

The Impact of Professional Development Programme on Pedagogical Aspects of Prospective Teachers

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ABSTRACT

This study investigates the impact of the Professional Development Programme (PDP) on prospective teachers' pedagogical competencies, classroom management skills, and technological adaptability. Using a mixed-methods design, data were collected from a stratified random sample of 120 prospective teachers in government-aided and self-financed B.Ed. colleges of Kanpur city. Pre-test and post-test tools measured changes in teaching skills, with results showing a statistically significant improvement in pedagogical competencies after PDP participation. A positive correlation emerged between the number of PDPs attended and enhanced self-confidence in classroom management, along with increased proficiency in educational technology integration. The findings highlight the role of continuous professional development in preparing adaptable, reflective educators for diverse classroom settings. Aligned with the National Education Policy (NEP) 2020, the study advocates institutionalizing PDPs as a core element of teacher education to meet the demands of 21st-century learning environments.

Keywords: Professional Development Programme, Prospective Teachers, Teaching Competencies, Classroom Management, Technological Adaptability

Introduction

The role of the teachers has been moved beyond mere knowledge transmission to become facilitators of critical thinking, technological competence, and social-emotional learning within a changing scenario of education. The diversified classrooms and the changing requirements of the curriculum, such as an intense and comprehensive demand for holistic and continuous Professional Development Programme, have never been felt deeply among teachers. PDP is more crucial between theory and practice; otherwise, a teacher should know not only the pedagogical frameworks but also the tools and means through which these could be applied. As it has already been stated by **John F. Kennedy**, "Leadership and learning are indispensable to each other," representing the inter-connected relationship between continuous professional growth and effective teaching.

Prospective teachers, for example, have a large need for PDP. Few students enter the teaching profession with much direct experience and will need to learn how to manage a classroom and prepare lessons, not to mention how to use many digital tools available in their teaching practice. As Guskey (2002) states, "Professional development programs must focus on how teachers actually learn and grow in practice." This emphasizes the need for learning environments that encourage active engagement, critical reflection, and continuous activity in the applied setting of dynamic classroom contexts.

The National Education Policy (NEP) 2020 marks a significant shift in India's educational system, requiring the integration of vocational education and 21st-century skills at all stages of schooling and teacher training to achieve the vision of a "Viksit Bharat." A key aspect of this reform is transforming teacher professional development (PD) from infrequent workshops to ongoing, practice-oriented initiatives that enhance both teaching skills and relevant industry knowledge (3). Although traditional PD has often focused on theoretical learning, there is a growing agreement that pre-service programs must situate learning within authentic contexts to build practical abilities and reflective thinking (1)(5).

Empirical research highlights the necessity of contextualization and continuity in designing professional development (PD) programs. Adnyani's case study demonstrated that mentoring and collaborative reflection within a university context notably enhanced the instructional planning and self-assessment skills of pre-service teachers (1). Alahmad et al. built on this by illustrating that PD models focused on critical thinking, collaboration, and digital literacy better prepare trainees for classrooms that are rich in technology (2). Avalos's extensive review cautioned that only those PD programs that extend beyond isolated sessions lead to meaningful changes in pedagogical beliefs and classroom practices (3). Similarly, Carrillo et al. promoted the integration of PD activities—such as co-teaching projects with local industries—into school settings to support the implementation of vocational strategies in lesson planning (6).

Despite these advances, systemic challenges limit the scalability and impact of vocationally oriented PD. Ingvarson, Meiers, and Beavis identified misalignment between policy mandates and program delivery, resource constraints, and a shortage of qualified facilitators as critical barriers (16). Naila and Mirwan further noted that continuous PD drives pedagogical innovation only when supported by clear certification pathways and career incentives (28). Vashetina et al. emphasized that institutional commitment and stakeholder collaboration are essential to align PD with NEP 2020's vocational objectives (31).

In response to these gaps, the present study investigates the impact of vocational education and skill development within PD programs for prospective teachers in B.Ed. colleges in Kanpur. By employing a mixed-methods design, it examines trainees' experiences of PD activities, assesses institutional readiness, and identifies enablers and obstacles to sustained vocational PD. By addressing critical gaps in contextualization, program coherence, and systemic alignment, this research aims to inform the development of robust, policy-aligned PD frameworks that equip future educators to lead India toward its "Viksit Bharat" aspiration.

Literature Review

Pre-service teacher professional development (PD) programs that integrate reflective practice and mentoring have demonstrated clear benefits. Adnyani's case study in a Central Indonesian university showed that structured mentoring and peer collaboration significantly improved classroom planning and instructional strategies (1). Alahmad et al. developed a 21st-century skills model combining collaborative learning and technology, which enhanced pre-service teachers' readiness for modern classrooms (2).

