

# **Linking Professional Development to Teacher Practice, Student Learning and Costs**

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## **Executive Summary**

NCLB has catalyzed a number of state initiatives designed to improve the flow of data across local districts, states and the federal government. By and large, these initiatives have been taken to help states meet compliance and reporting requirements triggered by various accountability provisions of the law requiring Adequate Yearly Progress (AYP). Measures designed to improve the efficiency of data management systems and greater attention to the “cleanliness” of data entered into them have occupied policymakers and administrators concerned with assuring that schools progress in line with state and federal requirements.

Questions however surround the calculation and use of data to determine progress. Are the data required for AYP the best or only data with which to measure and evaluate student progress? Would additional data help improve performance as well as document it? Are current data requirements sufficient to enable policymakers to determine their “return on investment?”

One vital missing element seems to be data that deals with instruction and professional development. Research has indicated that teaching remains the biggest factor influencing student achievement, and so it would seem important that states look to gather data and measure the importance of variables such as professional development (including its cost and transference into instruction) that influence its effectiveness. Such attention could alter the present accountability system by focusing on growth or gain in student achievement as well as absolute levels of student performance. It might then be possible to relate this growth to the investment required to realize it.

Even prior to the passage of NCLB, a number of states had implemented “growth” or value-added models in accounting for student academic progress. Many

more are now arguing that growth models are a valuable alternative or supplement to the AYP measures spelled out in the act. Linking the effect of teaching and professional development programs with individual student achievement might prove at least as effective in pinpointing areas of needed improvement and success as in isolating overall school effects. Why not, therefore, include measures capable of accurately and continuously targeting classroom instruction as it relates to achievement as well as to overall school status measures-especially since it appears that teaching makes the most difference in student achievement?

Accountability measures relating student achievement to the factors that influence its growth is only half the story for policymakers interested in determining their “return on investment” (ROI). The other half concerns costs. To date, Florida has been most explicit about linking learning and costs (ROI) by combining data that includes school, district and state data on student/staff indicators alongside financial indicators (see: <http://web.fldoe.org/eds/ROI/> )

Other uses of data relating teacher training to student achievement are possible and intriguing. For example, teacher training data might be helpful in monitoring and improving the effectiveness of teacher training institutions. Policymakers concerned with costs associated with teacher training and retention, and how well teacher training institutions are preparing teacher candidates for today’s classrooms, could use pre-service program data and compare it to data of new teacher and student performance in order to assess and improve upon the effectiveness of teacher training programs.

In sum, this paper takes seriously the notion that it is feasible and beneficial for states to develop infrastructures that keep track of and use data related to teacher training and professional development. In particular, the paper examines what it would take for professional development, its attendant costs and changes in instructional practice to be causally related to growth in student achievement. The suggestions for doing so are based on both the current state of research and work in-progress under the auspices of a recent US Dept of Education grant.

## **I. Why States Need to Look Seriously at Professional Development**

### **Costs**

A July 2005 survey conducted by the Association of School Business Officials revealed that for the most recent year, the cost of providing health care in school districts amounted to approximately \$900 per student out of a total district per pupil expenditure of \$9400. This figure represents an almost 10% increase in district health care costs at a time when total school district revenues rose only 2.3%. Clearly, doing more with less is a 21<sup>st</sup> century mantra for state and local governments. In education, one way to do more with less is for local and state governments to spend dollars more wisely-that is, on those things that promise the greatest return. Training and professional development is one of those things. Professional development most closely affects the quality of instruction, and it is the quality of instruction that most impacts student achievement. Spending blindly on professional development, however, would be foolish. Until and unless policymakers get a handle on what the expenditures are, what objectives they are designed to meet, and how specific groups of teachers and students benefit from them, there is no way to determine and plan for the sensible allocation of funds.

### **Accountability**

The second overriding reason why state policymakers ought to be taking a hard look at the role of professional development in their information and technical services is the growing importance of incorporating growth measures (such as Value-added models) as well as status measures in state accountability systems. As research continues to demonstrate the contribution individual teachers make in either accelerating or retarding individual student achievement, the impact of training and PD on instruction will help document the catalysts or impediments to growth.

