Sir Syed Journal of Education & Social Research
Vol. 4, Issue 4, 2021 (October – December)
ISSN 2706-6525 (online), ISSN 2706-8285 (Print)
ISSN 2706-9362 (CD-ROM), ISSN 2706-6525 (ISSN-L)
DOI: https://doi.org/10.36902/sjesr-vol4-iss4-2021(42-49)

SJESR
Sir Syed Journal of Education & Social Research

Impact of Professional Development of Teachers on Students' Achievement

* Shahida Tanveer (Corresponding Author)

** Prof. Dr. Zafar Iqbal (Rtd.)

*** Muhammad Arsalan

Abstract

Professional Development is an integral part of a teacher's professional career and it is a topic most discussed in the teaching profession since the last decade. Lastly, it was called in-service training but now it is known as "Professional Development". The main aim of the present study was to analyze the impact of teachers' professional development on the students' achievement in Elementary teachers' training institutes of Punjab, Pakistan. Government Colleges for Elementary Teachers (GCET) of Punjab was the target population. From 30 colleges of Punjab, data was collected using a self-developed tool from the sample of 70 teachers, and 100 students of the same colleges were used in the study. This study was cross-sectional. The data regarding the professional development of teachers was primary data collected from both teachers and students. The data about achievement scores of students was secondary. The statistical methodology correlation and regression analysis were used to analyze the impact. Further to test the significance of correlation and regression results the t-test and ANOVA were applied respectively. Data were analyzed with the help of Statistical software SPSS. Study findings showed that the correlation between 'Professional Development' and 'Students achievement' is high i.e. 0.314 for students and 0.343 for teachers along with significance values 0.004 and 0.001 respectively. The regression results are also significant having an F-statistic of 10.699 for students and 9.070 for teachers along with significant values 0.001 and 0.004 respectively. Analysis of the results showed that 'Professional Development of teachers have a great positive impact on 'Students achievement'.

Keywords: Achievement; Impact; Professional Development; Significance.

Introduction

Teachers' continuous commitment to extraordinary valued professional development is a vigorous contribution to extend teachers' learning and abilities, varying approaches, and dogmas, boosting academic milestones of students and refining their educational purposes and progression (Akiba & Liang, 2013; Darling-Hammond, Orphanos, Richardson, Wei, & Andree, 2009; Desimone, 2009). Educational representatives throughout the globe additionally recognize the magnitude of professional development and learning in the form of leaders and major focal points of systemic reform initiatives. As an example, teachers had been required to attend more than a hundred hours of professional development in 'Sweden' and over a hundred and fifty hours in the 'Netherlands' every year, and accomplishment of PD courses was a prerequisite for the promotion of teachers in England, Korea, Wales, Australia, Switzerland, and Northern Ireland, (OECD, 2005; Akiba & Le Tendre, 2009). It is expected, in Pakistan that there are almost two hundred thee 'Institutes for Teacher Trainings' are developed and those are running effectively and thoroughly. Govt. of Pakistan also has established around three hundred 'Teacher Resource Centers'. These are private 'Teacher Training Centers' beside the government. All these centers are to train teachers, develop pedagogical skills and in the end encourage them with professional certificates. Almost 40,000 teachers got training through these training centers every year under their short term training programs (Aly, 2007)

It is mandatory in the USA that a minimum of 5% of the funds provided under the No Child Left Behind (NCLB) act should be used for teachers to groom them as qualified and competent personalities in their profession and a minimum of 10% of the same funds are used for the teachers and principals for their professional developmental courses (Birman et al., 2007).

* STED, Allama Iqbal Open University, Islamabad
** Department of Teacher Education, Allama Iqbal Open University, Islamabad
*** Department of Statistics, Govt. Science College, Multan

The present research is done to find out the gaps and to deliver pragmatic outcomes to update policymakers in teachers' professional development in Pakistan especially in Punjab.

