



## Teacher Professional Development: Effective Strategies And Evaluation Methods

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### ABSTRACT

Teacher professional development (TPD) is crucial for enhancing the quality of education and fostering effective teaching practices. This review paper aims to explore effective strategies and evaluation methods for TPD, providing a comprehensive understanding of the current landscape. The research synthesizes findings from various studies and reports to identify key elements that contribute to successful professional development programs.

Effective TPD strategies include collaborative learning communities, where teachers engage in peer-to-peer learning and share best practices, and ongoing, jobembedded training that is directly relevant to their classroom experiences. Additionally, integrating technology in TPD, such as through online courses and virtual workshops, has shown to increase accessibility and engagement. Personalized professional development plans, which cater to the individual needs and career goals of teachers, are also highlighted as a significant factor in promoting teacher growth and retention.

The evaluation of TPD programs is equally critical to ensure their effectiveness and sustainability. This paper reviews various evaluation methods, including formative assessments, feedback surveys, and longitudinal studies, which track teacher performance and student outcomes over time. The importance of using a mixedmethods approach to gather both quantitative and qualitative data is emphasized, as it provides a more holistic view of the impact of TPD.

Ethical considerations in TPD research are discussed, with a focus on ensuring confidentiality, informed consent, and the respectful treatment of participants. The review concludes by offering recommendations for policymakers and educational leaders on how to design, implement, and evaluate TPD programs that not only improve teaching practices but also enhance student learning outcomes. Through this comprehensive review, the paper aims to contribute to the ongoing dialogue on effective teacher professional development and its pivotal role in educational improvement.

**Keywords:** Teacher Professional Development (TPD), Effective Strategies, Evaluation Methods, Collaborative Learning Communities, Job-Embedded Training, Technology Integration, Personalized Professional Development Plans, Formative Assessments, Educational Improvement.

### Introduction

Teacher professional development (TPD) is a cornerstone of educational improvement, ensuring that educators are equipped with the latest knowledge, skills, and methodologies to effectively facilitate student learning. In the rapidly evolving educational landscape, continuous professional growth is crucial for teachers

to adapt to new pedagogical trends, integrate technological advancements, and meet diverse student needs. Effective TPD not only enhances teachers' instructional capabilities but also contributes to their professional satisfaction and retention.

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Over the past few decades, the focus on TPD has intensified, driven by the recognition that teacher quality is one of the most significant factors influencing student achievement. Various strategies have been developed to foster professional growth, ranging from traditional workshops and seminars to more innovative approaches such as peer collaboration, coaching, and online learning communities. Evaluating the effectiveness of these strategies is essential to ensure that TPD programs are meeting their intended goals and providing meaningful benefits to educators.

This review paper aims to explore the most effective strategies for TPD and examine the methods used to evaluate their impact. By synthesizing findings from a wide range of studies, the paper seeks to provide a comprehensive understanding of what constitutes successful professional development for teachers. Key questions addressed include: What are the characteristics of effective TPD programs? How can the impact of TPD be measured? And what role do different stakeholders play in supporting and sustaining teacher development?

Through this analysis, the paper will offer insights into best practices and propose recommendations for designing and implementing TPD initiatives that foster continuous improvement and enhance educational outcomes.

### **Background of the study**

Teacher professional development (TPD) is an essential component of educational reform and improvement worldwide. As the demands on education systems continue to evolve in response to technological advancements, societal changes, and policy shifts, the need for ongoing teacher development becomes increasingly critical. Effective TPD aims to enhance teachers' knowledge, skills, and practices, ultimately leading to improved student outcomes.

Historically, professional development for teachers has taken many forms, from traditional workshops and seminars to more modern approaches such as collaborative learning communities and online courses. Despite the variety of methods available, the challenge lies in identifying and implementing the most effective strategies that can be tailored to different educational contexts and individual teacher needs.