### **Improvement**

The final reason why the capture, storage and manipulation of professional development data are critical is that it can be used to target improvement in specific populations. Not every teacher will benefit in equal amount from the same professional development, and not every student, therefore, will benefit in equal amount. One key to improvement lies in the granularity with which populations and subpopulations are

identified and provided with suitable training. Monitoring and evaluating professional development data is one way that improvement strategies can be crafted for specific instances in which the evidence demonstrates a likelihood of success.

## **II. Classifying and Capturing Professional Development Data**

Professional development includes all efforts occurring at the individual, school, or district/state level intended to improve teacher performance and effectiveness. As such the whole of PD forms a complex value chain leading to a desired “return on investment” (ROI). Establishing the links of the chain require a determination of PD:

- Description/classification
- Implementation
- Translation into instructional practice
- Costs
- Effects on student achievement

### **Describing PD**

Surveying a district, state or regional organization’s professional development system and activities is like walking into a library without a Dewey Decimal System. The shelves are filled with books, but their placement seems arbitrary and lacking in coherence. If there is a professional development “catalogue,” it is often filled with a smattering of activities, offered for a limited period of time and available to teachers on a “first come, first serve” basis.

In order to get a better handle on the nature of the professional development being offered, a classification scheme or taxonomy is necessary. The taxonomy should include a number of descriptors for the data that can be easily and clearly coded for inclusion in a central data repository or warehouse. In the work we have done under a US Department of Education Grant, we have created such taxonomy. We have labeled this taxonomy a “Compendium.” It is intended to enable a common schema for classifying professional development activities within and across districts in a state. Among the fields necessary to ensure that activities can be tracked and managed, the taxonomy ought to include the following program data:

- Target: Whether the PD is aimed at individuals, teams of teachers, schools, and so on;

- Purpose: The strategic reason behind the organization’s intent in providing the PD (for example: “induction” or “retraining” or “content support”);
- Format: The learning context in which the PD is delivered (such as “lecture,” “workshop,” or “lesson study”);
- Medium: The “wrapper” in which the PD was delivered (such as “online” or “face-to-face”).
- Duration: The period of time during which the PD occurred as well as the amount of time individual sessions took.

To be comprehensive, two additional sets of data fields that capture PD descriptive information are necessary: First, fields that specify the resource requirements of the professional development (including teacher time, materials, and the cost of trainers, coaches, mentors and the like) and the source of those resources (federal, state, district/local foundation); and second, a subject-matter classification that enables the drilling down of specific content areas (such as ELA) to more specific program categories (such as “comprehension”) and the intended teacher instructional outcomes of the PD (such as “how to make an inference,” or “how to determine the main idea”).

### **Implementing PD**

Taxonomy for classifying PD is a necessary precondition for monitoring, evaluating and managing particular activities or experiences. As most teachers know only too well, however, the way in which PD is implemented can have a lot to do with whether or not it will be successful. Facilitation by an experienced staff developer responsible for the program might result in a qualitatively different implementation than facilitation by someone only recently or poorly trained. In order to understand the nature of the implementation, a PD data infrastructure needs to get at three fundamental questions:

- 1). Were the objectives of the program or activity clear and measurable?
- 2). Was the program or activity implemented with fidelity?
- 3). Was it implemented well?

## **Translating PD into Instructional Practice**

If evaluating the effects of training is to amount to more than surveying whether recipients liked it or enjoyed the experience, a professional development data system needs to somehow track how the experience translated itself into instructional practice. Uncovering the black box of instruction is one of the most significant questions facing researchers, policymakers and practitioners (Eva Baker, David Cohen). Did it change the way teachers interacted with students around content? If so, how? Did the professional development intentionally set out to help teachers engage students in certain kinds of activities or work products? If so, how successful was it in doing this?

At present there are many instruments (with varying degrees of reliability and validity) that are being used to get at the instruction occurring in classrooms. These range from highly structured surveys in elementary literacy and mathematics developed by the University of Michigan's Study for Instructional Improvement to the less structured Survey of Enacted Curriculum developed by a partnership including the Council of Chief State School Officers. Both aim at getting at what the actual practice of teachers is. Other observation instruments aim to capture data on "best practice" rather than "actual practice."