Theoretical Framework: (The Path Model)

The process for professional development is candid for improvement of teaching and learning procedures. Teachers' active contribution in effective professional development enriches their skills and knowledge both as (Desimone, 2009) describes in 'The Path Model' that improves rather than changes their beliefs and attitudes. With the integration of teachers' beliefs, attitudes, skills, and knowledge, they develop their classroom practices and instructional approaches. The variations in the result of such training nurture progress in students' learning outcomes. The Path Model offers a concise and suitable theoretical framework along with complete and practically appropriate strategies to deal with professional development and its learning outcomes. This model presents the reciprocal and collaborative type of interaction among teachers' skills, knowledge, beliefs, pedagogical practices, critically characterized professional development, and students' achievement. This model also permits testing professional development to alert the teacher's attitudes, classroom practices, skills, and effects of enhanced instructional techniques on students' learning outcomes (Desimone, 2009).

The Impact of Professional Development on Students' Achievement

Different pragmatic studies support the influence of best quality professional development on teachers' instructional techniques and students' learning outcomes (Desimone et al. 2002; Darling-Hammond et al., 2009; Garet et al., 2001; Akiba & Liang, 2013; Slotnik & Smith, 2008). Here are examples. The most recent research was in the mid-western state of the USA, which was a longitudinal study and the data was about middle school science teachers and their students. It was found that an increase in one hour teachers' involvement in professional development seminars or informal negotiation resulted in an average of .23 increases in math scores of students and .15 increases in the annual growth rate of teachers (Akiba, Wang, & Liang 2015).

The main impact of PD on the achievement of students has been largely recognized globally by many researchers, for example in Pakistan (Warwick & Reimers, 1995), in Australia (Kattle & Sellars, 1996; Ingvarson, Meiers & Beavis, 2005), in England (Wood & Bennett, 2000), Norway (Kallestad & Oweus, 1998). Besides these researches, the impact of PD on the achievement of students is not having that much strength as it may have been, as it must have been (Yoon, Duncan, Lee, Shapley & Scarloss, 2007; OCED, 2005). Particularly, the fact is still not known whether the primary objective of professional development programs controls their impact on students learning behavior or not.

The Content Focus of PD and Students' Learning Outcomes

It has been observed that the eminent professional development activities contribute undermentioned features: (i) content focusing, (ii) promoting shared contribution and active learning, (iii) being coherent, intensive, and ongoing, and (iv) linkage to additional school creativities (Desimone, 2009; Desimone et al., 2002; Darling-Hammond et al., 2009; Slotnik & Smith, 2008; Garet et al., 2001). Garet et al., (2001) found that 1027 science and math teachers when focused on content, had chances to provide students teaching-learning activities that were coherent with further academic activities, they had positive and great impacts on enhanced skills, knowledge, and information and changed classroom practices of teachers. Another longitudinal research held by Desimone and his colleagues (2002) on 207 teachers in which they found that professional development was most operational when teachers' skills of assessments, teaching standards, and professional learning aligned with their teaching practices.

The focus of the content is more significant when it compares with additional core features of influential professional developmental procedures. The importance is to enhance the classroom activities and improve student learning where Professional Development practices emphasize teacher's teaching abilities (Darling-Hammond et al., 2009; Desimone, 2009)

The Need for Professional Development

Variations for extent debated to include any reform activities will necessitate tutors for the importance of studying modern methods (Borko, 2004) and achieve an improved consideration of the content being imparted (Garet et al, 2001). In the process of professional growth and development, a path is provided to the teachers to enhance their teaching and learning abilities (Lawless & Pelegrino, 2007). To attain the expectations developed, an educator essential possesses a deep consideration of the content of subject(s) he or she trains, possesses the skill to transfer this material to pupils and inspire

advanced level intellectual in the pupils (Garet et al., 2001). Teachers are normally considered as supportive of creating advanced prospects in respect to learning and teaching (Guskey, 2002). Consequently, teachers are frequently improvised to apply the teaching reforms necessary to attain the developed anticipations (Guskey, 2002). An alteration needs to be happened to attain encouraging learning improvements in which the demands of the adults may be considered instead of concentrating on their shortfalls (Templeton & Tremont, 20140. Similarly, the procedures permit teachers to improve approaches for applying new methodologies of teaching practices in the schoolroom. (Blazar, 2015)

