The Relationship Between Professional Development and Teacher Retention: A Mixed Methods Study

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Abstract

The negative impacts of high teacher turnover rates are widely documented, with particular impact on low-income, high-minority schools. Turnover can be especially widespread in science education, where teachers are in high demand. Although teacher retention is predicated on job satisfaction, which is in turn fostered by opportunities for professional growth, little research has been conducted on the relationship between professional development and retention. In order to investigate this relationship, we conducted a mixed methods study to first quantitatively determine the relationship between professional development and retention, and then qualitatively investigate the nature of the relationship. The results demonstrate a complex relationship, in which professional identity, professional development, and agency contribute iteratively to teachers remaining in middle school science teaching.

Keywords:
Professional development, agency, retention

Statement of Purpose

In its 2003 report, The National Commission on Teaching and America's Future stated that the impact of teacher turnover falls directly on students, differentially impacting underserved students in urban schools. Keeping teachers in the classroom is a critical component of high-quality education, especially in science education (NRC, 2013). Teacher retention is linked to job satisfaction (Banilower, et al., 2006; Simon & Johnson, 2015), which in turn has roots in professional learning opportunities (Fields, et al., 2012). Despite these links, little research explicitly connects teacher retention with professional learning opportunities.

Across studies, research demonstrates that working conditions have a substantive relationship with retention (e.g., Brill & McCartney, 2008; Guarino et al., 2006). The lowest rates of teacher retention occur in urban high-poverty schools with high proportions of minority students, often a different race than the teachers (Goldring, et al., 2014; Smith & Ingersoll, 2004). Although this body of research suggests race and poverty play a role in teacher retention, teachers may be more likely abandoning workplace conditions that make it extremely

difficult to teach their students (Simon & Johnson, 2015), such as leadership (Boyde, et al., 2011), facility quality (Buckley, Schneider & Shang, 2004), and sense of agency (Shen, 1997). Effective professional development (PD) may be one such workplace condition. Studies demonstrate that effective PD provides teachers a sense of efficacy (Loucks-Horsley et al, 2010), reinforcing their identity as experts in their field (Sagor, 1998). A few studies have found relationships between mentoring and retention (Eberhard, Reinhardt-Mondragon, & Stottlemyer, 2000). Despite the potential of this relationship, the role of professional learning opportunities in teacher retention remains under-researched. We thus examined the following questions: *What is the relationship between PD and science teacher retention? What factors explain the nature of this relationship?*

Theoretical Framework

To frame this study, we draw on notions of professional identity, defined as teachers' concept of self in relation to their work (Beijaard, et al., 2004). Identity exists in a fluid state and is influenced by required roles, opportunity and engagement in learning, and professional context (Beijaard, et al., 2004; Reynolds, 1996). This definition implies a tension regarding agency and structure, in that teacher individual dispositions, such as self-efficacy, commitment, and responsibility to the profession, are influenced by their social context and the autonomy imbued by the organization (Coldron & Smith, 1999). Particularly, a sense of agency regarding professional learning can have important implications for strengthening professional identity. In addition, a strong, internalized professional identity may help teachers cope with negative circumstances in their schools (Moore & Hofman, 1988).

Methods and Data Sources

Research Design

We used an explanatory sequential mixed methods design (Creswell & Clark, 2011), which allowed us to both quantitatively measure the relationship between PD and retention, and to qualitatively elucidate the nature of that relationship. This data was collected as part of a PD effort across eight urban districts in California.

Sample 1. Every middle school science teacher in the participating districts was surveyed. The final sample size was 212 middle school teachers in 33 schools (Table 1); this was reduced to N =172 in the final model due to missing data.

Sample 2. Qualitative data was gathered through interviews of 13 current and former middle school science teachers in two of the districts. Six teachers had chosen to continue teaching middle school science. The other seven had migrated to other content areas or grade levels, moved into administration, or retired (Table 2).

Data

Quantitative. Table 3 describes the variables and instruments through which the quantitative data was collected.

Qualitative. Each teacher participated in a 40 to 90 minute audio-recorded interview. The interview addressed career choices, participation in PD, and the impact of PD on retention.