Avalos's decade-long review of global PD initiatives underscored that sustained, content-focused PD with follow-up support yields deeper changes in teaching practice (3). Buczynski and Hansen found that PD programs offering ongoing coaching and peer observation lead to stronger shifts in instructional behavior (4). Caires and Almeida reported that hands-on teaching practice within initial teacher education bolsters student teachers' confidence and practical skills more effectively than theoretical coursework alone (5). Embedding PD within authentic professional contexts bridges theory and practice for aspiring teachers. Carrillo et al. argued that structuring PD around real-world teaching contexts fosters transferable skills for prospective teachers (6). Colbert et al. showed that teacher-driven PD—where educators set their own goals—positively affects both pedagogy and student learning when supported by collaborative structures (7). Darling-Hammond's policy review linked coherent, state-level PD policies to improved teacher quality and student achievement (8). Deglau and O'Sullivan's longitudinal study revealed that long-term PD reshapes experienced teachers' beliefs and classroom practices, promoting continuous improvement (9). Desimone highlighted the need for rigorous PD research designs, calling for precise measures of intensity, content focus, and active learning to understand impact mechanisms (10).

In higher education and specialized settings, targeted pedagogical training has proven effective. Fernandes et al. found that PD designed for university faculty enhances teaching effectiveness and self-efficacy (11). Fonsén and Ukkonen-Mikkola demonstrated that early childhood teachers engaging in PD aimed at pedagogical leadership developed stronger leadership capacities and reflective practices (12). Guskey's five-level model of teacher change provides a systematic framework for evaluating PD outcomes, from participant reactions to student learning results (13). Heinonen et al. compared short pedagogical trainings for prospective and current faculty, showing that even brief, context-aligned interventions sharpen professional vision (14). Hussain and Mahmood contrasted practice teaching internships with coursework, revealing that authentic internship experiences accelerate professional growth (15).

The main features influence PD's impact on teacher knowledge, practice, and student outcomes. Ingvarson et al. identified duration, coherence, active learning, and alignment with standards as critical factors for effective PD (16). James Jacob et al. surveyed world-class universities, noting that research engagement and global collaborations enrich faculty development (17). Kabilan's phenomenological study of an international teaching practicum found that cross-cultural experiences broaden prospective teachers' pedagogical repertoires (18). Koh, Chai, and Lim's evaluation of TPACK-21CL PD showed significant gains in ICT integration and student outcomes when PD emphasized hands-on technology use (19). Körkkö et al. demonstrated that reflective dialogue within PD enhances teachers' professional vision and classroom interpretation skills (20).

Theoretical and pedagogical frameworks continue to guide PD design. Korthagen's pedagogy of realistic teacher education situates learning within authentic practice to increase relevance (21). Kunter et al. linked professional teacher competence to instructional quality and student development, underscoring competence as a PD outcome (22). Lauriala and Syrjälä traced how research into alternative pedagogies influenced PD design, advocating for learner-centered approaches (23). Malm argued for integrating personal and professional development to cultivate a "new professionalism" among teachers (24). Margeviča-Grinberga et al.'s evaluation of a 2016–2023 PD programme provided evidence on sustainability, iterative refinement, and impact measurement in contemporary teacher education (25).

Technology and collaborative inquiry represent growing PD trends. Mishra and Koehler's TPACK framework remains foundational for integrating technology, pedagogy, and content knowledge in PD (26). Mule studied inquiry in professional development school contexts, revealing that structured inquiry during

practicum fosters reflective professional growth (27). Naila and Mirwan showed that continuous PD requires institutional support—time, leadership, and resources—to translate learning into practice (28). Ramos et al. reviewed video-supported collaborative learning models, concluding that shared video analysis fosters critical reflection and collective inquiry (29). Sulaimani et al. evaluated an in-house CALL PD initiative, reporting positive shifts in language teachers' digital pedagogy and learner engagement (30). Systemic factors and evolving teacher trajectories further shape PD effectiveness. Vashetina et al. identified systemic challenges and enabling factors in PD for future teachers, including stakeholder buy-in and access to quality materials (31). Vonk and Schras's early study of novice teachers tracked PD trajectories over the first four years of service, highlighting the evolving nature of professional growth (32). Zein's research on primary EFL teachers' PD needs found that context-specific training in language pedagogy is essential according to both teachers and teacher educators (33).