How professional development works in student achievement:

Professional development works in student attainment in 3 steps. Firstly, professional development improves teachers' skills and knowledge. Secondly, improved learning and knowledge enhance classroom instruction. Thirdly, enhanced teaching increases student attainment. In case one connection is missing or fragile, enhanced pupil's learning was not predictable. When a teacher flops to spread over novel thoughts starting from professional development and goes to classroom practices, then students would not get an advantage by that teacher's professional training.

The primary portion of professional development ought to be the best quality in its design, execution, philosophy of transition, and formation. The professional development should be concentrated, coherent, constant, intensive, content bases, well-described, and greatly performed (Guskey, 2003; Loucks-Horsley, Hewson, Love, & Stiles, 1998).

In the secondary step, teachers essentially carry the belief, stimulus, and services for the presentation of professional improvisation to students' learning (Borko, 2004), maintained by continuing school relationships and complementing viewpoints with specialists. Doing so might need reducing such hurdles in novelty instructions for example lack of ample time to spend on coaching and training, shortage of material and human resources, and shortage of feedback sustenance expected from the participants of professional development.

In the tertiary step, the teaching-learning process advanced by the skilled learning improvement improves student achievement. Getting the second idea, that the factual indication of extraordinary eminence is the main emphasis of the article, that inspects the consistency of empirical researches directed to check the effects of PD and improvement (National Research Council, 2004). Even though PD improves teachers' learning abilities results in the improvement of students learning, an unwell structured appraisal or insufficient application will become difficult to identify any result after the professional development.

Methodology:

In the present study, both primary and secondary data were used. The information was gathered by two survey questionnaires. The target population was the elementary colleges of the Punjab province. A random sampling technique was applied for the collection of data. Two questionnaires were developed one for the teachers and the other for students except for the demographic items. The teachers' questionnaire was comprised of 18 items relating to the professional development training of the teachers. The students' questionnaire consisted of 16 items. All items of both tools were measured at 5 points Likert Scale from 1 to 5 ratings. 1 being the 'Strongly Disagree', 5 being 'Strongly Agree' and 3 being 'Neutral'. Scores were computed using the Statistical Package for Social Sciences (SPSS). The professional development was the independent variable while the dependent variable was the achievement score of the students of 1st and 3rd-semester results. In our study, the data was collected from 70 teachers and 100 students. Research ethics were followed during the study where needed. The achievement score was the secondary data collected from examination results.

To analyze, the data the deceptive measures were used to draw general conclusions. To test the impact of professional development on students' achievements the correlation and regression were the statistical tests. The significance of both regression and correlation has been checked based on the p-value. The goodness of the regression model has been checked by the regression ANOVA and coefficient of determination. To draw the results of the above analysis SPSS software was used.

Data Analysis:

The descriptive statistics for both the student and teachers scores are presented in table 1 and table 2 respectively as given below:

Table 1: ***Descriptive Statistics of Students' Feedback and Achievement***

	N	Minimum	Maximum	Mean	Std. Deviation
Student Feed Back	100	40	66	52.23	4.214
Student Achievement	100	16	88	62.50	20.397
Valid N (listwise)	100				

Table 2: ***Descriptive Statistics of Teachers' PD and Students' Achievement***

	N	Minimum	Maximum	Mean	Std. Deviation
Teacher Feed Back	70	45	65	57.04	3.998
Student Achievement	70	16	88	62.29	20.872
Valid N (listwise)	70				