The significance of TPD is underscored by research highlighting the direct correlation between teacher quality and student achievement. Effective professional development not only enriches teachers' instructional practices but also fosters a culture of continuous improvement within schools. This ongoing professional growth is vital for adapting to new curricula, integrating innovative teaching methods, and addressing diverse student needs.

In recent years, the emphasis has shifted towards more sustainable and impactful professional development models. These models often include features such as active learning, collaboration, and sustained duration, which are believed to contribute more effectively to lasting changes in teaching practices. Evaluation methods for TPD have also evolved, with a greater focus on measuring the impact on both teacher performance and student learning outcomes.

Despite the growing body of research on TPD, gaps remain in understanding the most effective strategies and evaluation methods across different educational settings. This review aims to synthesize current knowledge on effective TPD strategies and evaluation methods, providing a comprehensive overview of what works, for whom, and under what conditions. By doing so, it seeks to inform policymakers, educators, and stakeholders in their efforts to design and implement professional development programs that are both effective and sustainable.

### **Justification**

Teacher professional development is a critical component in the education system, significantly influencing the quality of teaching and, consequently, student outcomes. In an era where educational demands and technological advancements are rapidly evolving, it is essential to continuously enhance the skills and knowledge of educators. This review paper, titled "Teacher Professional Development: Effective Strategies and Evaluation Methods," aims to synthesize and evaluate the most effective professional development strategies and their evaluation methods.

One primary justification for this review is the persistent need for teachers to adapt to new pedagogical practices, integrate technology effectively in the classroom, and address diverse student needs. Professional development programs that are well-designed and effectively implemented can lead to improved teaching practices, which are directly correlated with better student performance. By identifying and disseminating successful strategies and evaluation methods, this review aims to provide educators, administrators, and

policymakers with evidence-based insights that can enhance the design and implementation of professional development programs.

Moreover, there is a substantial body of research indicating that traditional professional development approaches, such as one-time workshops, often fail to produce sustained changes in teaching practices. This underscores the need for a detailed examination of alternative, more effective approaches such as ongoing, collaborative, and job-embedded professional development. This review will explore these innovative strategies, providing a critical analysis of their impact on teaching efficacy and student achievement.

The evaluation of professional development programs is another crucial aspect that this review addresses. Effective evaluation methods are essential to determine the impact of professional development initiatives and to ensure that they meet the desired educational outcomes. This review will assess various evaluation frameworks and tools, offering a comprehensive understanding of how to measure the success of professional development efforts accurately.

This paper is justified by the ongoing need to improve teacher professional development practices to enhance teaching quality and student outcomes. By providing a thorough analysis of effective strategies and evaluation methods, this paper aims to contribute to the field of education by offering practical recommendations for designing and evaluating professional development programs that foster continuous teacher growth and improvement.

### **Objectives of the Study**

1. To identify and analyze various strategies that have proven effective in enhancing teacher professional development.
2. To assess the impact of various professional development programs on teaching practices and student outcomes.
3. To analyze the importance of continuous professional development in maintaining and enhancing teacher competencies over time.
4. To identify common barriers that impede the effectiveness of professional development programs.
5. To recommend robust methods for evaluating the effectiveness of professional development programs.

### **Literature Review**

Teacher professional development (PD) plays a pivotal role in enhancing teaching effectiveness and student learning outcomes (Darling-Hammond et al., 2017). As education continues to evolve, educators must engage in continuous learning to keep pace with new pedagogical approaches, technological advancements, and changing student needs (Guskey & Yoon, 2009). In this review, we explore effective strategies and evaluation methods for teacher PD to provide insights into improving professional growth opportunities for educators.

### **Effective Strategies for Teacher Professional Development:**

**1. Collaborative Communities of Practice (CoPs):** CoPs foster a supportive environment for teachers to engage in peer learning and collaboration (Wenger, 1998). By sharing experiences, resources, and expertise within a community, teachers can develop a deeper understanding of effective instructional practices (Borko, 2004).

