & Trust	0.91
InlfStnd	Influence of Standards on Instruction	0.85

Practice

Summary measures of practice focus on the cognitive demand implied by particular instructional activities. For example, the proportion of time that teachers report students being engaged in 'talk about their reasoning or thinking in solving a problem' contributes to the practice measure '*Communicate Understanding*', while 'solve word problems from a textbook or worksheet' contributes to the '*Perform Procedures*' measure. Results for these measures are reported as a proportion of total mathematics instructional time. For a list of the items that make up each practice scale, see Appendix A.

Table 4

Variable	**Construct**	Rel. Coefficient
PerfProc	Perform Procedures	0.73
CommUnd	Communicate Understanding	0.81
Analyze	Analyze Information	0.88
Connect	Make connections	0.87
AssessUse	Use of Assessments	0.82
Aclrn	Active Learning	0.83

In addition, two other summary measures related to practice are reported. These are *Assessment Use* and *Active Learning*. Assessment use summarizes the extent to which teachers use assessment strategies other than standard multiple choice or true-false type questions. The response metric for assessment use runs from 0 (none) to 4 (4-5 times per week). The Active learning scale summarizes the amount of time students spend actively engaged with subject matter content through activities such as data collection and the use of manipulatives.

Content

Summary measures of instructional content are reported for the each marginal of the two-dimensional construct of topic coverage and cognitive demand. Thus summary measures can be calculated for each of the five categories of cognitive demand (which vary slightly) for each subject. Topics are grouped by content areas, and also vary by subject. In K-8 mathematics topics are organized into seven content areas. K-8 science has twenty-five content areas, and English language arts and reading has fourteen content areas. Summary measures for topic coverage are reported at the level of content area. Content measures represent proportions of instructional time across the full school-year as reported for a specific class of students. Tables 5 & 6 report basic results for these summary measures across the full sample used for this discussion.

Table 5

Variable	Content Area	Mn/(StD)
MX1	Number Sense, Properties & Relationships	31% *(17)*
MX2	Operations	17% *(10.5)*
MX3	Measurement	15% *(7.7)*
MX4	Algebraic Concepts	9% *(8.7)*
MX5	Geometric Concepts	15% *(9.2)*
MX6	Data Analysis, Probability, Statistics	10% *(6.5)*
MX7	Instructional Technology	3% *(3.9)*

Table 6

Variable	Category of Cognitive Demand	Mn/(StD)
CgdB	Memorize, Recall	20% *(9.6)*
CgdC	Perform Procedures	23% *(9.2)*
CgdD	Demonstrate Understanding	22% *(9.1)*
CgdE	Conjecture, generalize, prove	13% *(7.1)*
CgdF	Solve non-routine problems, make connections	13% *(7.8)*

Results reported in Table 5 indicates that the majority of pre-secondary mathematics instructional time is spent in the content area of Number Sense, Properties and Relationships (31% of instructional time), while Algebraic Concepts and Data Analysis account for only a small proportion of overall mathematics instruction received in grades K-8 (9% & 10% respectively). Only instructional technology takes up less of mathematics instructional time. Among the five categories of cognitive demand, Table 6 suggests that memorization, procedural knowledge and demonstration of understanding of mathematical concepts account for the majority of instructional time.

Persistence

The strategy employed in this paper will be to look for significant correlations found between the professional development indicators and the measures of content, climate, and practice summarized above across the several different samples of data in order to determine which, if any relationships between professional development and instruction appear to persist across data samples. Any such persistent relationships will suggest areas worthy of further investigation, and raise questions about the nature of the relationship as well as the kinds of additional information that would help to draw causal connections and/or explain variations in outcomes.

Table 7

Variable	**CGDB**	**CGDC**	**CGDD**	**CGDE**	**CGDF**
Pdfreq	5	4	1	4	4
Pdhours	4	3	1	3	3
PDactive	5	5	2	4	6
Pdcohere	1	3	0	3	3
Pdcoll	1	3	0	2	2
PDcnt	4	5	1	4	4
Pddata	2	4	1	4	4
PDstnd	4	5	1	4	4
PDstlrn	2	6	2	4	5

Looking across the categories of cognitive demand reported for instructional content we find two relationships across all six sample sets examined. One is "PD w Active Engagement of Teachers" with the cognitive demand category "Make Connections". The other strongly persistent relationship was found for "PD with a focus on Student Learning" with "Perform Procedures". Six additional relationships emerge if one looks those relationships that persist for 5 of the 6 data samples examined (see Table 7).