Tables 1 and 2 show the score range of students between 40 to 66 (16 - 88) while the score range of teachers is 45 to 65 (16 – 88) respectively. This shows a smaller variation in the scores. Similarly, the descriptive statistics i.e. mean and standard deviation was 52.23 and 4.214 for students and 57.04 and 3.998 respectively for teachers. The two situations also show less relative variation patterns in this score. For the application of Ordinary Least Square (OLS) regression the assumption of normality of dependent variable was checked i.e. the achievement score. To test the normality, the Histogram was used and showed the score was approximately normal. The histograms are given below

Figure 1: Histogram of students' achievement score

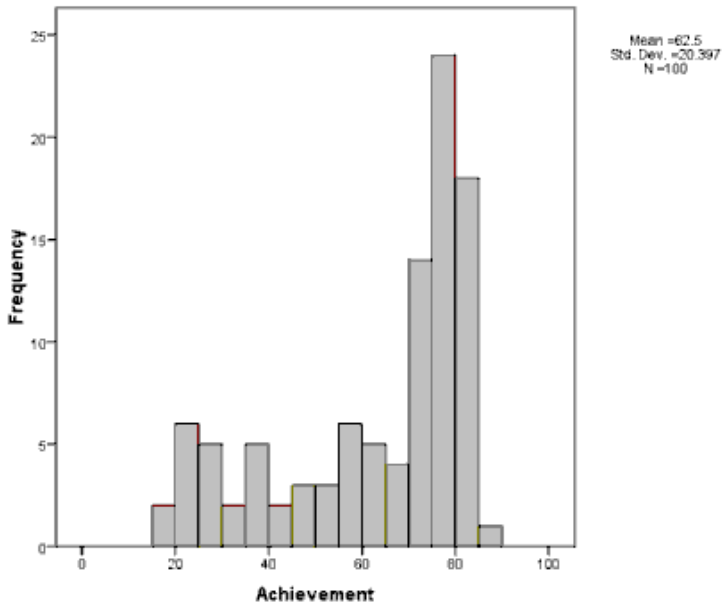
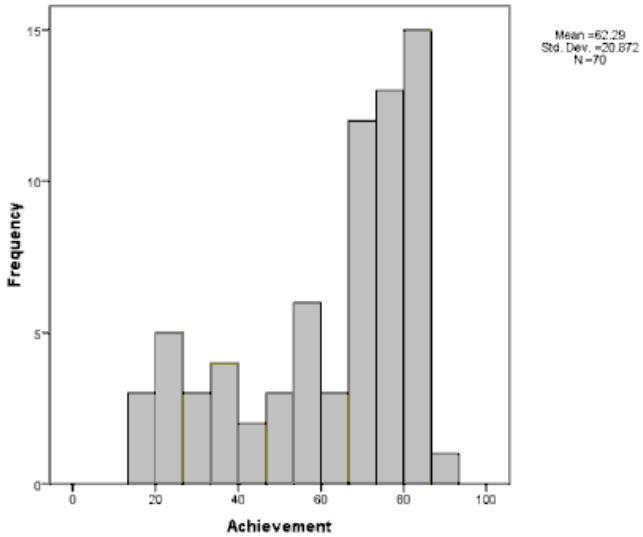


Figure 2: Histogram of teachers' professional development



Similarly, for justification of the regression, the correlation between professional development score and achievement score was calculated. The correlation for the student was 0.314 having a p-value of 0.001 and for teachers was 0.343 having a p-value of 0.004. The results are given below in table 3 and table 4.

Table 3: ***Correlations between Scores of students***

		Score	Achievement
Score	Pearson Correlation	1	.314**
	Sig. (2-tailed)		.001
	N	100	100
Achievement	Pearson Correlation	.314**	1
	Sig. (2-tailed)	.001	
	N	100	100

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

Table 4: ***Correlations between Scores of Teachers***

		Score	Achievement
Score	Pearson Correlation	1	.343**
	Sig. (2-tailed)		.004
	N	70	70
Achievement	Pearson Correlation	.343**	1
	Sig. (2-tailed)	.004	
	N	70	70

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

Both correlations are significant and positive. The correlation results suggested the use of regression analysis. The linear regression was used to check the impact of professional development on student achievement. The regression results are shown in Table 5 and Table 6.

