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The Perceived Effectiveness of Online Training for the Professional Development of Primary School Teachers: A Study of QAED APP

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ABSTRACT

This quantitative study investigated the perceived effectiveness of online training for primary school teachers' professional development using the QAED app in Punjab, Pakistan. A sample of 272 teachers completed the questionnaire adapted for this purpose. The reliability of the questionnaire was checked using Cronbach's alpha value. The findings showed that the pedagogical, technical, and classroom management skills and knowledge of primary school teachers were updated after the online training. Participants also reported moderate to high satisfaction with online training. The study concluded that online training may be effective, however, there is a need to address teachers' concerns so that they may overcome challenges (e.g., easy access to online resources even in remote areas) and make maximum use of online training. The findings of this study further recommended that administrators may play their role in improving the quality of online training and providing sufficient resources to teachers necessary to utilize such facilities.

Keywords: Online Training, Professional Development, QAED APP, Primary School Teachers

Introduction

The education system has always been viewed as a triangle, and teachers are the main component of this triangle. Teachers' knowledge, professional competencies, and skills affect the students' performance, skills, and achievements. That`s why developed countries spend millions

of dollars on improving and supporting their teachers (Kaur, 2022). Most teachers develop professionally through different training programs. In this regard, education authorities and other stakeholders cooperate to develop effective teacher training programs (Bhujel, 2019). But Khan et al. (2016) referred to the teacher training is challenging in the underdeveloped and developing countries as it demands huge costs, and proper facilities like infrastructure, training centers, training materials and teachers' time and cost to attend training institutes.

Former training programs were carefully planned, but handling the expenses and infrastructure issues gradually became challenging. Therefore, Training and online education have become trending these days (Wambugu, 2018). Online professional development (OPD) is a way to train and educate teachers and enhance their knowledge and skills using online communication modules and data delivery (Bragg et al., 2021). OPD gives teachers the flexibility to learn "anytime and from anywhere." This can help motivate teachers and boost their participation. OPD is especially suitable for remote areas. It is useful and efficient in providing a platform for collaboration with other teachers teaching the same subject. OPD organized to improve teachers' knowledge, real-time classroom practice, and students' achievement (Morina et al., 2023).

Teachers' professional development includes teachers' self-actualization, expressing themselves, gaining knowledge, improving teaching and technical skills, changing teaching behavior, and enhancing student learning outcomes. Hodovaniuk et al. (2023) highlighted that Ukraine's national report on states aimed to create an environment that facilitates teachers for self-actualization, self-expression and leading roles. Abekah et al. (2023) have mentioned that due to the shortage of CPD opportunities, distance education (DE) or online training programs are at a premium. Teachers register themselves in the full-time program and attend it for a short time. Kim & Bonk (2006) mentioned online training could prove to be more effective if it covered the development of teaching skills based on earlier training, promoting problem-solving skills, learning by doing, critical thinking, and hands-on activities. A study conducted by Liu &Zhang reported that teachers seem to be satisfied with the professional development through online training programs such as MOOCs, Coursera, etc., training material, instructor attitude, technology involved in training, assessment criteria, and the effectiveness of training programs all contribute to making the online training program effective for learners and educators.

Abdularb (2023) stated that Effective leadership plays an important role in the professional development of teachers. It was mentioned that the role of the head teacher and the training content decides either teacher learning improves or not. Improved learning, better student learning outcomes, and high-quality education are the parameters of successful training programs. It has also been reported that this type of learning environment can increase teachers' professionalism by about 25% and improve student results by 15_20%.

Dabrowski and Mitchell (2021), mentioned that online professional development can have a positive effect on both instructors and trainers. Online professional development has developed. It is a shift from simply translating physical training content to digital skills development and continues to update teachers' knowledge. It delivers a digital format to a specific group of educators who may not share the same level of knowledge and skills.

Background of the Study

Planning and organizing teachers' training programs has always been an integral part of the educational policies of Pakistan. Quaid-e-Azam Academy for Educational Development (QAED) is a renowned teacher and heads training institute in Punjab offering several in-service, pre-service, and continuous professional training programs. QAED plays a significant role in planning, managing, and providing quality content for educators at different levels to enhance their professional development skills. it not only offers physical training opportunities but also offers online training programs to combat several issues like training cost, overcrowded classes, traveling challenges, etc. (Abbas et al., 2023). In collaboration with the British Council, QAED organized several training programs, such as English as a Subject for Teachers and Educators (EaSTE) training course for primary school teachers of Punjab. This study focused on the effectiveness of this training program.