Table 8

Variable	**Procedures**	**Communicate**	**Analyze**	**Connect**
Pdfreq	1	2	3	5
Pdhours	1	2	2	5
PDactive	3	1	4	6
Pdcohere	1	1	3	2
Pdcoll	1	1	2	3
PDcnt	3	4	4	4
Pddata	3	3	3	5
PDstnd	3	4	4	4
PDstlrn	3	4	5	4

Looking at the parallel measures of practice, only one relationship persists across all six sample sets. "PD that Actively Engages Teachers" is significantly correlated with activities that engage students in the cognitive category of making connections across all six samples of data. The 'Making Connections' variable is also persistent across five of the sample sets in its correlation to "Frequency of Professional Development Activities", "Number of Professional Development Hours", and "Professional Development with a Focus on Data". The only other relationship to persist among this group for at least five of the sample sets was for "PD with a Focus on Student Learning" and "Analyze".

The most persistent measures associated with PD are those listed in Table 9. These include two practice, and two climate measures. For almost every PD measure, in almost every sample set examined, "Active Learning", "Assessment Use", "Professional

Collegiality& Trust" and the "Influence of Standards on Instruction" were found to have significant correlations.

Table 9

Variable	**Active Learning**	**Assessment Use**	**InflStnd**	**CollTrust**
Pdfreq	5	6	6	6
Pdhours	4	6	6	6
PDactive	6	6	6	6
Pdcohere	4	5	5	5
Pdcoll	4	5	6	5
PDcnt	6	6	6	6
Pddata	6	6	6	6
PDstnd	6	6	6	6
PDstlrn	6	6	6	6

The emerging picture of the relationship between professional development and instruction is one in which teachers reporting relatively more and/or more frequent professional development activities, also report more use of active learning and alternative assessment strategies, are more positively influenced by standards, and operating in an environment of greater professional collegiality and trust.

One might also ask which of the six PD variables seem most persistently associated with instructional practice. Table 10 indicates the number of content, practice and/or climate variables that persisted in at least 5 of the six sample sets. Curiously, frequency of PD activities shows more significant relationships with the various instructional measures than number of PD hours. Professional development designed to engage teachers in active forms of learning has the greatest number of significant relationships (7) with these indicators of instruction and instructional climate. Professional development with a focus on student learning is the next most prolific of the PD indicators in terms of showing a significant correlation to instructional practice.

Table 10

Variable	**Persistant Variables**
Pdfreq	5
Pdhours	4
PDactive	7
Pdcohere	3
Pdcoll	3
PDcnt	4
Pddata	4
PDstnd	4
PDstlrn	6

Using SEC Measures for PD Planning & Evaluation

Interestingly, summary measures related to topic coverage do not show persistent relationships with the professional development indicators, at least for the data considered here. While individual state results do yield significant correlations for particular content areas with one or another characteristic of professional development, the specific content areas involved varies from state to state. One might inquire as to whether this relationship between topic coverage and professional development might reflect past efforts by states to influence coverage of instructional content. An example of how one might begin to look at this question is provided for one state.

Chart A displays content results for instruction for grades K-6 in State I, compared to the grade 7 content standards for that state. The results reported for instruction provide a picture of students' opportunities to learn mathematics content through grade 6, juxtaposed to the Content Standards for grade 7. Looking at the two content maps, it appears that instruction in Algebraic Concepts is not adequately covered in grades K-6 (if one takes grade 7 standards as the target). Of course it may be the case that Algebraic Concepts is to be introduced in grade 7. However, 'geometric concepts' is even more strongly emphasized in the grade 7 standards, and teachers in grades K-6 do report substantially greater emphasis on geometric concepts. While we do not have sufficient information about the state context to form judgments about the goals of past professional development programs in the state, the data here suggest that more attention to algebraic concepts in the early grades might well be a worthwhile goal for planning future professional development offerings in the state.