Table 5: *Regression Coefficients of Students Achievement Scores*

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-16.824	24.329		-.692	.491
	Student Feedback	1.519	.464	.314	3.271	.001

a. Dependent Variable: Achievement Score

Table 5 shows the beta weights of student achievement scores (B = .314, sig = .001) which were shown to significantly impact the outcome variable student achievement. This showed the positive relationship of the student feedback to the outcome variable student achievement.

Examination of the regression coefficient reveals that professional development has a statistically significant impact on student achievement (B = .314, t = 3.271, sig = .001). This result supports the view that the professional development of teachers leads to effective teaching which results in increased student achievement (Darling-Hammond & McLaughlin, 2011; Supovitz & Turner, 2000; Sparks & Hirsh, 2000).

Table 6: *Regression Coefficients of Teachers' PD Scores*

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-39.873	34.004		-1.173	.245
	Teachers' Feedback	1.791	.595	.343	3.012	.004

a. Dependent Variable: Achievement Score

Table 6 shows the beta weights of student achievement scores (B = .343, sig = .004) which was shown to significantly impact the outcome variable student achievement. This showed the positive relationship of the student feedback to the outcome variable student achievement.

Examination of the regression coefficient reveals that professional development has a statistically significant impact on student achievement (B = .343, t = 3.012, sig = .004).

Table 7 *ANOVA of Regression Analysis of Inputs and Outputs*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4054.270	1	4054.270	10.699	.001[a]
	Residual	37134.730	98	378.926		
	Total	41189.000	99			

a. Dependent Variable: Student Achievement
b. Predictors: (Constant), Student Feedback Score

The F-statistics for the regression ANOVA for the student is 10.699 and significant at 0.01 as the P-value is 0.001.

Table 8 *ANOVA of Regression Analysis of Inputs and Outputs*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3537.302	1	3537.302	9.070	.004[a]
	Residual	26520.984	68	390.014		
	Total	30058.286	69			

a. Dependent Variable: Student Achievement
b. Predictors: (Constant), Student Feedback Score

Similarly, the F-statistics for the regression ANOVA of the teachers is 9.070 and also significant at 0.01 as the P-value is 0.004.

Recommendations and Conclusion:

Education is the driving force of individual and national growth. Teachers are considered to be the key participants in regulating or shaping the quality of education; only critical improvements around the country can be facilitated through improved education standards. Pakistan is a country which trying to improve its nation through reforms in the education system. Teachers are the drivers of developmental wisdom that can be used to achieve complete growth. Professional development should also be better planned to engage teachers in innovative ideas, novel curricula, and alternative teaching strategies. Professional development may also be properly constructed to introduce teachers to new ideas, a new curriculum, and various instructional techniques. To ensure the efficacy of teacher in-service professional development activities, planners need to create the various contents of teacher professional development activities relating to their subject areas for teachers involved in PD programs. It is important to seek daily input from teachers to recognize their specific areas of need that can be addressed to encourage better teaching skills in schools. Teacher evaluation should be performed based on subjects, grades of learners, school places, expectations of teachers, and preparation for new information. Full outcomes and debate indicate that the teachers' professional development has a positive effect on the students' achievement.

This investigation suggests that every teacher ought to be allowed to participate in various professional development courses consistently in a year to redesign their abilities. Although the present study focuses only on students' academic achievements, further researches should be done to report effect approximations of results such as teachers' retention, teachers' attitudes, and students' satisfaction.