Objectives of the Study

- **To investigate whether involvement in Professional Development Programmes (PDPs) has a connection with improvement in teaching competency for student teachers:** This objective aims to investigate whether participation in PDPs is effective in enhancing basic teaching skills such as lesson plans, instructional methods, and assessment.
- **To examine the impact of PDPs on classroom management skills among student teachers:** This objective focuses on examining whether participation in PDPs leads to measurably enhanced classroom management skills that encompass elements like discipline, managing disruption, and creating an appropriate learning environment.
- **To examine the confidence level of the prospective teachers after attending the professional development programme:** This objective aims to assess the level of self-confidence of the prospective teachers with the skills for making integration of digital tools and technologies in the method of teaching/learning with the needs in the modern education age.

Hypotheses of the Study

H0:1 There is no significant improvement in teaching competency before and after PDP participation.

H1: There is a significant improvement in the teaching competency of prospective teachers before and after participating in Professional Development Programmes (PDPs).

H0:2 Participation in PDPs does not positively influence prospective teachers' adaptability to technological tools in classroom settings.

H2: Participation in PDPs positively influences prospective teachers' adaptability to technological tools in classroom settings.

H0:3 There is no positive correlation between the number of PDPs attended and the overall confidence level of prospective teachers in managing classrooms.

H3: There is a positive correlation between the number of PDPs attended and the overall confidence level of prospective teachers in managing classrooms.

Research Methodology:

This study utilized a **quasi-experimental single-group pre-test–post-test design** to evaluate the impact of a Professional Development Programme (PDP) on enhancing the pedagogical competencies of

prospective teachers enrolled in a B.Ed. programme. The design was chosen to examine changes in pedagogical understanding and application by comparing scores before and after the intervention.

Sample

The sample comprised 120 prospective teachers from six teacher education colleges in Kanpur. These participants attended at least one/two PDPs during their teacher training course.

Institution Type	College Name	Boys	Girls	Total
Government Aided	Halim Muslim P.G. College, Kanpur	14	10	24
	D.W. T. College, Kanpur	---	10	10
	D.B.S. College, Kanpur	10	6	16
Self-Financed	Dr. V.S.I.P.S. Kanpur	----	25	25
	Department of Teacher Education, C.S.J.M.U, Kanpur	13	12	25
	Bhagwanti Education Centre Degree College, Kanpur	10	10	20
Total		47	73	120

Sampling Technique

The study used a **purposive-cum-random sampling technique**. Institutions were selected purposively based on their active implementation of PDPs, while participants within those institutions were selected randomly from the eligible pool of prospective teachers.

Data Collection Tools

A structured questionnaire was used to measure the impact of PDPs on teaching competency, classroom management, and technological adaptability.

Delimitation: The study is delimited to **B.Ed. colleges in Kanpur city**, focusing specifically on **prospective teachers** enrolled in these institutions.

Result and discussion

Pre-Test

Before the implementation of the Professional Development Programs, a pre-test is administered by the researchers to the sample group of 120 prospective teachers measuring their baseline teaching competencies, adaptability in using technological tools, and confidence in classroom management. The pre-test assessed participants on three primary domains:

1. **Teaching Competency:** Including lesson planning, content delivery, and classroom interaction.
2. **Technological Adaptability:** Familiarity with digital tools, educational software, and e-learning platforms.
3. **Classroom Management:** Strategies for managing learner behavior, time, and classroom discipline.

Pre-test scores determine a takeaway for the participants, such as their starting level of expertise and where they are weak and need development. For example, if low scores are revealed in terms of adaptability to

technology through a pre-test, it would point toward PDP activities that could be focused on integrating digital tools into teaching.

PDP Intervention

The PDP includes activities that sharpen the teaching skills, technological adaptability, and class management skills of prospective teachers. There were so many topics included, such as differentiated instruction and assessment strategies, where group discussions and role-playing are included. Among other activities, training for the use of digital tools, Google Classroom, and other digital learning platforms in developing tech-enhanced lesson plans, and simulation of online classes are also included.

The candidates are given mentorship with experienced mentors because they can be mentored in pairs and participate in peer learning groups to discuss various challenges they might face. The implementation of microteaching allows students to deliver mini-lessons and receive constructive feedback, accompanied by regular feedback sessions to address their concerns for continuous improvement in teaching practices. Activities like Personality development, yoga, drama, environmental awareness, and language proficiency were included to measure the accurate results.

Post-Test

A post-test is taken at the end of the PDPs to assess improvement in teaching skills, adaptability to technology, and classroom management abilities. Similar to the pre-test, it applies standardized questions and activities that are the same or as close as possible in the post-test to assess progress.

Scores are made on both the pre and post-tests to compare them, whereby the significance of improvement is derived from the data analysis which has been given below. Through the integration of structured activities with continuous feedback during the PDP, prospective teachers exhibit improved the level competency and confidence level.