Looking at correlations for those teachers reporting from State I (see Table 11), significant correlations are found for the content areas of Operations and Algebraic Concepts, each moderately positive. The results indicate that among these teachers, those reporting more PD hours, greater frequency, and/or more actively engaging professional development, report relatively more time spent on instruction in the content areas of Operations and Algebraic Concepts. Though only baseline data, the results do indicate that teachers taking relatively more professional development do report relatively more time spent covering algebraic concepts, which looking at Chart A, would seem like a positive outcome. Of course longitudinal data reporting change in teacher practice over time, and linked to particular PD programs would provide much better evidence of whether professional development was indeed resulting in more time spent on algebraic concepts in the early grades.

Chart A

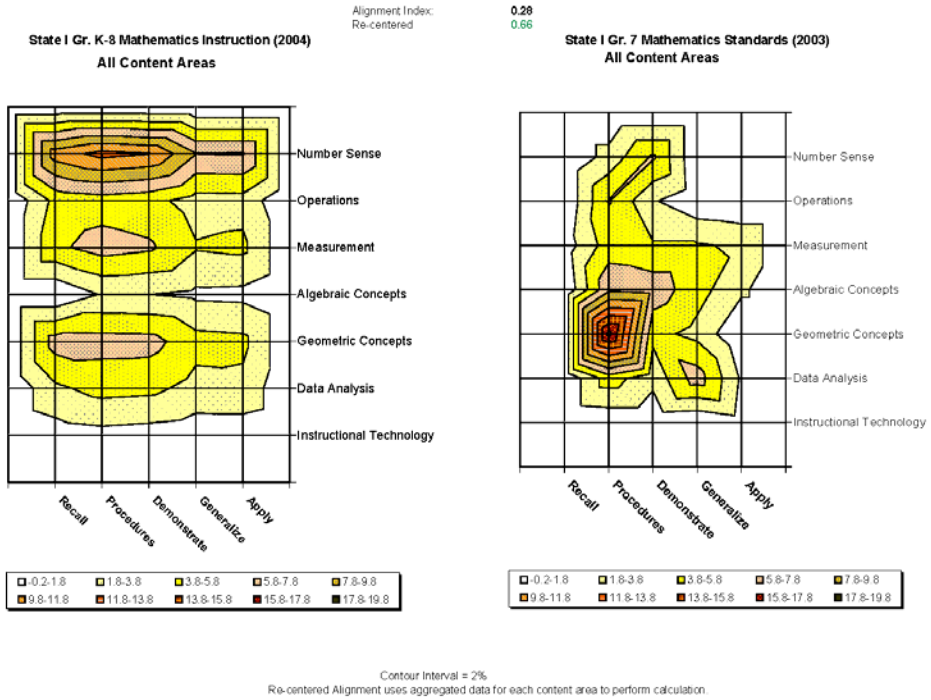
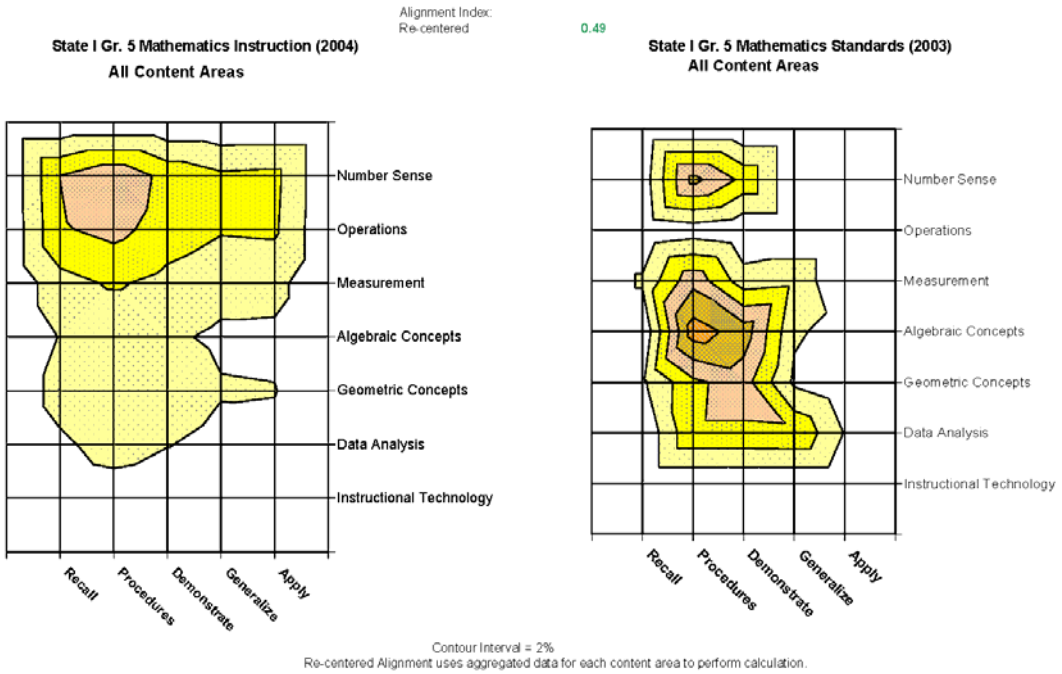