References

Akiba, M., Chiu, Y.-L., Shimizu, K., & Liang, G. (2012). Teacher salary and national achievement: A cross-national analysis of 30 countries. International Journal of Educational Research, 53, 171-181. http://dx.doi.org/10.1016/j.ijer.2012.03.007

Akiba, M., LeTendre, G. K., & Scribner, J. P. (2007). Teacher quality, opportunity gap, and national achievement in 46 countries. Educational Researcher, 36(7), 369-387. http://dx.doi.org/ 10.3102/0013189X07308739

Akiba, M., & Liang, G. (2014). Teacher qualification and the achievement gap: A cross-national analysis of 50 countries. In J. V. Clark (Ed.), closing the achievement gap from an international perspective: Transforming STEM for effective education. New York, NY: Springer. http://dx.doi.org/10.1007/978-94-007-43571_3

Akiba, M., & Liang, G. (2013). Effects of teacher professional learning activities on student achievement growth. Paper presented at the Association for Education Finance and Policy Annual Conference.

Akiba, M., & LeTendre, G. K. (2009). Improving teacher quality: The U.S. teaching force in a global context. New York: Teachers College Press.

Akiba, M., Wang, Z., & Liang, G. (2015). Organizational resources for professional development: A statewide longitudinal survey of middle school mathematics teachers. Journal of School Leadership, 25(2), 252-285.

Aly, J.H. **(**2007**)** Education in Pakistan: A White Paper **(**revised**)**. Available at http://planipolis.iiep. unesco. org/upload/Pakistan/Pakistan%20National%20Education% 20Policy%20Review%20 WhitePaper.pdf, accessed August 13, 2018

Ahmad, A. (2017). Role of teacher in student's personality development. *Psychology and Behavioral Science International Journal*, *2*(2), 1-2.

Birman, B. F., Floch, K. C. L., Klekotka, A., Ludwig, M., Taylor, J., & Walters, K., et al. (2007). State and local implementation of the No Child Left behind Act volume II—Teacher quality under NCLB: Interim report. Washington, DC: U.S. Department of Education.

Blazar, D. (2015). Effective teaching in elementary mathematics: Identifying classroom practices that support student achievement. *Economics of Education Review, 48*, 16-29.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain.

Educational Researcher, 33(8), 3-15. Doi: 10.3102/0013189X033008003

Carpenter, T. P., Fennema, E., Peterson, P. L., Chiang, C.-P., & Loef, M. (1989). Using knowledge of children's mathematics thinking in classroom teaching: An experimental study. American Educational Research Journal, 26(4), 499-531.

Cohen, D. K., & Hill, H. C. (2001). Learning policy: When state education reform works. New Haven, CT: Yale University Press.

Darling-Hammond, L., 2000. Teacher Quality and Student Achievement: A review of State Policy 2000. Education Policy Analysis, 8, 1.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad. Dallas, TX: National Staff Development Council.

Darling-Hammond, L., & McLaughlin, M. W. (2011). Kappan Classic: Policies that support professional development in an era of reform. Phi Delta Kappan, 92(6), 81-92.

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Education Researcher, 38*(3), 181-199. Doi: 10.3102/0013189X08331140.

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. Educational Evaluation and Policy Analysis, 24(2), 81-112. http://dx.doi.org/ 10.3102/0162373702400208 1

Desimone, L. M., Smith, T., Baker, D., & Ueno, K. (2005). Assessing barriers to the reform of U.S. mathematics instruction from an international perspective. American Educational Research Journal, 42(3), 501-535. http://dx.doi.org/10.3102/0002831204200350 1

Education Week. (2013). Quality Counts 2013. Bethesda, MD: Editorial Projects in Education.

Guskey, T. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice, 8*(3/4), 381-391. Doi: 10.1080/13540600210000051 2

Hirsh, S., & Killion, J. (2009). When educators learn, students learn Eight principles of professional learning. *Phi Delta Kappan*, *90*(7), 464-469.