## **PD Support: Leadership and Costs**

Work done in a number of large urban districts (Hawley Miles 2004) has demonstrated that districts have little idea of how much they are investing in PD much less how their investments are being strategically applied. Simply put, data surrounding the allocation of PD resources is largely absent from most districts, and there is little strategic planning to motivate the capture and use of such data. In part, this is due to the scattered sources of PD funding. District budgets, for example, often mask PD within overall grant awards. Then, PD is often defined inconsistently, sometimes accounting for school-based efforts and sometimes not. Budgets are rarely created and maintained to accurately reflect PD resources, and because the allocation of these resources is often distributed amongst a host of different organizational subdivisions (professional development, C&I, technology, etc.), there can be resistance to forming an overall PD strategy that might threaten existing organizational turf. A framework for classifying costs, as Hawley et al. recommend, ought to include at least six core areas of professional

development: Teacher time, training and coaching; administration; materials, equipment and facilities; travel and transportation; and tuition and conference fees.

Support for professional development encompasses more than dollars. It also takes sound and stable leadership at the school and district. Therefore, states wishing to track effectiveness ought to take into account the quality and continuity of leadership exercised at the school and district levels. This data can be captured through some combination of direct observation, perceptual surveys and existing school and district data sources.

### **III. Student Achievement Results**

Of recent interest to policymakers at the district, state and federal levels is the calculation of growth models that are capable of determining what value classrooms and schools are contributing to student performance. This kind of “value-added” measurement (VAM) can be useful in:

- Identifying which schools are performing better than expected, and which worse than expected.
- Measuring gains in learning that occur when students are in a particular school, or when they are taught by a particular teacher.
- Assuring schools and/or teachers being compared are teaching “comparable” students.

Although a number of different statistical techniques are available to determine VAM, they share a number of similarities in the steps required for their construction. The first step is formulating a multilevel regression model of student gains. This calculates expected learning gains for schools and classrooms with particular student compositions. Once this is done, then for each school and teacher a calculation is performed to determine whether actual learning gains are above, equal to or below expected gains. These “residual” scores serve as the value-added measure. VAMs for teachers can compare teachers within the same grade. VAMs for schools can compare schools. The total value-add would then be calculated by adding the teacher and the school residual.

The same steps accompanied by additional data and regression analyses can be used in the determination of a value-added measure for professional development and/or instructional practice. Effects on teachers (e.g., program participation, numbers of hours,

improvements in motivation and skills, etc.) could be added to the mixed model regression analysis. The effects would then represent what an organization (school system or state) could expect to experience (on average) from increases in specific instructional practices or professional development experiences. The data and variables required for the calculation of VAM that include professional development include:

- Student achievement scores for multiple years on vertically aligned tests
- Student indexed to teachers by subject for each year
- Teachers indexed by professional development program for each year
- Instructional practice aggregated across classrooms and schools

Variables that are necessary to “control for” include:

- Student characteristics: SES, ethnicity, gender, program status (LEP, Special Ed.)
- Teacher characteristics: years of experience, highest degree, years within school
- Classroom characteristics: type of classroom, class size, student demographic composition
- School characteristics: size, student demographic composition
- Duration and timing of the professional development

#### **IV. Capturing and Using the Data: Technology, Process and Organization**

##### **Technology to Store and Report on Data**

A necessary condition for inclusion of the data model is a central data repository (or data warehouse). Over the past few years, these have become more reasonably priced and increasingly available from multiple vendors. Although many vendors include standardized data models, the use of the kinds of data outlined here would require some customization. Licensing of software and database structures has become increasingly prevalent.

Historically, data warehouse technology has been used for either research or preparing reports to comply with regulatory mandates. Recently, however, states have become more active in school improvement efforts as well. This has resulted in the need

for tools that are relatively intuitive to use by personnel that are neither technologically nor statistically sophisticated. Sometimes bundled with a warehouse, today's tools should incorporate many graphical options, the ability to save to Excel and a drag and drop option—all useful features for ad hoc analysis.