Table 11 (significant correlations only)

Variable	MX1	MX2	MX3	MX4	MX5	MX6	MX7
PDFREQ	-0.09	0.08		0.14			
PDHRS		0.07		0.09			
PDACTIVE		0.07		0.11			
PDCOHERE							
PDCOLL							
PDCNT							
PDDATA							
PDSTND							
PDSTLRN							0.07

While these results cover a range of grades, it is possible to take a more focused, grade-specific look at the relationship between instruction and standards. Chart B shows content maps for grade 5 instruction juxtaposed to grade 5 content standards for State I. (n=27). If the map of instructional content shown here were taken as a representative sample (and there is no evidence that it is) of 5th grade instruction in State I, a comparison to the fifth grade standards for the state suggests that a program of professional development aimed at the content areas of algebraic concepts, geometric concepts, and data analysis, might serve to move instruction into closer alignment with the state standards.

Chart B



Correlation results for this sub-sample are even more striking, and raise the question of whether the significant relationships reported represent the starting-point or end-point of professional development efforts. If this sample of teachers represents the *baseline reports* of teachers participating in professional development, then the state appears to have been reasonably successful at identifying teachers in need of altering their instruction to better align with the state content standards. If the picture of practice reported by these teachers represents the *effects* of previous professional development efforts in the state, one would conclude the state efforts are poorly targeted at emphasizing measurement and operations to the detriment of instructional time spent on algebraic concepts and data analysis. Of course data collected at a single point in time on these measures is going to represent a little of both, so again longitudinal data, where changes in practice can be examined, would help to get at the effects of PD on practice.

The results reported for professional development activities focused on data are particularly noteworthy for this group as they indicate a strong positive correlation with the content area of Measurement, and a strong negative correlation with the content area of Data Analysis. If this is interpreted as a picture of the impact of professional development in the state, then the results are quite disconcerting. If however the results indicate something about the teachers that are taking professional development with a focus on data, then these would appear to be just the teachers one would want to target.

Table 12 (significant correlations only)

Variable	MX1	MX2	MX3	MX4	MX5	MX6	MX7
PDFREQ							
PDHRS							
PDACTIVE						-0.49	
PDCOHERE							
PDCOLL							
PDCNT							
PDDATA			0.35			-0.48	
PDSTND			0.43				
PDSTLRN			0.40			-0.51	

Conclusion

Based upon these initial analyses across several samples of SEC data available it seems clear that the professional development and other indicators embedded within the SEC instruments yield a prolific group of indicators that reveal intriguing and sometime persistent relationships between professional development, climate, practice and instructional content indicators. Such data can prove useful to school improvement efforts, professional development planning. Again though to reiterate the point made early in this paper, in order to investigate these questions well one would want to augment this data with additional information. Two general types of additional data are mentioned here by way of concluding remarks; 1) data on context and 2) data on change over time.