Analysis

Quantitative analysis. Because the data consists of teachers nested within schools we analyzed the data using a multilevel linear model (MLM) with Bernoullian distribution on the binary (0/1) retention variable; thus *the results portray the percent chance of retention*. After generating descriptive statistics (Table 4), we ran correlations to determine the strength of associations among observed variables (Table 5). We then tested each explanatory variable individually and in a stepwise regression on retention. Based on the literature, at the school level (level 2), we tested the relationship between retention and percent underrepresented (%UR), free and reduced lunch percentage (%FRL), and base academic performance index (API). To reduce overspecification, we kept only the most substantive predictor in the final model, base API. At the teacher level (level 1), in addition to our variable of interest (PD hours), we tested years of experience and log salary. Because gender and bachelor's degree had no significant correlation to retention, we did not test them in the MLM. We also tested interactions between base API and level 1 explanatory variables, with the only significant interaction being that between API and PD Hours. The final mixed model is as follows (level 1 variables centered at the group mean):

$$Retention = \gamma 00+\gamma 01*APIBASE2j+\gamma 10*YRSTEACHij+\gamma 20*PDHrsij+\gamma 21*APIBASE2j*PDHrsij+u0j$$

Qualitative analysis. Using Dedoose®, transcripts were analyzed for trends along four themes: reasons for teacher turnover, teacher classroom efficacy, agency in PD, and administrative and teacher-to-teacher support.

Results

Quantitative

Figure 1 indicates the non-parametric relationship between the average number of PD hours and percent chance of retention. On average, teachers with no PD showed only a 60% chance of retention. Teachers with over 20 hours of PD, on the other hand, demonstrated 85% chance of retention. This relationship appears stronger in schools that have a lower average API. In the MLM only base API and PD hours were significant (Table 6); however, we included years' experience in the final model due to its importance in the literature (Strunk & Robinson, 2006). Most importantly, the relationship between PD hours and retention was consistently significant—solely, with other variables, and in interaction, providing evidence that PD may be a crucial factor for supporting teacher retention.

Qualitative

Although the quantitative analysis showed a compelling relationship between PD hours and retention, this is not necessarily causal. For example, teachers with a particular set of

dispositions may have chosen to take many hours of PD, thus a latent variable of "professional identity," is predicting both PD hours and retention. Qualitative evidence points to an iterative, interconnected, rather than causal, relationship between PD hours and retention.

Teachers who stayed. The iterative process is summarized as follows:

1) A strong professional identity was present among teachers who chose to invest in, take advantage of, and sometimes lead PD.
2) In turn, science-focused PD built teacher knowledge, which led to a sense of efficacy and excitement.
3) That efficacy, and observing engaged students, strengthened teachers' commitment over time, leading to retention.
4) The extent to which teachers had some agency in creating or selecting their PD also had a relationship with commitment and retention.

Gary's statement provides an example of this iterative process (numbers corresponding to the above processes are noted in parenthesis in the analysis):

> Yeah, I mean I feel like I'm more passionate about staying in science 'cause I feel like the professional development I've had in the last few years has been effective, and I was able to use it in my classroom. So that definitely makes me feel more dedicated and more enthusiastic in staying in science…

He later continued regarding his work in facilitating some of the PD:

> Well, I mean, it's sort of my baby...I've been...present in every step of the process since the first SLP grant. I'm pretty committed in seeing the process all the way through, and participate as much as I can.

Although Gary was already committed enough to participate in hundreds of hours of voluntary PD (1), the ability to learn and grow as a teacher (2) translated into his classroom, making him "more enthusiastic in staying" (3). He also considered the PD to be "his baby," noting that he's "pretty committed" (4).

In the Sample 2 districts, there had been limited science PD before the start of the SLP PD project. The teachers discussed how this lack of PD made them feel unvalued as they were forced to take math/ELA PD. Over the two years of the study, there were several changes in PD opportunities: Motivated teachers could attend many hours of SLP science PD; teachers volunteered for PD leadership roles; and many of the districts appointed science teachers on special assignment, who planned science-specific PD that involved teacher voice.

As a result of the opportunities for teacher agency, some teachers emerged as leaders. For example, Kathy said,

> Well, I do think that having a voice in the past couple of years, and being able to do PD that is designed by science teachers…for science teachers has definitely improved my attitude toward science. I think if we hadn't had that then I would probably have left...and gone to teaching math.

Kathy was encouraged that her leadership was valued, and that having a voice in PD "designed by science teachers" was instrumental to her staying in science (4).

Teachers who left. A different set of processes was in place for those who left.

1) Leavers often had not established a professional identity in science education (sometimes linked to not having a single subject science credential).
2) This contributed to a diminished self-efficacy in teaching science.
3) Although facing the same structural issues as the "stayers" (e.g., lack of materials) leavers felt more frustrated by these issues.
4) They felt little sense of agency regarding PD.

For example, Julie said:

> And, as far as science goes, I don't have enough credits to get a single subject. And also the constant battle with the district over supplies, resources, and assistance...It seems like it's never resolved.

She later added:

> I have no voice in the design of my professional development. Zero. I don't think they view teachers as experts. And Common Core standards are not new. It's just a rehash of Integrated Thematic Instruction. So I don't feel like I need the PD to move to the new standards.