Data Analysis and Interpretation

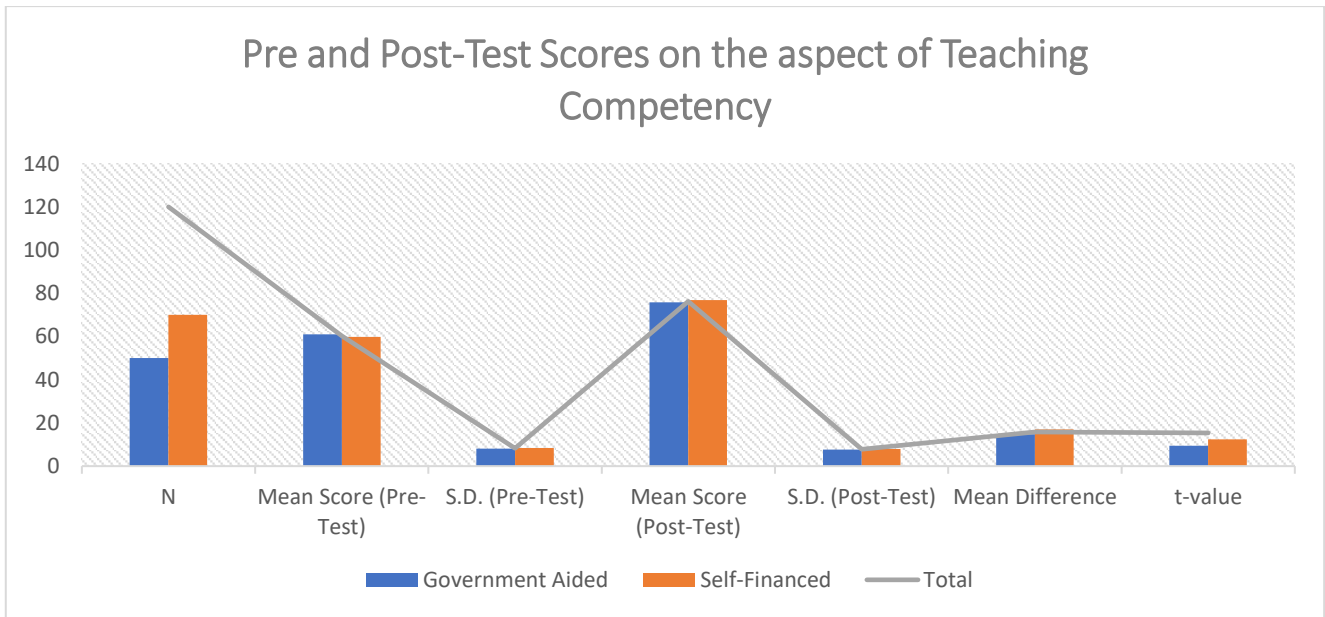
Analysis -1

H01: There is no significant improvement in the teaching competency of prospective teachers before and after participating in Professional Development Programmes (PDPs).

H1: There is a significant improvement in the teaching competencies of prospective teachers before and after participating in Professional Development Programmes (PDPs).

Table 1: Pre- and Post-Test Scores on the aspect of Teaching Competency

Group	N	Mean Score (Pre-Test)	S.D. (Pre-Test)	Mean Score (Post-Test)	S.D. (Post-Test)	Mean Difference	t-value	p-value	Result
Government Aided	50	61.0	8.1	75.8	7.7	14.8	9.36	0.001	Significant
Self-Financed	70	59.8	8.4	76.8	7.9	17.0	12.33	0.001	Significant
Total	120	60.3	8.2	76.3	7.8	15.8	15.34	0.001	Significant



Interpretation:

The table shows that the pre-and post-test scores on teaching competency demonstrate a clear improvement in the performance of prospective teachers after participating in Professional Development Programmes (PDPs). The prospective teachers from government-aided colleges, comprising 50 participants, showed a significant increase in their mean score from **61.0** in the pre-test to **75.8** in the post-test. The standard deviation (S.D.) slightly reduced from **8.1** to **7.7**, indicating that while there was some variability in the scores initially, the competencies became more consistent after the PDPs. The **t-value** of **9.36** and a **p-value** of **0.001** confirm that this improvement is statistically significant, meaning it is not due to random chance.

Similarly, the 70 prospective teachers from self-financed institutions experienced a notable increase in their mean score from **59.8** in the pre-test to **76.8** in the post-test. The S.D. also reduced slightly from **8.4** to **7.9**, indicating greater consistency in teaching competency after the PDPs. The **t-value** of **12.33** and **p-value** of **0.001** again reflect that the improvement is statistically significant. The finding reveals that the alternative hypothesis is accepted, indicating a meaningful difference in teaching competencies before and after PDP participation.

