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Research Article

Relationship Between Professional Development and Effectiveness of Formative Assessment Techniques at University Level

Dr Fahd Naveed Kausar[1]*, Miss Majabeen Shafqat[2], Farah Deeba Chughtai[3]

[1]*Assistant Professor, School of Education, Minhaj University Lahore, Punjab, Pakistan, Email: fahdnaveed1@hotmail.com
[2]Department of Education, University of Kotli, Azad Jammu and Kashmir, Email: syedamajabeen512@gmail.com
[3]Lecturer, Institute of Education & Research, University of the Punjab Lahore, Pakistan

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ABSTRACT

Professional development significantly enhances the effectiveness of formative assessment techniques by equipping educators with the skills to design, implement, and interpret assessments that foster student learning. It enables teachers to provide actionable feedback and adapt instructional strategies to meet diverse learning needs. The objectives of the study was to find out the level of level of professional development and formative assessment techniques, and to analyze the relationship between professional development and formative assessment techniques at university level. The study's design is primarily descriptive. The research for this study was quantitative. Every public and private university in the Lahore district made up the population. The total number of universities are 39 in which 16 are public and 23 are privates (HEC, 2024). A researcher self-developed questionnaire was used as the study's tool. The validity of the questionnaire was found through experts' opinions and reliability through pilot testing. The Cronbach's Alpha value of PD was 0.888 and formative assessment techniques questionnaire value was 0.849. Version 27 of the Statistical Package for Social Science (SPSS) was employed. Descriptive statistics (mean, standard deviation), and inferential statistics (Pearson r) was used. The findings of the study was revealed that there was highly significant relationship between professional development and formative assessment techniques at university level.

Keywords: professional development, formative assessment techniques, university level.

Introduction

The relationship between professional development (PD) and the effectiveness of formative assessment techniques is widely acknowledged as critical to fostering high-quality teaching and learning. Formative assessment, which entails the continuous gathering of evidence about student learning to inform instruction, requires educators to have a nuanced understanding of assessment principles and their practical applications (Black & Wiliam, 1998; Wiliam, 2011). However, despite its centrality to effective pedagogy, many teachers lack sufficient training in assessment literacy, defined as the knowledge and skills needed to design, administer, and interpret assessments in ways that support learning (Stiggins, 2005). Professional development initiatives aimed at enhancing formative assessment practices address this gap, equipping teachers with the competencies required to integrate assessment into their instructional strategies effectively (Darling-Hammond et al., 2017). Research consistently demonstrates that teachers who participate in sustained and targeted PD are better able to employ diverse formative assessment techniques, leading to improved student outcomes such as enhanced engagement, critical thinking, and academic achievement (Hattie & Timperley, 2007; Wiliam & Thompson, 2007). Consequently, understanding the interplay between PD and formative assessment is crucial for advancing educational equity and excellence (Kausar, & Haroon, 2022).

Numerous studies have highlighted the transformative impact of PD on teachers' ability to use formative assessment effectively. For example, Black and Wiliam's (1998) seminal work emphasizes the potential of formative assessment to improve learning outcomes across diverse contexts, provided that teachers are

adequately trained. Similarly, Hattie and Timperley (2007) identify feedback as a central element of formative assessment, noting that its effectiveness depends on the teacher's capacity to diagnose learning needs and provide actionable recommendations. Professional development programs that focus on feedback strategies enable teachers to refine their practice, resulting in a more responsive and student-centered approach to instruction (Brookhart, 2008). Furthermore, PD initiatives that incorporate experiential learning, such as designing and piloting formative assessments, are particularly effective in helping teachers translate theoretical concepts into classroom applications (Garet et al., 2001). These hands-on experiences not only enhance teachers' technical skills but also build their confidence in using formative assessments as tools for fostering student learning (Kausar, Ghazala, & Jan, 2023).

