LITERATURE REVIEW: PROFESSIONAL DEVELOPMENT

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Review of Literature: Introduction

Professional development, according to Desimone, et al, constitutes "an essential mechanism for deepening teachers' content knowledge and developing their teaching practices" (Desimone, 2002). Effective professional development has been called "the most promising, cost-effective tool available to teachers, schools, districts, and states as they seek to improve the quality of teachers" (Wallace, 2009). What does the research say about high-quality professional development, especially as related to technology integration, and what can be learned from this research that might guide the development of future professional development efforts?

Examining research that utilizes a mixture of quantitive and qualitative methods, three themes will be addressed by asking the following questions:

1. Is professional development effective in improving teacher growth and student achievement growth?
2. What forms of professional development related to technology integration have been proven effective?
3. Are there common characteristics of effective PD models? If so, what are they? How do they differ from one another?

Effects of professional development on teacher growth and student achievement

Tracing a professional development program's impact on teacher growth and through to its impact on student growth and learning is a challenge (Ham, 2010). However, it is possible, based on current research, to draw correlations, if not direct causal evidence. Wallace, for

example, finds that “professional development has moderate effects on teacher practice and very small but sometimes significant effects on student achievement” (2009).

Three primary studies will be used to further investigate the relationship between professional development, teacher growth and student achievement.

Wallace conducted a quantitative study investigating the connections between professional development, teacher practices, and student achievement (Wallace, 2009). Data from two states (Connecticut and Tennessee) was analyzed, drawing from the Beginning Teacher Preparation Survey (BTPS) and corresponding student data from the National Assessment of Educational Progress assessments in Mathematics and Reading. Data from students (n = 1,550–6,408) nested within teachers (n = 168–1,029) from six existing databases were analyzed using a hybrid structural equation model. This model was tested on these data sets from smallest to largest in an effort to confirm its validity.

As Wallace concludes, “Professional development has moderate effects on teacher practice and very small but sometimes significant effects on student achievement when the effects of professional development are mediated by teacher practice. In spite of differences in samples, academic subjects, and assessments, the effects of professional development on teacher practice and student achievement persist and are remarkably similar across analyses.” (2009).

One limitation of Wallace’s work in this context is that it focuses on student growth specifically in the areas of mathematics and reading. Research that draws could follow these links and dealt specifically with teacher growth in the area of technology integration and student growth in the use of ICTs would be welcome to test whether similar claims can be made for this subject area.

Bates, et al conducted a quantitative research study focused on the eMINTS (enhancing Missouri's Instructional Networked Teaching Strategies; http://www.emints.org) program. This program was designed to provide PD to teachers in Missouri. It was begun in 1999 by educators at the University of Missouri, Columbia. Participants in eMINTS complete two years of professional development. A significant number of contact hours with an instructional specialist was an essential component (90 hours for the eMINTS4ALL track or 250 for the COMP PD track).

The eMINTS program was investigated as a program evaluation (not an academic research study); the authors acknowledge that this approach enforced limitations in the approach used to evaluate the program. Research was conducted in three segments:

In phase one, researchers examined the program's core components first and created an assessment instrument designed understand the implementation's consistency across sites. To do this, 50 observations were conducted of 31 different instructional specialists as they facilitated four-hour PD sessions. PD fidelity scores were calculated from these observations, then matched those to 269 teachers in the corresponding PD sessions.

Secondly, the research team investigated teacher understanding of the program concepts and how variations in PD fidelity were associated with this teacher understanding. Limitations in funding prevented the evaluators from conducting a large enough number of teacher observations to include teacher outcome data gathered in that way. The researchers instead evaluated the quality of lesson plans submitted by teachers as a measure of teacher outcomes. Additionally,

only lesson plans that included accompanying student work samples were used, in an effort to ensure that teachers had taught these lessons.