### **Process to Capture, Clean and Update Data**

Understanding what data are necessary and the technology necessary to house, manipulate and report against it, is one thing; setting up regular processes to ensure that the data is clean, timely, and actionable is another. Many states now have or soon will have data structures for capturing longitudinal data on each student at least two times during the year (fall and spring). Data collection at these times permits the more accurate reporting of dropout rates as well as the identification of students who have been enrolled in various programs (such as bilingual or ESL).

In order to capture professional development data, it will be necessary for states to expand the reach of their longitudinal systems. In particular, states will need to employ a standard way to collect, store and report on the data. They will also need to standardize the way they classify professional development so that it is consistent with school districts (and possibly teacher training institutions). The data would include at least three additional sources not now routinely collected: cost data, instructional practice data, and professional development activity data. The “Compendium” suggested above is one such example in which all three sources of data are included.

Because there is wide variation in how districts now deal with aberrant or conflicting pieces of data (for example, how to deal with students who seem to skip from the fourth grade to the eleventh grade), states will need to develop uniform “decision rules” in which a standardized means of dealing with this kind of data is agreed upon. As with calculating high school graduation rates, unless similar rules are followed by all, the resulting data will be inconsistent and unreliable.

Additionally, a statewide data collection system ought to include unique teacher as well as school and student identifiers. To account for the effect of professional development on student achievement, it should also contain a system that links individual students with individual teachers. According to a May 2005 Education Commission of the States (ECS) paper on State Student Information Systems, 31 states now have student

longitudinal data systems in place; 15 more are developing them, but only 7 states have developed unique teacher identifiers.

### **Organization and Personnel to Sustain Process**

In order to ensure that the data collection process goes smoothly, states might need to expand their current organizational information systems organizations. Expanding a state function, undoubtedly, will not be easy to do--especially in revenue-strapped state governments. Yet, the cost in efficiency and accuracy without well-trained personnel might exact an even greater price. Dealing with “unclean,” unneeded or redundant data takes time and personnel away from more critical tasks.

Many states have already begun initiatives to deal with the “drowning in data” phenomenon. California, for example, has conducted an extensive review of the amount and kinds of data currently collected and the costs associated in doing so. In California’s case, the results were surprising and dismaying. California school districts “in 2004 were reporting on student ethnicity 40 different ways. The estimated cost, according to State Public of Instruction Superintendent Jack O’Connell, was about \$315 per piece of data” (Pasadena Star News, August 2, 2005). The state has now passed a bill authorizing further reductions in redundant data collecting. Similarly, in Pennsylvania, the state Department of Education has established a standard system of data elements, trimming an original 4,500 down to 400 (Golden 2005).

## **V. Summary Checklist of Recommendations**

- The Right Data, Data Model and Technologies
  - Does the data model enable the routine capturing of data on professional development? Most particularly, does the model employ a classification scheme that takes into account the objectives, implementation and eventual translation of the professional development into instructional practice classrooms?
  - Is there a means to capture the true costs of the PD?
  - If the state is using a growth model to determine program effect based on student achievement, has it provided guidelines for this use (including guidelines to understand the reliability and confidence of the resulting correlations)?

- Is there a filtering process to ensure the aggregation of the data at an appropriate level for state analysis and use?
- Can the captured data be managed within a data system whose architecture links individual students to individual teachers and programs and tracks this data longitudinally?
- Are there uniform “decision rules” for districts to follow in order to ensure the data is being captured and stored in a standardized manner?
- The Right Organization
  - Are the various departments of the state DOE not only sharing a common data repository, but working together across departments to gain maximum use of it?
  - Has there been a state data audit to determine usefulness and eliminate any redundancies for data collection and storage in both districts and in the state DOE?
- The Right Services
  - Are state DOE divisions entrusted with providing technical services to schools and districts using the data on their services and providing data training for client schools and districts so they might also use this data routinely?
  - Does the state capture and distribute “best practices” amongst the districts?
  - Does the state have standard tools and forms for districts to use and are these easily accessible through a state portal?