Ingvarson, L., Meiers, M., & Beavis, A. (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes & efficacy. Education Policy Analysis Archives, 13(10). Retrieved May 24, 2012, from http://epaa.asu.edu/epaa/v13n10/

Kallestad, J. H., & Olweus, D. (1998). Teachers' emphases on general educational goals: A study of Norwegian teachers. Scandinavian Journal of Educational Research, 42(3), 257279. http://dx.doi.org/10.1080/0031383980420302

Kettle, B., & Sellars, N. (1996). The development of student teachers' practical theory of teaching. Teaching and Teacher Education, 12(1), 1-24. http://dx.doi.org/10.1016/0742051X(95)00016-D

Lawless, K. & Pellegrino, J. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614.

Loucks-Horsley, S., Hewson, P.W, Love, N. & Stiles, K. (1998). Designing professional development for teachers of science and mathematics. Thousand Oaks, CA: Corwin.

National Research Council. 2004. Fairness and Effectiveness in Policing: The Evidence. Washington, DC: The National Academies Press.

OECD. (2005). Attracting, developing, and retaining effective teachers. Paris: Author. http://dx.doi.org/10.1787/9789264018044-en

Pong, S.-L., & Pallas, A. (2001). Class size and eighth-grade math achievement in the United States and abroad. Educational Evaluation and Policy Analysis, 23(3), 251-273. http://dx.doi.org/10.3102/0162373702300325 1

Power, T., & Thomas, R. (2007). The classroom in your pocket? Curriculum Journal, 18(3), 373388. http://dx.doi.org/10.1080/0958517070159003 1

Slotnik, W. J., & Smith, M. D. (2008). Focus on literacy: Professional development audit. Boston, MA: Community Training and Assistance Center.

Saxe, G. B., Gearhart, M., & Nasir, N. S. (2001). Enhancing students' understanding of mathematics: A study of three contrasting approaches to professional support. Journal of Mathematics Teacher Education, 4(1), 55-79. http://dx.doi.org/10.1023/A:1009935100676

Smith, T. M., Desimone, L. M., Zeidner, T. L., Dunn, A. C., Bhatt, M., & Rumyantseva, N. L. (2007). Inquiry-oriented instruction in science: Who teaches that way? Educational Evaluation and Policy Analysis, 29(3), 169-199. http://dx.doi.org/10.3102/0162373707306025

Sparks, D., & Hirsh, S. (2000). Strengthening professional development. Education Week, 19(37), 42

Supovitz, J. A., & Turner, H. M. (2000). The effects of professional development on science teaching practices and classroom culture. Journal of Research in Science Teaching, 37(9), 963-980.

Telese, J. A. (2008). Teacher professional development in mathematics and student achievement: A NAEP 2005 analysis. Paper presented at the Annual Meeting of the School Science and Mathematics Association.

Templeton, N. & Tremont, J.W. (2014). Applying business lessons to education: Mentoring as job-embedded professional development. *International Journal of Organizational Innovation, 6*(4).

Warwick, D. P., & Reimers, F. (1995). Hope or despair? Learning in Pakistan's primary schools. Westport, CT: Praeger.

Wood, E., & Bennett, N. (2000). Changing theories, changing practice: Exploring early childhood teachers' professional learning. Teaching and Teacher Education, 16(5), 635-647.

Wiley, D. E., & Yoon, B. (1995). Teacher reports on the opportunity to learn: Analyses of the 1993 California learning assessment system. Educational Evaluation and Policy Analysis, 17(3), 355-370.

Wenglinsky, H. (2002). How schools matter: The link between teacher classroom practices and student academic performance. Education Policy Analysis Archives, 10(2).

Woessmann, L. (2011). Cross-country evidence on teacher performance pay. Economics of Education Review, 30, 404-418. http://dx.doi.org/10.1016/j.econedurev.2010.12.008

Yoon, K. S., Duncan, T., Lee, S. W.-Y., Scarloss, B., & Shapley, K. L. (2007). Reviewing the evidence on how teacher professional development affects student achievement. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.