Additional information about the context in which these teachers practice, and in particular the nature of the professional development offerings provided, would help one to determine whether the program of professional development was appropriately targeted or not. The PDAL online collection system, highlighted by other members of this symposium, represents one key additional data source for obtaining more detailed information about the professional development offerings available to teachers. Also, information about the policy environment, and/or more in-depth qualitative information about practice in the classroom would further help improve our understanding of the impact of various initiatives

Secondly, longitudinal results for these teachers would provide data on change over time, permitting better examination into the effects of the professional development opportunities pursued by these teachers. For researchers, such data is intended to augment, not supplant the more intensive classroom-based investigations that characterize the majority of research on teacher practice mentioned at the beginning of this paper. For administrators and teachers, the SEC data provide a basis for reflection and conversations that can, under the right circumstances, become powerful agents of change. Thus the SEC data-set, while providing a valuable and useful set of indicators for examining instructional practice and professional development experiences, is only one of a number of data sources necessary to support data-driven decision-making, program evaluation, and/or basic research into classroom practice and policy effects.

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Appendix

Math Scales

		Reliability Coefficient
Assessment Use		**0.819**
Q65	Short answer questions such as performing a mathematical	
Q66	Extended response item for which student must explain or justify	
Q67	Performance tasks or events (e.g. hands-on activities).	
Q68	Individual or group demonstration, presentation.	
Q69	Mathematics projects.	
Q70	Portfolios.	
Q71	Systematic observation of students.	
Influence of Standards		**0.847**
Q72	Your state's curriculum framework or content standards.	
Q73	Your district's curriculum framework or guidelines.	
Q77	National mathematics education standards.	
Q84	Provide mathematics instruction that meets mathematics content standards (district,	
Q129	State mathematics content standards (e.g. what they are and how they are used).	
Q130	Alignment of mathematics instruction to curriculum.	
Climate of Trust		**0.908**
Q94	I am supported by colleagues to try out new ideas in teaching mathematics.	
Q97	Mathematics teachers in this school trust each other.	
Q98	It's OK in this school to discuss feelings, worries, and frustrations with other mathematics teachers.	
Q99	Mathematics teachers respect other teachers who take the lead in school improvement efforts.	
Q100	It's OK in this school to discuss feelings, worries, and frustrations with the principal.	
Q101	The principal takes personal interest in the professional development of the teachers.	
Perform Procedures		**0.734**
Q37	Solve *word problems* from a textbook or worksheet.	
Q45	Solve *word problems* from a textbook or worksheet.	
Q53*	Work with manipulatives (e.g. counting blocks, geometric shapes, or algebraic tiles) to understand concepts.	
Q54*	Measure objects using tools such as rulers, scales, or protractors.	
Q56*	Collect data by counting, observing, or conducting surveys.	
Q59	Practice procedures	
Q61	Retrieve or exchange data or information (e.g. using the Internet or partnering with another class)	
Communicative Understanding		**0.812**
Q29	Present or demonstrate solutions to a math problem to the whole class.	
Q32*	Work in pairs or small groups on math exercises, problems, investigations, or tasks.	
Q39	Explain their reasoning or thinking in solving a problem, using several sentences orally or in writing.	
Q47	Talk about their reasoning or thinking in solving a problem.	
Q57	Present information to others using manipulatives (e.g. chalkboard, whiteboard, posterboard, projector).	

Note:

* Item used in multiple scales (for exploratory purposes only).