**2. Job-Embedded Professional Development:** Job-embedded PD integrates learning opportunities directly into teachers' daily practice, allowing them to apply new strategies in real-world contexts (Hirsh & Hord, 2010). This approach promotes sustained growth by addressing teachers' immediate instructional needs (Desimone, 2009).

**3. Differentiated Professional Development:** Recognizing that teachers have diverse learning preferences and needs, differentiated PD provides personalized learning experiences tailored to individual interests and expertise (Tomlinson, 2001). This approach enhances teacher engagement and efficacy by addressing specific professional goals (Yoon et al., 2007).

**4. Use of Technology for PD:** Leveraging technology tools and platforms can extend PD opportunities beyond traditional face-to-face workshops, enabling anytime, anywhere learning (Niess, 2005). Online courses, webinars, and virtual communities offer flexible options for professional growth (Jacobsen & Lock, 2004).

### **Evaluation Methods for Teacher Professional Development:**

**1. Participant Feedback Surveys:** Surveys soliciting feedback from participants can assess the relevance, effectiveness, and satisfaction with PD activities (Guskey, 2002). Gathering input from teachers helps identify areas for improvement and informs future PD planning (Hattie & Timperley, 2007).

**2. Observations and Classroom Assessments:** Observations of teacher practice and student engagement provide valuable insights into the impact of PD on instructional practices and student learning outcomes (Wei et al., 2009). Classroom assessments can measure changes in teaching strategies and student performance over time (Penuel et al., 2007).

**3. Longitudinal Studies:** Longitudinal studies track changes in teacher knowledge, skills, and attitudes over an extended period, offering a comprehensive view of PD effectiveness (Bryk et al., 2010). By examining sustained changes in practice, researchers can assess the long-term impact of PD initiatives (Garet et al., 2001).

**4. Action Research:** Action research engages teachers as active participants in the evaluation process, empowering them to systematically reflect on and refine their practice (Sagor, 2000). This collaborative approach promotes continuous improvement and fosters a culture of inquiry within schools (McNiff & Whitehead, 2010).

Effective teacher PD requires a strategic blend of collaborative, job-embedded, differentiated, and technology-enhanced strategies, supported by robust evaluation methods such as participant feedback, observations, longitudinal studies, and action research. By employing these approaches, education stakeholders can cultivate a culture of continuous learning and professional growth, ultimately benefiting both educators and students alike.

## Material and Methodology Research

### Design:

This paper aims to systematically examine effective strategies and evaluation methods for teacher professional development. The research design follows a structured approach involving literature review, synthesis, and analysis of existing studies, reports, and articles. The review will be conducted using a systematic methodology to ensure comprehensiveness and reliability in identifying and evaluating various strategies and methods.

### Data Collection Methods:

1. **Literature Search:** A systematic search will be conducted across electronic databases such as PubMed, ERIC, PsycINFO, and Google Scholar using relevant keywords related to teacher professional development strategies and evaluation methods.
2. **Inclusion Criteria:** Studies published in peer-reviewed journals, reports from reputable organizations, and relevant books published within the last 10 years will be included. The focus will be on empirical studies, meta-analyses, systematic reviews, and theoretical papers that discuss effective strategies and evaluation methods for teacher professional development.
3. **Exclusion Criteria:** Studies that do not directly address teacher professional development strategies or evaluation methods, non-peer-reviewed sources, and those published in languages other than English will be excluded.
4. **Data Extraction:** Relevant data including study design, sample characteristics, intervention strategies, evaluation methods, and outcomes will be extracted from selected studies using a standardized data extraction form.
5. **Quality Assessment:** The methodological quality of included studies will be assessed using established criteria such as the Cochrane Collaboration's tool for assessing risk of bias in randomized trials or the Joanna Briggs Institute's critical appraisal checklist for systematic reviews and meta-analyses.

### Inclusion and Exclusion Criteria: Inclusion

Criteria:

- Studies published in peer-reviewed journals.
- Reports from reputable organizations.
- Books published within the last 10 years.
- Empirical studies, meta-analyses, systematic reviews, and theoretical papers.
- Studies focusing on teacher professional development strategies and evaluation methods.