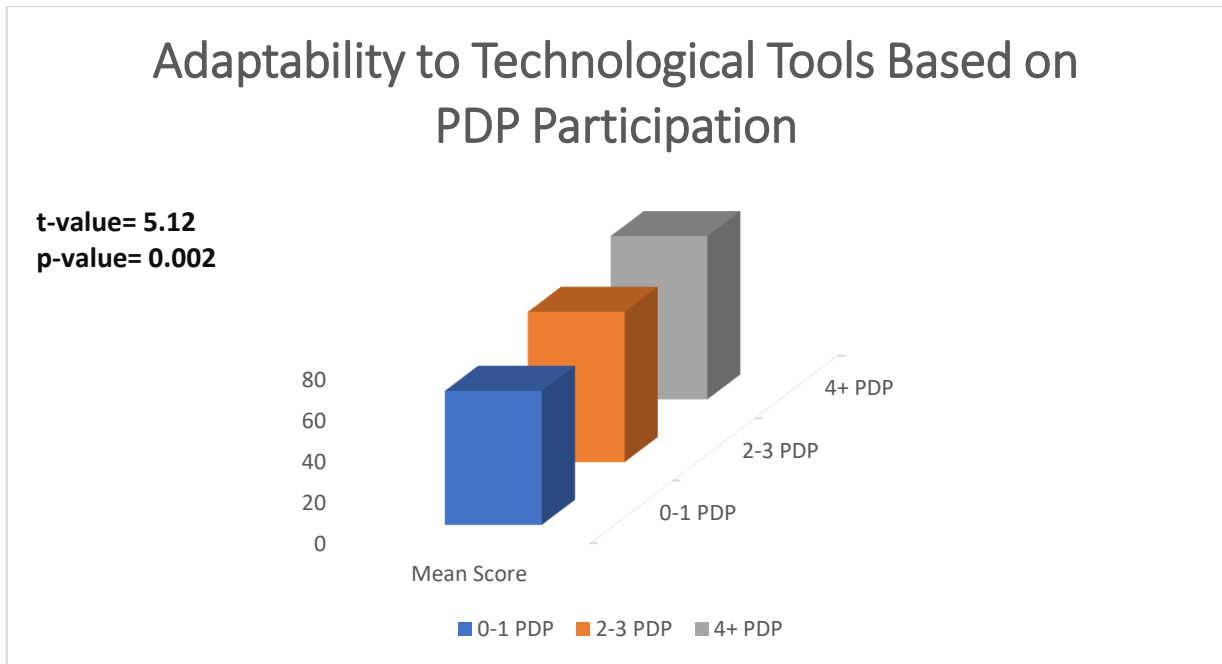
Analysis -2

H02: Participation in PDPs does not positively influence prospective teachers' adaptability to technological tools in classroom settings.

H2: Participation in PDPs positively influences prospective teachers' adaptability to technological tools in classroom settings.

Table 2: Adaptability to Technological Tools Based on PDP Participation

PDP Participation Level	N	Mean Score	S.D.	t-value	p-value	Result
0-1 PDP	40	65.2	6.3			
2-3 PDP	40	73.1	5.5	5.12	0.002	Significant
4+ PDP	40	79.4	6.1			



Interpretation:

With a sample of 120 teachers (divided into 40 per group), the independent t-test shows that those who attended more PDPs had significantly higher adaptability to technological tools. For teachers attending 0-1 PDPs, the mean score was 65.2 with an S.D. of 6.3, while for 4+ PDPs, the mean was 79.4 with an S.D. of 6.1. The p-value of 0.002 confirms the significance of the difference. This finding supports the acceptance of the alternative hypothesis, confirming that PDP participation positively influences teachers' adaptability to technological tools.