Appendix

		Reliability Coefficient
Analyze Information (Conjectures, Generalize, Prove Math)		**0.875**
Q41	Make estimates, predictions or hypotheses.	
Q42	Analyze data to make interferences or draw conclusions.	
Q44	Complete or conduct proofs or demonstrations of their mathematical reasoning.	
Q49	Make estimates, predictions or hypotheses.	
Q52	Complete or conduct proofs or demonstrations of their mathematical reasoning.	
Make Connections (Solve new notions)		**0.871**
Q38	Solve non-routine mathematical problems (e.g. problems that require novel or non-formulaic thinking).	
Q40	Apply mathematical concepts to "real-world" problems.	
Q46	Solve non-routine mathematical problems (e.g. problems that require novel or non-formulaic thinking).	
Q48	Apply mathematical concepts to "real-world" problems.	
Q50	Apply data to make inferences or draw conclusions.	
Q51	Work on a problem that takes at least 45 minutes to solve.	
Active Learning		**0.826**
Q30	Use manipulatives (e.g. counting blocks, geometric shapes, or algebraic tiles), measurement instruments (e.g. rulers or protractors), and data collection devices (e.g. surveys or probes).	
Q32*	Work in pairs or small groups on math exercises, problems, investigations, or tasks.	
Q33	Do a mathematics actively with the class outside the classroom.	
Q53*	Work with manipulatives (e.g. counting blocks, geometric shapes, or algebraic tiles) to understand concepts.	
Q54*	Measure objects using tools such as rulers, scales, or protractors.	
Q56*	Collect data by counting, observing, or conducting surveys.	
PD Frequency	For the most recent school year, how often have you participated in:	**0.551**
q102a	Workshops or in-service training related to mathematics or mathematics education	
q103a	Summer institutes related to mathematics or mathematics education	
q104a	College courses related to mathematics or mathematics education	
PD Hours	For the most recent school year, how many total hours have you participated in:	**0.618**
q102b	Workshops or in-service training related to mathematics or mathematics education	
q103b	Summer institutes related to mathematics or mathematics education	
q104b	College courses related to mathematics or mathematics education	
Active Teacher Engagement PD		**0.828**
q112	Observed demonstrations of teaching techniques	
q113	Led group discussions.	
q114	Developed curricula or lesson plans, which other participants or the activity leader reviewed.	
q115	Reviewed student work or scored assessments.	
q116	Developed assessments or tasks as part of a formal professional development activity.	
q117	Practiced what you learned and received feedback as part of a professional development activity.	
q118	Received coaching or mentoring in the classroom.	
q119	Given a lecture or presentation to colleagues.	

Note:

* Item used in multiple scales (for exploratory purposes only).

Appendix

		Reliability Coefficient
Coherent PD Program		**0.931**
q120	Designed to support the school-wide improvement plan adopted by your school.	
q121	Consistent with you mathematics department or grade level plan to improve teaching.	
q122	Consistent with your own goals for your professional development.	
q123	Based explicitly on what you had learned in earlier professional development activities.	
q124	Followed up with related activities that built upon what you learned as part of the activity	
Collective Participation (sum)		**0.890**
q125	I participated in professional development activities with most or all of the teachers from my school.	.
q126	I participated in professional development activities with most or all of the teachers from my department or grade level.	.
PD w/ Content Focus		**0.857**
q129*	State mathematics content standards (e.g. what they are and how they are used).	
q130*	Alignment of mathematics instruction to curriculum.	
q132*	In-depth study of mathematics or specific concepts within mathematics (e.g. fractions).	
q133*	Study of how children learn particular topics in mathematics.	
PD w/ Data Focus		**0.887**
q136*	Classroom mathematics assessment (e.g. diagnostic approaches, textbook-developed tests, teacher-developed tests).	
q137*	State or district mathematics assessment (e.g. preparing for assessments, understanding assessments, or interpreting assessments).	
q138*	Interpretation of assessment data for use in mathematics instruction.	
PD w/ Standards & Instruction Focus		**0.884**
q129*	State mathematics content standards (e.g. what they are and how they are used).	
q130*	Alignment of mathematics instruction to curriculum.	
q132*	In-depth study of mathematics or specific concepts within mathematics (e.g. fractions).	
q137*	State or district mathematics assessment (e.g. preparing for assessments, understanding assessments, or interpreting assessments).	
q138*	Interpretation of assessment data for use in mathematics instruction.	
PD w/ Student Learning Focus		**0.880**
q133*	Study of how children learn particular topics in mathematics.	
q134	Individual differences in student learning.	
q135	Meeting the learning needs of special populations of students (e.g. second language learners; students with disabilities).	
q136*	Classroom mathematics assessment (e.g. diagnostic approaches, textbook-developed tests, teacher-developed tests).	
q139	Technology to support student learning in mathematics.	

Note:

* Item used in multiple scales (for exploratory purposes only).