### Exclusion Criteria:

- Studies not directly related to teacher professional development.
- Non-peer-reviewed sources.
- Studies published in languages other than English.

### Ethical Consideration:

Ethical considerations will be adhered to throughout the research process. This includes obtaining necessary permissions for data access and ensuring that proper citation and attribution are given to the original authors of the included studies. Confidentiality of data will be maintained, and any potential conflicts of interest will

be disclosed. Additionally, the review process will be conducted with integrity and transparency to uphold the standards of academic research.

## Results and Discussion

The research paper on "Teacher Professional Development: Effective Strategies and Evaluation Methods" unveils significant insights into the realm of teacher professional development (TPD). Through a comprehensive review of existing literature and empirical studies, several key findings emerge, shedding light on effective strategies and evaluation methods crucial for enhancing teacher competence and student learning outcomes.

- 1. Diverse Strategies Yield Positive Outcomes:** The study underscores the importance of employing diverse strategies in TPD programs. Findings suggest that a multifaceted approach, incorporating workshops, seminars, peer coaching, online courses, and collaborative learning communities, tends to yield more significant improvements in teacher practices and student achievement compared to singular, one-size-fits-all interventions.
- 2. Continuous Support and Collaboration are Vital:** Effective TPD initiatives emphasize continuous support and collaboration among educators. The research highlights the significance of ongoing mentorship, feedback mechanisms, and communities of practice in fostering reflective teaching practices and sustained professional growth among teachers.
- 3. Contextualized Learning Enhances Relevance:** Contextualizing professional development activities to align with teachers' specific needs, school contexts, and student demographics emerges as a crucial factor. Tailored interventions that address the unique challenges and instructional requirements of educators contribute to a more meaningful and impactful learning experience.
- 4. Integration of Technology Facilitates Learning:** The integration of technology-enhanced learning tools and platforms holds promise in enriching TPD endeavors. Findings suggest that leveraging digital resources, such as online modules, virtual simulations, and data analytics, can enhance accessibility, flexibility, and personalized learning experiences for teachers, thereby fostering innovation and instructional effectiveness.
- 5. Formative Evaluation Promotes Growth:** The study underscores the importance of formative evaluation mechanisms in TPD programs. Regular assessment and feedback loops enable educators to reflect on their practice, identify areas for improvement, and make informed adjustments to their instructional strategies, ultimately fostering continuous professional growth and enhanced student outcomes.
- 6. Sustainable Models Ensure Long-Term Impact:** Sustainable TPD models, characterized by institutional commitment, stakeholder involvement, and long-term planning, are essential for achieving lasting impact. Findings emphasize the need for systemic reforms and policy support to institutionalize effective professional development practices within educational frameworks, ensuring scalability, equity, and sustainability over time.

The findings of this review underscore the multifaceted nature of effective TPD strategies and evaluation methods. By emphasizing the importance of diversity, collaboration, contextualization, technology integration, formative evaluation, and sustainability, this study provides valuable insights for policymakers, educational leaders, and practitioners seeking to design and implement impactful professional development initiatives aimed at enhancing teacher quality and improving student learning outcomes.

## Limitations of the study

As with any research endeavor, the review paper on "Teacher Professional Development: Effective Strategies and Evaluation Methods" has its limitations. These constraints should be acknowledged to provide a balanced perspective on the findings and implications presented. The limitations of this study include:

- 1. Scope Limitations:** The review paper may not cover all possible strategies and evaluation methods for teacher professional development due to the vastness of the topic. The selection of studies and resources included in the review is based on predetermined criteria, which may result in the omission of relevant strategies or evaluation approaches.
- 2. Publication Bias:** There might be a bias towards studies that report positive outcomes of teacher professional development strategies and evaluation methods. Studies with negative or null results may be

underrepresented in the literature, leading to an incomplete understanding of the effectiveness of certain approaches.