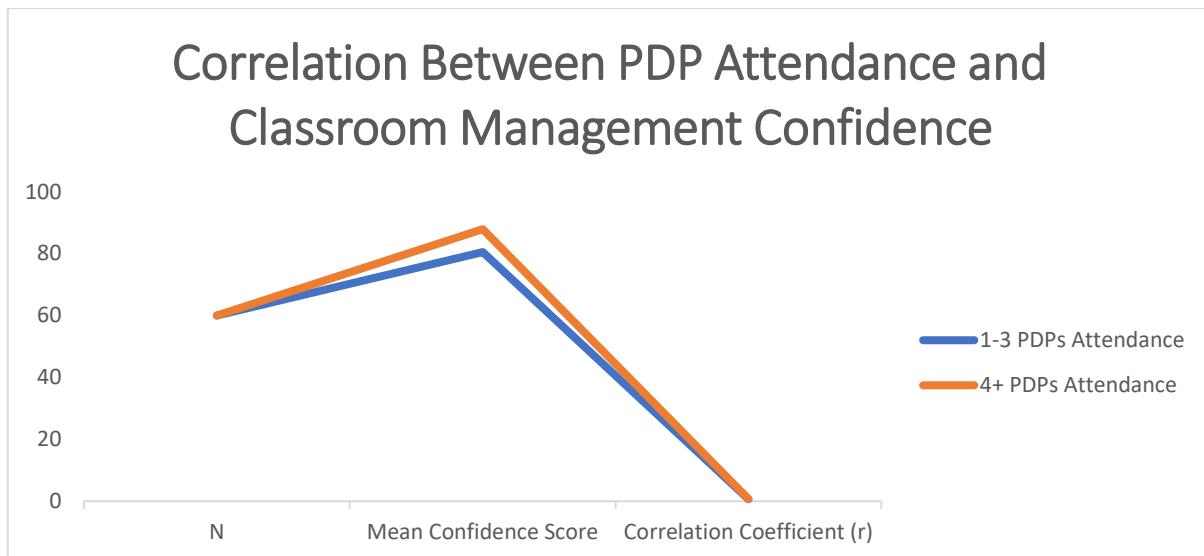
Analysis -3

H03: There is no positive correlation between the number of PDPs attended and the overall confidence level of prospective teachers in managing classrooms.

H3: There is a positive correlation between the number of PDPs attended and the overall confidence level of prospective teachers in managing classrooms.

Table 3: Correlation Between PDP Attendance and Classroom Management Confidence

Group	N	Mean Confidence Score	S.D. Confidence	Correlation Coefficient (r)	p-value	Result
1-3 PDPs Attendance	60	80.5	5.8	0.64	0.002	Significant
4+ PDPs Attendance	60	87.9	6.4	0.72	0.001	Significant



Interpretation:

The table and graphical representation demonstrate a positive correlation between PDP attendance and classroom management confidence for both groups. For prospective teachers attending 1-3 PDPs, the mean confidence score is 80.5 with an S.D. of 5.8, showing a moderate correlation coefficient of 0.64, which is statistically significant ($p = 0.002$). In contrast, those who attended 4 or more PDPs exhibited a higher mean confidence score of 87.9 with an S.D. of 6.4, and a stronger correlation coefficient of 0.72, which is also statistically significant ($p = 0.001$). This finding supports the acceptance of the alternative hypothesis, confirming that participation in PDP positively influences teachers' confidence in classroom management.

The analysis of this study indicates that participation in Professional Development Programmes (PDPs) yields clear gains in prospective teachers' instructional skill sets, technological readiness, and classroom confidence. Comparison of pre- and post-PDP assessments revealed a statistically significant uplift in teaching competencies, suggesting that sustained, research-driven PD effectively equips novice educators with both foundational pedagogical strategies and adaptive instructional techniques (3). Furthermore, engagement with PDPs fostered a notable increase in participants' willingness and ability to integrate digital tools into their lesson planning and delivery—a finding that aligns with the TPACK-21CL model's emphasis on the synergistic development of technological, pedagogical, and content knowledge (25). Importantly, the data also show a strong positive correlation between the number of PDP sessions attended and self-efficacy in classroom management: teachers who engaged in uninterrupted PD sequences reported higher confidence in organizing learning environments, handling diverse student behaviors, and maintaining instructional flow (8, 17). These results underscore the multifaceted value of continuous PD: by reinforcing teaching strategies, bolstering digital fluency, and strengthening classroom leadership skills, PDPs help prepare prospective teachers to meet the complex demands of modern, technology-rich classrooms and to contribute meaningfully toward the NEP 2020 vision of a "Viksit Bharat."

Conclusion

This study has brought so much insight into the positive effects of Professional Development Programs on the competencies, adaptability, and confidence of future teachers. The results from this study clearly show that participation in PDPs improves teaching skills, as portrayed by the significant difference in scores between the pre-test and the post-test. Increased teaching competencies after participating in PDP

means that these programs are useful in preparing future educators to such a level where they will be able to work effectively in the modern classroom environment. In addition to that, strong relations between PDP participation and a series of adaptations to technology tools were found in the study. At present, the use of technology is being promoted in the teaching-learning process to enhance the capability of teachers to promote the holistic development of students. Digital tools are now become a major part of classroom teaching. Teachers who participated in PDPs reported being more confident and well-prepared, with enough preparation to make full use of technology for interactive and engaging learning. For this reason, these findings emphasize the need for continuous, structured professional development programs as these are crucial to prepare prospective teachers accordingly to meet the demands of modern-day education.