The benefits of PD in formative assessment practices are further amplified when professional learning is situated within collaborative frameworks. Professional learning communities (PLCs), for instance, provide a structured environment for teachers to share insights, discuss challenges, and co-construct knowledge related to formative assessment (Vescio, Ross, & Adams, 2008). Research by Stiggins (2005) underscores the value of collaboration in developing a shared understanding of assessment criteria and goals, which enhances the reliability and consistency of formative assessments across classrooms. Moreover, PLCs encourage ongoing reflection and peer feedback, enabling teachers to identify areas for improvement and refine their practices over time (DuFour, 2004). Such collaborative approaches align with the principles of formative assessment, which emphasize iterative cycles of feedback and adaptation to support continuous learning (Wiliam, 2011). As a result, teachers who engage in collaborative PD are better positioned to create classroom environments that promote student agency and ownership of learning (Shepard, 2000).

Contextual factors also play a significant role in shaping the effectiveness of PD and its impact on formative assessment practices. For instance, supportive school leadership is critical for fostering a culture of professional growth and experimentation with new assessment strategies (Leithwood et al., 2004). Leaders who prioritize formative assessment as an integral part of teaching and learning are more likely to allocate resources for PD and provide teachers with the time and support needed to implement what they have learned (Bryk et al., 2010). Additionally, the integration of technology into PD programs offers new opportunities for enhancing formative assessment practices (Kausar, Irshad, Chughtai, & Saqib, 2024). Digital tools, such as online assessment platforms and data visualization systems, enable teachers to collect and analyze student performance data more efficiently, facilitating real-time feedback and personalized instruction (Heritage, 2010). PD initiatives that incorporate training on these technologies not only enhance teachers' technical proficiency but also expand their repertoire of formative assessment strategies, bridging the gap between traditional methods and innovative approaches (Pellegrino & Quellmalz, 2010).

Despite the significant potential of PD to enhance formative assessment practices, challenges remain in ensuring its accessibility, relevance, and sustainability. Teachers often face barriers such as limited time, insufficient resources, and competing professional demands, which hinder their participation in PD programs (Darling-Hammond et al., 2017). Moreover, traditional PD models, characterized by one-time workshops or generic training sessions, are frequently criticized for their limited impact on long-term teacher growth (Desimone, 2009). To address these challenges, researchers advocate for a systemic approach to PD, emphasizing alignment with instructional goals and integration within broader educational frameworks (Borko, 2004). Programs that provide sustained support, such as coaching and mentoring, have been shown to be particularly effective in helping teachers internalize new skills and apply them consistently in their classrooms (Knight, 2007). Additionally, PD initiatives that prioritize teachers' agency and involve them in the design and evaluation of training activities are more likely to yield meaningful and lasting outcomes (Darling-Hammond & Richardson, 2009).

The relationship between professional development and the effectiveness of formative assessment techniques underscores the importance of investing in teacher learning as a lever for improving student outcomes. Through targeted training, collaborative learning, and sustained support, PD enables teachers to develop the skills and knowledge needed to use formative assessments as tools for promoting deep and meaningful learning (Kausar, Haroon, Abid, & Tatlah, 2022). However, realizing the full potential of PD requires addressing contextual barriers and ensuring alignment with the specific needs of teachers and students. As educational systems continue to evolve, ongoing research and innovation in professional development and formative assessment practices will be essential for achieving equitable and impactful learning outcomes across diverse contexts. By equipping educators with the tools to integrate assessment seamlessly into instruction, PD has the power to transform teaching and learning at all levels.

Objectives

1- To find out the level of level of professional development and formative assessment techniques at university level.
2- To analyze the relationship between professional development and formative assessment techniques at university level.

Research gap

At the university level, the relationship between professional development (PD) and formative assessment techniques is vital for fostering effective teaching and enhanced student learning. University instructors, often experts in their fields but not always in pedagogy, benefit from PD programs that focus on the integration of formative assessments into their teaching practices. These programs provide educators with insights into assessing students' understanding throughout the learning process, rather than relying solely on summative assessments like exams or final projects. PD in this context equips faculty with the skills to design and implement formative assessment techniques, such as low-stakes quizzes, reflective journals, peer reviews, and interactive discussions (Kausar, Ghazala, & Haroon, 2022). These methods offer continuous feedback, allowing instructors to adjust their teaching in real time to address student needs. Additionally, PD fosters data literacy, enabling faculty to analyze formative assessment results to better support student progress and adapt instruction accordingly. At the university level, where students' learning needs are diverse, formative assessments help instructors identify gaps in understanding early and provide timely feedback. PD programs focused on these techniques enhance teaching effectiveness, encourage student engagement, and improve overall academic performance by aligning assessment with instructional goals and responsive pedagogy.