Finally, research was conducted to understand how variations in PD fidelity and teacher understanding were associated with student outcomes over two years. The standardized test scores of students who corresponded with the teachers observed were collected for the school years 2005-2006 (to be used as a control), 2006-2007 (Year 1), and 2007-2008 (Year 2). 2,004 third to fifth grade students' scores were used from Year 1, and 1,689 were used from Year 2 (see Table 1). These students matched to 148 teachers and 141 teachers, respectively. PD fidelity and teacher data were matched by teacher to each student.

Several interesting results were found through this study. The first was that time spent planning lessons during the visits of instructional specialists was associated with higher-quality lesson plans, but sessions that spent more time focused on technical assistance and problem-solving was associated with lower-quality lesson plans. Lesson plans for 180 teachers were scored for this purpose, and quality of lesson plans were determined by how well they reflected thorough understandings of the program’s core concepts. In addition to the increase in quality of these lesson plans, the researchers also saw a “significant positive relationship between the amount of time that instructional specialists spent engaged in lesson planning and student achievement in grades 4 and 5”. This suggests that spending time planning lessons during professional development and modeling best practices for lessons has a high pay-off.

Limitations of this study included the following: small effect size, a limited amount of data collected from the PD sessions, an inability of the researchers to observe the participant

teachers engaging in classroom instruction, and a lack of method by which researchers could identify whether strategies from the PD were integrated into the instruction.

Proven forms of effective professional development related to technology integration

In the introduction to their literature review, Lawless and Pellegrino describe the state of technology integration this way: 'we need to move to a more systematic study of how technology integration occurs within our schools, what increases its adoption by teachers, and the long-term impacts that these investments have on both teachers and students." (Lawless & Pelligrino, 2007). In the first section, the effects of professional development on both teacher and student growth were discussed. Can professional development be a tool toward moving toward the goal of adoption of technology integration described by Lawless and Pelligrino?

A number of studies will be used to further investigate the current forms of professional development and their effectiveness.

Mouza's work (2009) is a qualitative multiple case study of a professional development program consisting of two different models. The Technology Integration Series (TIS) model was designed to enhance teachers' computer usage skills and understanding of technology integration into classroom instruction. This model included teams of teachers from different K–8 schools. The Curriculum Technology Theme (CTT) model sought to help teams of teachers from the same school integrate technology within specific subject areas (e.g., literacy) or interdisciplinary curriculum themes (2009).

The research is based on the case study of 7 teachers: 5 teachers who participated in the TIS model, and 2 teachers who participated in the CTT model. This small sample size (7 teachers, all from same school) is one of the limitations of this study.

The work of Mouza separates the kinds of knowledge required of teachers into three categories: content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK).

CK, for Mouza, is the set of skills needed to effectively use computers both generally and in the context of teaching and learning.

PK includes general pedagogical strategies and "the ability to apply those strategies using technology (e.g., using technological tools to address curricular learning goals, using generic technology-based ideas such as WebQuests2 and so on; Margerum-Leys & Marx; Mishra & Koehler)".

Finally, PCK is used to "describe knowledge acquired through the use of technology that does not necessarily transfer to other subject areas (e.g., repurposing commercial software for learning; Margerum-Leys & Marx). Mouza describes PCK as "the basis of good teaching with technology" and notes that it "requires an understanding of the pedagogical strategies that use technology in constructive ways to teach content." (2009).

The case studies revealed many insightful anecdotes. In addition, the interview data that was collected suggested 3 factors influential to teacher learning and change over time: beliefs about student characteristics; availability of resources; and collegial support (2009). These themes, especially those of availability of resources and collegial support, are echoed by the work of Desimone (described below), and indicate common threads.

The work of Desimone, et al used a sample of approximately 207 teachers in 30 schools, in 10 districts in five states (Desimone, et al 2002) to conduct a qualitative research study. Their work examined “features of teachers' professional development and its effects on changing teaching practice in mathematics and science from 1996-1999” (2002).