In these two quotes Julie implied her struggle around being a science teacher in middle school where multiple subject credentials were being phased out. (1,2). She felt deeply frustrated by district structures ("the constant battle") (3), and she expressed a lack of trust that PD would support her efficacy (4). Based on this constellation of factors, she moved from science into math.

Scholarly Significance

Over the last 30 years, there has been a shift in teacher retention literature from economic conceptualizations (the relationship between salary and retention) (Dolton & van der Klaauw, 1999), to a focus on the relationship between student characteristics and retention (Hanushek, Kain, & Rivkin, 2004), to an understanding of the major role of organizational characteristics and retention, especially at low income schools (Buckley et al., 2015). Our study contributes to this progressive trajectory in focusing more clearly on the relationship between PD and retention. We first demonstrate using a multilevel model that PD had a consistent significant relationship with retention. Moreover, other typical associations were insignificant in our data (salary, degree, years' experience). The qualitative data makes it clear that the relationship was based on complex and iterative processes. First, our findings suggest that teacher professional identity played a powerful role in both PD and retention (Beijaard, et al., 2004). Yet a strong professional identity was not enough to support long-term retention if there was no opportunity for PD, which helped teachers feel effective and motivated, especially if they had a voice in its design (Loucks-Horsley et al., 2010; Sagor, 1998). The combination of a professional identity and opportunities for agentive PD mitigated problems associated with low-income schools,

including lack of materials. For teachers who left, lack of support by the district was not ameliorated by one or more: 1) PD: the ability to learn and apply new ideas in the classroom, 2) identity: a strong sense of self in the context of science teaching, or 3) agency: a voice in the design and execution of PD.

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Table 1. School District Demographics 2014

District Name	Enrollment	% English Learners	% Underrepresented	Largest Ethnic Group	% FRL	API base score
Allport	12570	55.5	71.0	Hispanic	85.9	803.3
Farmington	33406	24.3	33.0	Asian	21.3	886.0
Helmwood	21939	34.1	86.7	Hispanic	73.2	713.4
Mt. Danworth	32001	27.5	61.5	Hispanic	53.6	774.7
San Loredo	8704	33.7	75.3	Hispanic	64.4	776.9
San Isabela	12270	26.5	73.3	Hispanic	68.9	746.9
Santa Carmina	15151	35.6	58.9	Hispanic	51.2	807.8
South Santigo	9263	14.8	82.6	Hispanic	34.1	810.6

Table 2. Sample 2 Teachers characteristics

Pseudonym	Gender	Grade	School 2013 API	Retention status	Credential	Degree	Years of service
San Isabela							
Kathy	Female	7th/8th Science	648	Still teaching	Science	Science	23
Leo	Male	6th Math/ Science	726	Retired	Science	Science	16
Jennifer	Female	6th Math/ Science	791	Migrated to ELA	MS	Not science	4
Julie	Female	6th Math/ Science	791	Migrated to ELA	MS	Not science	15
Harry	Male	6th Math/ Science	791	Migrated to math	MS	Not science	21
Laura	Female	7th Science	791	Still teaching	Science	Not science	14
Mary	Female	6th Math/ Science	726	Retired	MS	Not science	30
Helmwood							
Gary	Male	7th Science	775	Still teaching	Science	Science	7
Tom	Male	8th Science	775	Still teaching	Science	Not science	20
Nadine	Female	Elementary Science & District TOSA	767	Still teaching, but considering admin	MS	Not science	5
Oscar	Male	8th Science	775	Still teaching	Science	Science	7
Steven	Male	Middle School Hearing Impaired	688	Special Ed	Special Education	Science	18
Ann	Female	7th Science	688	Migrated to high school science	Science	Science	14