Methodology

The study's design is primarily descriptive. The research for this study was quantitative. Every public and private university in the Lahore district made up the population. The total number of universities are 39 in which 16 are public and 23 are privates (HEC, 2024). A sizable sample of educators and students should be included in the study. A multistage sampling procedure was used to collect the sample. Using a stratified sampling technique, the researcher first identified two strata (public and private). The researcher then used the cluster sampling technique to divide the entire population into three zones (clusters) based on where they were located. Using basic random sampling, two private and one public universities were chosen from each cluster. Using a basic random sampling technique, a sample of 200 professors was chosen. A researcher self-developed questionnaire was used as the study's tool. The validity of the questionnaire was found through experts' opinions and reliability through pilot testing. The Cronbach's Alpha value of PD was 0.888 and formative assessment techniques questionnaire value was 0.849. A five-point Likert scale was employed in the survey, ranging from strongly disagree to strongly agree. The current study used primary sources of data. Version 27 of the Statistical Package for Social Science (SPSS) was employed. Descriptive statistics (mean, standard deviation), and inferential statistics (Pearson r) was used.

Data analysis

Table 1: ***Sample description on the basis of mean and standard deviation***

Variables	Mean	S.D.
Professional development	3.7018	.64199
Formative assessment techniques	3.6265	.57859
• Understanding and Implementation of Formative Assessment	3.6300	.71867
• Use of Feedback from Formative Assessments	3.6860	.73765
• Impact on Teaching and Learning	3.5650	.71493
• Professional Development and Support	3.6250	.85981

The above illustrates the sample description on the basis of mean and standard deviation. According to the responses of the respondents, Professional development (M=3.70; SD=0.64), Formative assessment techniques (M=3.62; SD=0.57), Understanding and Implementation of Formative Assessment (M=3.63; SD=0.71), Use of Feedback from Formative Assessments (M=3.68; SD=0.73), Impact on Teaching and Learning (M=3.56; SD=0.71), and Professional Development and Support (M=3.62; SD=0.85). Overall, the response of the respondents reflected toward the level of agreement.

Professional development

Table 2: ***Professional development item wise analysis***

Items	Mean	S.D.
I feel confident teaching the grade level(s) I am currently assigned.	3.51	.546
I have sufficient experience in teaching to address the needs of my students effectively.	3.79	.596
My current level of education adequately prepares me for the challenges in my teaching role.	3.63	.483
I need more professional development in areas such as classroom management, differentiated instruction, or technology integration.	3.80	.526
I prefer receiving professional development through workshops, online courses, or peer collaboration.	3.87	.763

I have clear goals for the skills or knowledge I want to develop through professional development.	3.00	.913
I face barriers such as time constraints or lack of resources that prevent me from participating in professional development.	3.79	.595
I have participated in various forms of professional development in the past year.	3.92	.802
The professional development activities I have attended have been effective in improving my teaching practice.	3.77	.622
I regularly apply new knowledge or skills from professional development in my classroom.	3.87	.674

The above illustrates the professional development description on the basis of mean and standard deviation. According to the responses of the respondents, I feel confident teaching the grade level(s) I am currently assigned (M=3.51; SD=0.54), I have sufficient experience in teaching to address the needs of my students effectively (M=3.79; SD=0.59), my current level of education adequately prepares me for the challenges in my teaching role (M=3.63; SD=0.48), I need more professional development in areas such as classroom management, differentiated instruction, or technology integration (M=3.80; SD=0.52), I prefer receiving professional development through workshops, online courses, or peer collaboration (M=3.87; SD=0.76), I have clear goals for the skills or knowledge I want to develop through professional development (M=3.00; SD=0.91), I face barriers such as time constraints or lack of resources that prevent me from participating in professional development (M=3.79; SD=0.59), I have participated in various forms of professional development in the past year (M=3.92; SD=0.80), The professional development activities I have attended have been effective in improving my teaching practice (M=3.77; SD=0.62), I regularly apply new knowledge or skills from professional development in my classroom (M=3.87; SD=0.67). Overall, the response of the respondents reflected toward the level of agreement.