**3. Generalization Challenges:** The effectiveness of teacher professional development strategies and evaluation methods can vary based on contextual factors such as the characteristics of teachers, students, schools, and educational systems. Therefore, the findings of this review may not be universally applicable and may require adaptation to specific contexts.

**4. Quality of Included Studies:** The review paper relies on the quality of studies included in the analysis. While efforts are made to include high-quality research, some studies may have methodological limitations or biases that could affect the validity of the conclusions drawn from them.

**5. Temporal Factors:** The review paper may not capture the most recent developments in teacher professional development strategies and evaluation methods. New approaches may have emerged since the completion of the review, which could influence the conclusions drawn from it.

**6. Language Bias:** The review may be limited by language restrictions, as only studies published in certain languages were included. This could result in the exclusion of relevant research published in languages other than those considered in the review.

**7. Publication Date Limitations:** Due to practical constraints, the review may have limitations regarding the publication dates of included studies. While efforts are made to include recent research, older studies that remain relevant to the topic may be overlooked.

**8. Lack of Longitudinal Data:** Many studies included in the review may be cross-sectional or short-term in nature, lacking long-term follow-up data on the sustained impact of teacher professional development strategies and evaluation methods over time.

Addressing these limitations in future research endeavors can enhance the robustness and applicability of findings related to teacher professional development strategies and evaluation methods.

### Future Scope

Teacher professional development plays a crucial role in enhancing educational outcomes and ensuring the continuous improvement of teaching practices. This review paper examines various effective strategies and evaluation methods employed in teacher professional development programs. While the current paper provides a comprehensive overview of existing practices, the future scope lies in exploring innovative approaches and advancements in this field to further enhance teacher effectiveness and student learning outcomes.

### Future Directions:

**1. Integration of Technology:** Embracing technological advancements can revolutionize teacher professional development. Future research could explore the integration of AI-driven platforms, virtual reality simulations, and data analytics to personalize professional development experiences. This could include adaptive learning systems that tailor training modules to individual teacher needs, immersive simulations for real-world practice, and data-driven insights to assess teacher performance and identify areas for improvement.

**2. Lifelong Learning and Continuous Professional Development:** The traditional model of professional development often focuses on discrete workshops or courses. However, the future lies in promoting a culture of lifelong learning and continuous professional development among teachers. Research could delve into innovative models such as micro-credentialing, online communities of practice, and jobembedded coaching to support ongoing growth and reflection among educators.

**3. Culturally Responsive Practices:** As education becomes increasingly diverse, there is a growing need for teacher professional development programs that promote culturally responsive practices. Future research could explore strategies for integrating culturally relevant content, fostering inclusive classrooms, and addressing implicit biases among educators. This could involve collaborative partnerships with communities, culturally responsive pedagogy training, and the development of culturally sensitive evaluation measures.

**4. Global Perspectives and Cross-Cultural Exchange:** With the globalization of education, there is an opportunity to enrich teacher professional development through cross-cultural exchange and

collaboration. Future studies could explore international partnerships, exchange programs, and virtual learning networks to facilitate the sharing of best practices across borders. This could involve exploring how different cultural contexts influence teaching practices, fostering intercultural competence among educators, and promoting global citizenship in the classroom.

**5. Evidence-Based Evaluation Methods:** While assessment is integral to professional development, there is a need for more robust and evidence-based evaluation methods. Future research could focus on refining evaluation frameworks, leveraging advanced statistical techniques, and incorporating multiple sources of data to measure the impact of professional development initiatives accurately. This could include longitudinal studies, randomized controlled trials, and mixed-methods approaches to provide comprehensive insights into the effectiveness of different strategies.

The future of teacher professional development lies in embracing technological innovation, promoting lifelong learning, fostering culturally responsive practices, facilitating global collaboration, and refining evaluation methods. By exploring these future directions, researchers can contribute to the continuous improvement of teacher effectiveness and ultimately enhance student learning outcomes in diverse educational contexts.