Table 3. Variables and instrument through which the data was collected

Variable	Description	Collection
Level 1 (teacher)		
Retention	A binary 1-0 variable indicating whether the teacher stayed teaching middle school science (1) or left the district, the content, or the grade band (0). If all teachers stayed, the outcome variable would be 1, or 100%. If less than 1, retention is portrayed as a percent chance of staying.	Collected from phone calls to district staff requesting status of middle school teachers before/after the 2014-2015 school year, and nature of their leavetaking.
Total PD hours	A continuous variable from 0 to a little less than 200. Total amount of science PD hours for each teacher in the 2014-2015 academic year.	Recorded as part of participant tracking for each PD event in 2014-2015. PD consisted of content and pedagogy workshops, lesson study, and district planning days.
Log Salary	Median salary of the 2014-2015 academic year for the district at the teacher's experience level; log transformation on salary was used because of its skewed distribution.	We used the salary scale for each district along with teacher years of experience to calculate an estimate each teacher's salary, using the median of the district salary for the number of years of experience.
Years' Experience	The numbers of years the teacher taught science. To account for skewed distribution, the data was binned into 0-5 years (1), 6-10 years (2), and 11+ years (3)	Teacher survey: Asked to report years of service, degree, and gender.
Bachelors' degree	Binary dummy variable of whether the teacher's degree was in natural science or science education (2) or other (1)	
Gender	Binary dummy variable of teacher's gender: Male (1) or female (2).	
Level 2 (school)		
% Underrepresented (%UR)	% of students not White or Asian.	Collected from California's data repository site, http://www.ed-data.org/.
Free and Reduced Lunch Percentage (% FRL)	% of students on Free or Reduced Lunch, a loose proxy for local poverty.	
API base	Academic Performance Index: student standardized test scores used for accountability purposes, range 648-791.	

Table 4. Descriptive Statistics of Variables

Variable Name	N	Mean	SD	Min	Max
Retention	261	0.69	0.46	0.00	1.00
Total PD Hours	266	26.13	38.04	0.00	171.17
Yrs. Experience	179	2.27	0.84	1.00	3.00
Log Salary	179	11.14	0.19	10.83	11.45
Gender	259	1.66	0.47	1.00	2.00
Degree	141	1.55	0.50	1.00	2.00
Base API	32	797.97	86.06	602.00	986.00

Table 5. Correlation Matrix

	%UR	%FRL	Base API	PD Hours	Years Experience	Log Salary	Degree	Gender
Retention	-.146*	-.131*	.151*	.222**	.171*	.163*	.004	.050
% UR		.912**	-.881**	.133*	-.105	-.214**	-.048	-.128*
% FRL			-.940**	.100	-.059	-.159*	-.024	-.102
Base API				-.066	.098	.251**	.031	.120
PD Hours					.084	.145	.076	-.011
Years Experience						.756**	-.078	.005
Log Salary							.095	.026
Degree								-.104
Gender								

Note. * $p < .05$, ** $p < .01$

Table 6. MLM models of key variables. Standard error in parenthesis.

Fixed Effect	Coefficient Model 1	Coefficient Model 2	Coefficient Model 3	Coefficient Model 4	Model 5 *(Final Mixed Model)*
Base API	0.001*				0.003†
	(0.000)				(0.002)
Total PD Hrs		0.018***			0.023***
		(0.005))			(0.006)
Years experience			0.459†		0.524†
			(0.247)		(0.277)
Log Salary				2.596	
				(1.553)	
Interaction: Total PD hrs and API					0.0002**
					(0.000)
Intercept	0.699***	0.920***	1.291***	1.283***	1.488***
	(0.033)	(0.168)	(0.160)	(0.158)	(0.204)
N	257	258	172	172	172

*Note: †p > .10, *p < .05, **p < .01, ***p < .001*

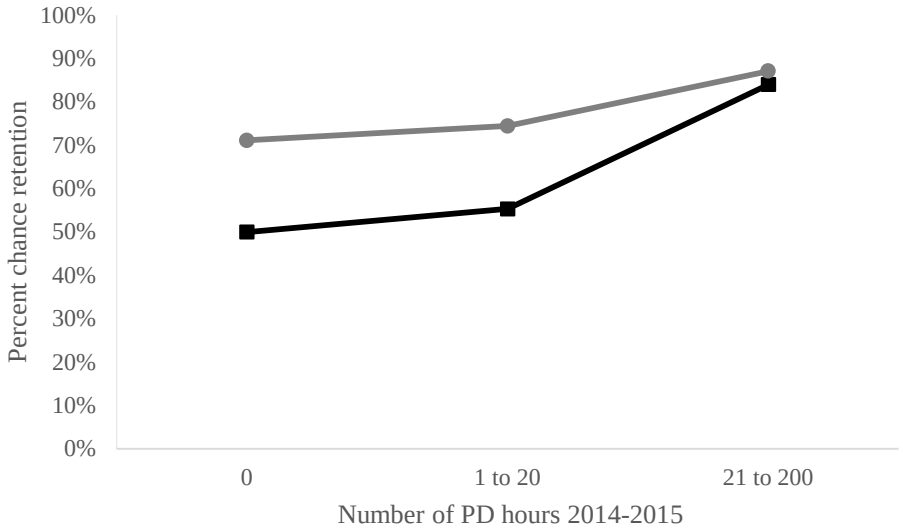

Figure 1. Percent chance retention by PD hours, delineated by API (gray: 800-1000; black 600-800)