Understanding and Implementation of Formative Assessment

Table 3: ***Sample description on the basis of mean and standard deviation***

Items	Mean	S.D.
I regularly use formative assessments to monitor student learning progress.	3.70	1.124
I am confident in my ability to design effective formative assessments for my courses.	3.90	1.152
Formative assessments are a regular part of my instructional planning.	3.57	1.238
I use a variety of formative assessment techniques (e.g., quizzes, peer feedback, exit tickets) to assess student understanding.	3.24	1.361
I understand how to align formative assessment techniques with course learning objectives.	3.74	1.131

The above illustrates the Understanding and Implementation of Formative Assessment description on the basis of mean and standard deviation. According to the responses of the respondents, I regularly use formative assessments to monitor student learning progress (M=3.70; SD=1.12), I am confident in my ability to design effective formative assessments for my courses (M=3.90; SD=1.15), Formative assessments are a regular part of my instructional planning (M=3.57; SD=1.23), I use a variety of formative assessment techniques (e.g., quizzes, peer feedback, exit tickets) to assess student understanding (M=3.24; SD=1.36), I understand how to align formative assessment techniques with course learning objectives (M=3.74; SD=1.13). Overall, the response of the respondents reflected toward the level of agreement.

Use of Feedback from Formative Assessments

Table 4: ***Sample description on the basis of mean and standard deviation***

Items	Mean	S.D.
I provide students with timely and actionable feedback based on formative assessment results.	3.75	1.120
I use the results of formative assessments to adjust my teaching strategies.	3.61	1.138
I involve students in the feedback process by encouraging self-assessment or peer assessment.	3.73	1.051
Feedback from formative assessments helps me identify which students need additional support.	3.60	1.199
I use formative assessments to encourage students' active participation in their learning process.	3.76	1.158

The above illustrates the Use of Feedback from Formative Assessments description on the basis of mean and standard deviation. According to the responses of the respondents, I provide students with timely and actionable feedback based on formative assessment results (M=3.75; SD=1.12), I use the results of formative assessments to adjust my teaching strategies (M=3.61; SD=1.13), I involve students in the feedback process by encouraging self-assessment or peer assessment (M=3.73; SD=1.05), I involve students in the feedback process by encouraging self-assessment or peer assessment (M=3.60; SD=1.19), I use formative assessments to

encourage students' active participation in their learning process (M=3.76; SD=1.15). Overall, the response of the respondents reflected toward the level of agreement.

Impact on Teaching and Learning

Table 5: ***Sample description on the basis of mean and standard deviation***

Items	Mean	S.D.
Formative assessments help me identify gaps in student understanding early in the course.	3.82	1.080
I use formative assessment results to inform and modify future lesson plans.	3.38	1.226
Students in my course demonstrate improved learning outcomes as a result of regular formative assessments.	3.58	1.127
Formative assessments help me differentiate instruction based on individual student needs.	3.57	1.262
I feel that formative assessments contribute to a deeper understanding of course material among my students.	3.48	1.160

The above illustrates the Impact on Teaching and Learning description on the basis of mean and standard deviation. According to the responses of the respondents, Formative assessments help me identify gaps in student understanding early in the course (M=3.82; SD=1.08), I use formative assessment results to inform and modify future lesson plans (M=3.38; SD=1.22), Students in my course demonstrate improved learning outcomes as a result of regular formative assessments (M=3.58; SD=1.12), Formative assessments help me differentiate instruction based on individual student needs (M=3.57; SD=1.26), I feel that formative assessments contribute to a deeper understanding of course material among my students (M=3.48; SD=1.16). Overall, the response of the respondents reflected toward the level of agreement.