### Conclusion

This research paper has illuminated the critical importance of teacher professional development in enhancing educational outcomes. Through an examination of various strategies and evaluation methods, it is evident that effective professional development programs are multifaceted, dynamic, and tailored to the needs of educators and the educational context.

Key findings indicate that sustained professional development, characterized by ongoing support, collaboration, and reflective practice, yields the most significant impact on teacher efficacy and student achievement. Additionally, the incorporation of innovative pedagogical approaches, technology integration, and culturally responsive teaching practices emerges as essential components of effective professional development initiatives.

Furthermore, the evaluation of professional development programs is essential to gauge their effectiveness and inform future iterations. Robust evaluation methods, including qualitative and quantitative measures, should be employed to assess the impact on teacher knowledge, skills, and instructional practices, as well as student learning outcomes.

In moving forward, it is imperative for educational stakeholders to prioritize investment in high-quality, research-based professional development opportunities that empower teachers to continually grow and adapt to the evolving demands of the classroom. By fostering a culture of lifelong learning and professional growth, we can cultivate a cadre of highly effective educators equipped to meet the diverse needs of learners and drive positive educational change.

### References

1. Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3-15.
2. Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational researcher*, 33(8), 3-15.
3. Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. (2010). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.
4. Darling-Hammond, L., Hyster, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
5. Darling-Hammond, L., Hyster, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
6. Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational researcher*, 38(3), 181-199.
7. Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199.
8. Desimone, L. M., Smith, T. M., & Frisvold, D. E. (2005). How do comprehensive school reform models measure up to widely accepted standards of effectiveness? *Journal of Education for Students Placed at Risk*, 10(4), 401-430.
9. Fullan, M. (2007). *The new meaning of educational change* (4th ed.). Teachers College Press.
10. Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.
11. Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.

12. Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice*, 8(3), 381-391.
13. Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, 8(3), 381-391.
14. Guskey, T. R., & Yoon, K. S. (2009). What works in professional development? *Phi Delta Kappan*, 90(7), 495-500.
15. Guskey, T. R., & Yoon, K. S. (2009). What works in professional development? *Phi Delta Kappan*, 90(7), 495-500.
16. Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
17. Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81-112.
18. Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In *Teaching as the learning profession: Handbook of policy and practice* (pp. 127-150). Jossey-Bass.
19. Hirsh, S., & Hord, S. (2010). *Leading professional learning communities: Voices from research and practice*. Corwin Press.
20. Hirsh, S., & Hord, S. (2010). *Leading professional learning communities: Voices from research and practice*. Corwin Press.
21. Jacobsen, D. M., & Lock, J. V. (2004). The educational benefits of one-to-one computing for sustainability. *Journal of Educational Computing Research*, 30(4), 305-321.
22. Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd ed.). Association for Supervision and Curriculum Development.
23. Kennedy, M. M. (2016). How does professional development improve teaching? *Review of Educational Research*, 86(4), 945-980.
24. Lieberman, A., & Pointer Mace, D. H. (2010). Teacher learning: The key to educational reform. *Journal of Teacher Education*, 61(1-2), 46-56.
25. Little, J. W. (1993). Teachers' professional development in a climate of educational reform. *Educational evaluation and policy analysis*, 15(2), 129-151.
26. McNiff, J., & Whitehead, J. (2010). *You and your action research project*. Routledge.
27. Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education*, 21(5), 509-523.
28. Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal*, 44(4), 921-958.
29. Sagor, R. (2000). *Guiding school improvement with action research*. ASCD.
30. 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.
31. Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration*. Ministry of Education, New Zealand.
32. Tomlinson, C. A. (2001). *How to differentiate instruction in mixed-ability classrooms*. ASCD.
33. Wei, R. C., Darling-Hammond, L., 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*. National Staff Development Council.
34. Wei, R. C., Darling-Hammond, L., 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*. National Staff Development Council.
35. Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
36. Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of research in education*, 24(1), 173-209.
37. 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. *Issues & Answers Report, REL 2007No. 033*.