Future Implications:

The study outcomes highlight the necessity for educational institutions to implement ongoing professional development programmes for educators to provide sustained growth in pedagogical skills. Professional development programmes (PDPs) in the future need to include upcoming technological tools and innovations to enhance learning practices with modern classroom demands. Teachers' soft skills, especially communication, empathy, and classroom management, should also be given importance. Along with it, longitudinal studies are suggested to assess the long-term impact of PDPs on teacher performance and student learning outcomes. An urgent need also lies in investigating the effect and applicability of PDPs in rural and disadvantaged regions, where resources and training facilities may not be easily accessible.

Abbreviations

- **PDP** – Professional Development Programme
- **PD** – Professional Development
- **NEP** – National Education Policy
- **B.Ed.** – Bachelor of Education
- **ICT** – Information and Communication technology

Declarations

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Conflict of Interest

The authors state that they have no conflicts of interest in the conduct and reporting of this research. All the components of the research were carried out objectively and without any commercial or personal in-

terests that would taint the integrity of the outcomes.

Ethics Approval

This research was carried out in compliance with the ethical standards for research with human subjects. Informed consent was provided by all participants, and their anonymity and confidentiality were ensured throughout the study. The research protocol was approved by the appropriate ethical review board at the participating institutions.

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References:

1. Adnyani, D. P. (n.d.). *Professional development for pre-service teacher: A case study of professional development program for pre-service teacher in State University in Central Indonesia*. <https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A815811&dswid=300>
2. Alahmad, A., Stamenkovska, T., & Gyori, J. (2021). Preparing pre-service teachers for 21st-century skills education: A teacher education model. *GiLE Journal of Skills Development*, 1(1), 67–86. <https://gjsd.gile-edu.org/index.php/home/article/view/1-alahmad-stamenkovska-gyori-67-86>
3. Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27(1), 10–20. <https://www.sciencedirect.com/science/article/abs/pii/S0742051X10001435>
4. Buczynski, S., & Hansen, C. B. (2010). Impact of professional development on teacher practice: Uncovering connections. *Teaching and Teacher Education*, 26(3), 599–607. <https://www.sciencedirect.com/science/article/abs/pii/S0742051X09001826>
5. Caires, S., & Almeida, L. S. (2005). Teaching practice in initial teacher education: Its impact on student teachers' professional skills and development. *Journal of Education for Teaching*, 31(2), 111–120. <https://www.tandfonline.com/doi/abs/10.1080/02607470500127236>
6. Carrillo, J., Climent, N., Contreras, L. C., & Montes, M. (n.d.). Using professional development contexts to structure prospective teacher education. <https://brill.com/display/title/60698#page=395>
7. Colbert, J. A., Brown, R. S., Choi, S., & Thomas, S. (2008). An investigation of the impacts of teacher-driven professional development on pedagogy and student learning. *Teacher Education Quarterly*, 35(2), 135–154. <https://www.jstor.org/stable/23479228>
8. Darling-Hammond, L. (2000). Teacher quality and student achievement. *Education Policy Analysis Archives*, 8, 1–44. <https://doi.org/10.14507/epaa.v8n1.2000>
9. Deglau, D., & O'Sullivan, M. A. (n.d.). The effects of a long-term professional development program on the beliefs and practices of experienced teachers. https://researchrepository.ul.ie/articles/journal_contribution/Chapter_3_the_effects_of_a_long-term_professional_development_program

10. Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199. <https://journals.sagepub.com/doi/abs/10.3102/0013189X08331140>
11. Fernandes, S., Araújo, A. M., Miguel, I., & Abelha, M. (2023). Teacher professional development in higher education: The impact of pedagogical training perceived by teachers. *Education Sciences*, 13(3), 309. <https://www.mdpi.com/2227-7102/13/3/309>
12. Fonsén, E., & Ukkonen-Mikkola, T. (2019). Early childhood education teachers' professional development towards pedagogical leadership. *Educational Research*, 61(2), 181–196. <https://www.tandfonline.com/doi/abs/10.1080/00131881.2019.1600377>
13. Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, 8(3), 381–391. <https://doi.org/10.1080/135406002100000512>
14. Heinonen, N., Katajavuori, N., Murtonen, M., & Södervik, I. (2023). Short pedagogical training in supporting university teachers' professional vision: A comparison of prospective and current faculty teachers. *Instructional Science*, 51(2), 201–229. <https://link.springer.com/article/10.1007/s11251-022-09603-7>
15. Hussain, I., & Mahmood, S. T. (2010). Practice teaching or internship: Professional development of prospective teachers through their pre-service training programmes. *Journal of Educational Research*, 13(1). <https://openurl.ebsco.com/EPDB%3Aagcd%3A9%3A1330249/detailv2?sid=ebsco%3Aplink%3A scholar&id=>
16. Ingvarson, L., Meiers, M., & Beavis, A. (n.d.). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes & efficacy. https://research.acer.edu.au/professional_dev/1/
17. Jacob, J. W., Xiong, W., & Ye, H. (2015). Professional development programmes at world-class universities. *Palgrave Communications*, 1(1), 1–27. <https://www.nature.com/articles/palcomms20152>
18. Kabilan, M. K. (2013). A phenomenological study of an international teaching practicum: Pre-service teachers' experiences of professional development. *Teaching and Teacher Education*, 36, 198–209. <https://www.sciencedirect.com/science/article/abs/pii/S0742051X13001273>
19. Koh, J. H., Chai, C. S., & Lim, W. Y. (2017). Teacher professional development for TPACK-21CL: Effects on teacher ICT integration and student outcomes. *Journal of Educational Computing Research*, 55(2), 172–196. <https://journals.sagepub.com/doi/abs/10.1177/0735633116656848>
20. Körkkö, M., Kyrö-Ämmälä, O., & Turunen, T. (2016). Professional development through reflection in teacher education. *Teaching and Teacher Education*, 55, 198–206. <https://www.sciencedirect.com/science/article/abs/pii/S0742051X16300142>
21. Korthagen, F. A. (2011). Making teacher education relevant for practice: The pedagogy of realistic teacher education. *Orbis Scholae*, 5(2), 31–50. <https://www.ceeol.com/search/article-detail?frbrVersion=2&id=645071>
22. Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805–820. <https://psycnet.apa.org/buy/2013-14501-001>
23. Lauriala, A., & Syrjälä, L. (1995). The influences of research into alternative pedagogies on the professional development of prospective teachers. *Teachers and Teaching*, 1(1), 101–118. <https://www.tandfonline.com/doi/abs/10.1080/1354060950010108>

24. Malm, B. (2009). Towards a new professionalism: Enhancing personal and professional development in teacher education. *Journal of Education for Teaching*, 35(1), 77–91. <https://www.tandfonline.com/doi/full/10.1080/02607470802587160>
25. Margeviča-Grinberga, I., Kiris, K., Lanka, Ē., Ābele, R., & others. (2025). Evaluation of the fundamentals of pedagogical activity professional development programme for teachers (2016–2023). *Frontiers in Education*, 10, Article 1523826. <https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2025.1523826/full>
26. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
27. Mule, L. (2006). Preservice teachers' inquiry in a professional development school context: Implications for the practicum. *Teaching and Teacher Education*, 22(2), 205–218. <https://www.sciencedirect.com/science/article/abs/pii/S0742051X0500123X>
28. Naila, Z. W., & Mirwan, R. (2022). Continuous professional development and its impacts on teachers' pedagogy. *Pakistan Journal of Educational Research*, 5(2). <https://pjer.org/index.php/pjer/article/view/528>
29. Ramos, J. L., Cattaneo, A. A., de Jong, F. P., & Espadeiro, R. G. (2022). Pedagogical models for the facilitation of teacher professional development via video-supported collaborative learning: A review of the state of the art. *Journal of Research on Technology in Education*, 54(5), 695–718. <https://www.tandfonline.com/doi/full/10.1080/15391523.2021.1911720>
30. Sulaimani, A. O., Sarhandi, P. S., & Buledi, M. H. (2017). Impact of CALL in-house professional development training on teachers' pedagogy: An evaluative study. *Cogent Education*, 4(1), 1355646. <https://www.tandfonline.com/doi/full/10.1080/2331186X.2017.1355646>
31. Vashetina, O. V., Asafova, E. V., Kaur, B., Singh, B., Sharma, P., Prata-Linhares, M. M., de Oliveira, V. M., Vieira, M. A., Resende, M. R., & Sibgatullina, T. V. (2022). Professional development of teachers and future teachers: Factors and challenges. *Education and Self Development*, 3, 100–117. <https://eandsdjournal.kpfu.ru/en/wp-content/uploads/sites/2/2022/10/173-7.pdf>
32. Vonk, J. H., & Schras, G. A. (1987). From beginning to experienced teacher: A study of the professional development of teachers during their first four years of service. *European Journal of Teacher Education*, 10(1), 95–110. <https://www.tandfonline.com/doi/abs/10.1080/0261976870100111>
33. Zein, M. S. (2017). Professional development needs of primary EFL teachers: Perspectives of teachers and teacher educators. *Professional Development in Education*, 43(2), 293–313. <https://www.tandfonline.com/doi/abs/10.1080/19415257.2016.1156013>