Professional Development and Support

Table 6: ***Sample description on the basis of mean and standard deviation***

Items	Mean	S.D.
I have participated in professional development programs that focus on formative assessment techniques.	3.51	1.268
I believe that professional development has improved my use of formative assessments in teaching.	3.61	1.202
I collaborate with colleagues to share and improve formative assessment practices.	3.76	1.082
My institution provides sufficient resources and support for implementing formative assessments.	3.73	1.111
I would benefit from additional training on how to effectively analyze and use formative assessment data.	3.51	1.268

The above illustrates the Professional Development and Support description on the basis of mean and standard deviation. According to the responses of the respondents, I have participated in professional development programs that focus on formative assessment techniques (M=3.51; SD=1.26), I believe that professional development has improved my use of formative assessments in teaching (M=3.61; SD=1.20), I collaborate with colleagues to share and improve formative assessment practices (M=3.76; SD=1.08), My institution provides sufficient resources and support for implementing formative assessments (M=3.73; SD=1.11), I would benefit from additional training on how to effectively analyze and use formative assessment data (M=3.51; SD=1.26). Overall, the response of the respondents reflected toward the level of agreement.

Table 7: ***Relationship between Professional development and Formative assessment techniques***

		Professional development	Formative assessment techniques
Professional development	Pearson Correlation	1	.589**
	Sig. (2-tailed)		.000
	N	200	200
Formative assessment techniques	Pearson Correlation	.589**	1
	Sig. (2-tailed)	.000	
	N	200	200

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

The above table illustrates that relationship between Professional development and Formative assessment techniques. The Pearson correlation value is 0.589 which shows that there was moderate significant relationship between Professional development and Formative assessment techniques at university level.

Table 8: ***Relationship between Professional development and Understanding and Implementation of Formative Assessment***

		Professional development	Understanding and Implementation of Formative Assessment
Professional development	Pearson Correlation	1	.587**
	Sig. (2-tailed)		.000
	N	200	200
Understanding and Implementation of Formative Assessment	Pearson Correlation	.587**	1
	Sig. (2-tailed)	.000	
	N	200	200

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

The above table illustrates that relationship between Professional development and Understanding and Implementation of Formative Assessment. The Pearson correlation value is 0.587 which shows that there was moderate significant relationship between Professional development and Understanding and Implementation of Formative Assessment at university level.

Table 9: ***Relationship between Professional development and Understanding and Use of Feedback from Formative Assessments***

		Professional development	Use of Feedback from Formative Assessments
Professional development	Pearson Correlation	1	.539**
	Sig. (2-tailed)		.000
	N	200	200
Use of Feedback from Formative Assessments	Pearson Correlation	.539**	1
	Sig. (2-tailed)	.000	
	N	200	200

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

The above table illustrates that relationship between Professional development and Use of Feedback from Formative Assessments. The Pearson correlation value is 0.539 which shows that there was moderate significant relationship between Professional development and Use of Feedback from Formative Assessments at university level.

Table 10: ***Relationship between Professional development and Understanding and Impact on Teaching and Learning***

		Professional development	Impact on Teaching and Learning
Professional development	Pearson Correlation	1	.397**
	Sig. (2-tailed)		.000
	N	200	200
Impact on Teaching and Learning	Pearson Correlation	.397**	1
	Sig. (2-tailed)	.000	
	N	200	200

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

The above table illustrates that relationship between Professional development and Impact on Teaching and Learning. The Pearson correlation value is 0.397 which shows that there was low positive significant relationship between Professional development and Impact on Teaching and Learning at university level.

Table 11: ***Relationship between Professional development and Understanding and Professional Development and Support***

		Professional development	Professional Development and Support
Professional development	Pearson Correlation	1	.303**
	Sig. (2-tailed)		.000
	N	200	200
Professional Development and Support	Pearson Correlation	.303**	1
	Sig. (2-tailed)	.000	
	N	200	200

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

The above table illustrates that relationship between Professional development and Professional Development and Support. The Pearson correlation value is 0.303 which shows that there was low positive significant relationship between Professional development and Professional Development and Support at university level.