Desimone, et al (2002) describes 6 key features of effective professional development. These 6 key features are split into 2 types: structural (having to do with the form or organization of the activity), and core (describing the activity’s substance).

The 3 structural features identified are:

1. Reform type vs traditional workshop
2. Having adequate duration
3. Using collective participation among teachers in a department, school, or grade

The 3 core features described are:

1. Utilizing active learning
2. Having coherence between the PD and the teachers' knowledge and beliefs
3. Content focus

Although the research investigated three areas of teaching practice and professional development (technology use, instructional methods, and student assessments), I am choosing to focus strictly on the research related to technology use, as it has the most relevance to impact of professional development on technology integration. The authors define Technology Use during

the professional development as “improving their capacity to use (a) calculators or computers to develop models or simulations; (b) calculators or computers for data collection and analysis; (c) computers to write reports; and (d) computers to access the Internet.” (2002).

The research results show a “benefit to technology-related professional development when there is collective participation of teachers from the same school, department,or grade level. ” (2002). This concept of “collective participation” will be taken up again later in this literature review as a connecting thread among the work reviewed.

One admitted weakness in the work of Desimone, et al is that is not an intervention study, in which a random half of teachers is given professional development where the other half does not receive the development experience. This sort of study would, perhaps, strengthen the claims that the 6 key features of professional development identified are truly as important as they are claimed to be, and may indicate a future direction for research.

Orrill, C.H. (2001)

In her work, Orrill conducted a participant observation study of two teachers, with the goal of developing and evolving a professional development framework. As such, this is a study with somewhat limited applicability to generalization; the sample size (2 teachers) is quite small. Additionally, as a participant observation study, the author admits that her perspective is necessarily non-objective; she worked closely with both teachers during this experience, providing coaching, resources and challenging their practice. There are, perhaps, still ideas worth considering even in this limited domain.

As the author describes it, “The framework included five key pieces: (a) reflection, (b) proximal goals, (c) collegial support groups, (d) one-on-one feedback, and (e) support materials for the teachers”. This framework connects to the work of Desimone (2002) and others, and these connections will be explored in greater detail below.

Providing more detail, Orrill describes educational improvement as “...the central focus of this participant observation study. In this instance, improvement means creating learner centered environments through the use of computer-based simulations that were designed to be learning tools for students and curriculum reform tools for teachers.”

The very nature of this study indicates what Desimone describes as “Active Learning”. The two teachers Orrill worked with were engaged in the professional development activity from the beginning, taking on such activities as reading books and immediately implementing suggestions from them, working hand-in-hand with the participant observer to refine questioning practices, and engaging in reflection. Important growth was described, especially in the more veteran teacher Orrill worked with.

Common characteristics of effective professional development models

In order to inform future professional development efforts, it is worthwhile to identify common characteristics of effective professional development models.

Desimone describes 6 key features of effective professional development. For sake of clarity, they are repeated below:

3 structural features:

1. Reform type vs traditional workshop

2. Adequate duration

3. Collective participation

3 core features:

1. Active learning

2. Coherence

3. Content focus

In analyzing the eMINTS program of professional development (described in detail in section 1, "Effects of professional development on teacher growth and student achievement"), Bates et al are careful to point out that the program features four of Desimone's 6 key features (active learning, coherence, adequate duration, and collective participation). This common set of features seems to point to these as being important factors for effective professional development.

In addition to the connections between the work of Bates and Desimone, the focus on collegial support made in the research of Mouza seems to connect neatly to the principle of collective participation.

It would appear that collective participation among those undergoing professional development is a significant aspect to designing and delivering effective professional development.

Conclusions

Professional development has demonstrable effects on teacher practice. It also has small but present effects on student achievement. (Wallace, Desimone et al). Effective forms of professional development specifically designed for technology integration exist and are relatively well-documented (Mouza). Common features among effective professional development frameworks exist (Desimone et al, Bates, et al). Among them are collective participation and active learning.

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