Discussion

Studies have identified a moderate but significant relationship between professional development and the effective use of formative assessment techniques at the university level. Professional development enhances educators' assessment literacy, equipping them with the skills to design and implement formative practices that promote deeper learning and student engagement (Stiggins, 2005; Wiliam, 2011). Research shows that sustained and targeted training improves teachers' ability to provide actionable feedback and adapt instructional strategies based on assessment data (Hattie & Timperley, 2007). However, the impact of professional development varies depending on factors such as its relevance, duration, and the institutional support available to faculty (Darling-Hammond et al., 2017). Thus, well-structured PD programs are crucial for optimizing formative assessment practices in higher education contexts.

Research indicates a moderately significant relationship between professional development (PD) and the understanding and implementation of formative assessment at the university level. PD enhances educators' assessment literacy, equipping them with the skills to design, interpret, and utilize formative assessments effectively (Stiggins, 2005; Wiliam, 2011). This relationship is vital, as formative assessment requires not only technical proficiency but also a reflective understanding of how assessment practices influence learning outcomes (Black & Wiliam, 1998). Studies have found that targeted PD programs help university instructors integrate formative assessment into their teaching, promoting deeper student engagement and improved academic performance (Hattie & Timperley, 2007; Darling-Hammond et al., 2017). This suggests that sustained and contextually relevant PD can bridge gaps in educators' knowledge and application of formative assessment techniques.

A moderately significant relationship exists between professional development (PD) and the effective use of feedback from formative assessments at the university level. PD programs focusing on feedback strategies equip educators with skills to analyze assessment data and provide actionable, constructive feedback to students (Brookhart, 2011; Nicol & Macfarlane-Dick, 2006). Research highlights that educators trained through PD are more likely to use feedback as a tool for guiding students' learning processes, fostering self-regulation and critical thinking (Sadler, 1989; Shute, 2008). Moreover, collaborative and reflective PD approaches have been shown to enhance instructors' capacity to personalize feedback, aligning it with individual student needs (Boud & Molloy, 2013; Hounsell, 2007). This underscores the importance of PD in strengthening feedback practices that are integral to formative assessment.

Studies have shown a low but positive significant relationship between professional development (PD) and its impact on teaching and learning at the university level. Effective PD programs provide instructors with innovative pedagogical strategies, which, although gradually adopted, contribute to improvements in instructional quality and student outcomes (Guskey, 2002; Avalos, 2011). This relationship highlights the incremental nature of PD in transforming teaching practices, as sustained support and reflective opportunities are often required for meaningful change (Desimone, 2009). Despite its modest direct impact, PD fosters a culture of continuous professional growth, encouraging educators to experiment with new approaches that can enhance student engagement and learning experiences over time (Borko, 2004; Knight, 2007). Such findings underscore the need for context-sensitive and iterative PD efforts to achieve a greater impact on university-level teaching and learning.

Research has identified a low but positive significant relationship between professional development (PD) and support for its implementation at the university level. Effective PD initiatives often provide resources and foster a supportive environment, yet challenges such as limited time and insufficient institutional backing can constrain their impact (Desimone, 2011; Guskey, 2002). While PD programs are critical for enhancing teaching practices, their success often hinges on systemic support, including leadership advocacy and collaborative structures (Timperley et al., 2007; Avalos, 2011). This relationship underscores the need for universities to integrate PD efforts with broader organizational strategies to maximize their effectiveness and sustainability. Although the correlation may be modest, the role of ongoing support is pivotal in enabling faculty to translate PD insights into practice.

Conclusion

In conclusion, the relationship between professional development and the effectiveness of formative assessment techniques at the university level highlights the critical role of targeted and sustained training in enhancing educators' assessment practices. Professional development equips instructors with the knowledge and skills necessary to design, implement, and interpret formative assessments effectively, fostering improved teaching strategies and student learning outcomes. Collaborative and experiential approaches within PD further enhance its impact, enabling educators to adapt assessment practices to diverse contexts. However, the effectiveness of these initiatives depends on systemic support, including institutional leadership, adequate resources, and ongoing mentorship. Strengthening this relationship through integrated and contextually

relevant PD programs is essential for fostering a culture of continuous improvement and innovation in higher education.

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