The National Achievement Test (NAT),2023 conducted by the National Achievement Wing (NAW) of the Pakistan Institute of Education (PIE), 2023. The NAT report (PIE, 2023) presents that:

Teachers score the lowest in Math's assessment, achieving 74% and 71% (Grade 4 and Grade 8, respectively) as the available maximum for students. Overall, teachers' performance is lowest in Grade 8 subjects. 84% and 74% of grade 8 teachers have not received any training related to Math and Science, respectively, in the last two years.

This report highlighted the urgent desire for teachers' professional development and training programs in Pakistan. As Osamwonyi (2016) mentioned, the professional development of teachers is a matter that can never be ignored in any era. It is significant to promote and regulate continuous professional skills among teachers of all levels, especially elementary grade. To cope with it, the provincial Government of Punjab has launched the QAED APP (Digital teachers' training application) for online teachers' professional development. That's why this study aimed to investigate teachers' perceptions regarding the effectiveness of online teacher training through the QAED APP. Overall, the objective of this study was to examine the different aspects of the professional development of primary School Teachers (PSTs) through online training programs such as the QAED APP.

Rationale of the Study

Different online courses via Massive Open Online Courses (MOOC), digital applications, and websites are being introduced in the whole world to improve the quality of teacher training as per the demands of the twenty-first-century world. There is a lot of research about the effectiveness of the professional development of PSTs and the Perception of teachers regarding professional training courses. However, research about the perceived effectiveness of online training through the QAED APP is yet to be measured in Punjab.

Research Questions of the Study

1. How far the training through QAED APP may enhance the efficacy of professional skills among educators?
2. To what extent are primary school teacher satisfied with their professional development through online training?

Significance of the Study

To the progress of digital training programs for teachers at all levels in the public and private sectors, this study is highly significant. Both the researchers and educators could be motivated to understand the worth of technology-based training and to appreciate the Quaid-e- Azam Academy for its educational development to take an initiative of introducing online digital training programs for their convenience. This study may also help instructors understand the potential benefits of online learning and technological trends.

Research Methodology

A descriptive quantitative research design was used to examine the effectiveness of online training in the professional development of primary school teachers. The 272 primary school teachers from the districts of Gujranwala and Lahore in Punjab, Pakistan, were selected through a convenience sampling approach as the sample of the study. Data were gathered both online and through physical visits to the QAED institute and various public schools in Gujranwala and Lahore districts. An adapted questionnaire based on a 5-point Likert scale was used for data collection. Expert opinions were taken to check the validity of the Instrument, while the reliability was analyzed by using Cronbach's alpha. SPSS 29.0 version was used to analyze data. The analysis included assessment of internal consistency of the scales, followed by descriptive statistics (mean and standard deviation) to summarize participants' responses regarding professional development scales. In addition, inferential statistics were applied, where independent-samples t-tests were used to examine differences in perceptions based on gender, residential area, and district, while one-way ANOVA was conducted to explore differences based on qualification and age group of participants.

Reliability Analysis of the Questionnaire

After the complete data collection, the data was entered into SPSS (version 29.0). To ensure the reliability of all scales, their internal consistency was measured. Cronbach's Alpha coefficient and inter-item mean values were calculated with the help of SPSS. The results of this test are presented in Table 1. One scale (Pedagogical skills) has an alpha value of more than .8, which shows very high reliability.

Table 1: *Reliability of scales*

Sr. no	Name of Scale	Number of items	Cronbach Alpha value	Mean Inter-item correlation
1	Experience in using ICT	3	.70	.44
2	External Support	3	.65	.38
3	Motivation	5	.77	.41
4	Technical skills	5	.70	.32
5	Pedagogical skills	5	.82	.48
6	Knowledge	3	.66	.40
7	Effectiveness of Online Activities	5	.70	.32
8	Classroom management	5	.71	.33
9	Satisfaction with professional development through online training	4	.70	.37
10	After the training program	4	.75	.43

In addition, seven scales (Experience of using ICT, Motivation, Technical skills, Effectiveness of online activities, Classroom management, Satisfaction with professional development through online training, After the Training program scale showed an alpha value above .7 which is also highly acceptable while two scales (External support, Knowledge) have an Alpha value (above .6) close to .7. It is also satisfactory keeping in mind the number of items these scales contain. Meanwhile, the Mean inter-item correlation of all scales is also very acceptable.

Descriptive Statistics and Comparative Analyses of Professional Development Scales

Descriptive statistics, including mean and standard deviation of all professional development scales selected for the study. The results in the following table 2 present a summary of comparative scores of all scales

Table 2: *Descriptive Statistics of Professional Development Scales*

Names of Scale	Mean	Standard Deviation
Experience of using ICT	3.16	.78
External Support	3.33	.76
Motivation	3.75	.75
Technical skills	3.58	.70
Pedagogical skills	3.34	.95
Knowledge	3.62	.77
Effectiveness of Online Activities	3.66	.68
Classroom Management	3.54	.73
Satisfaction with professional development through online training	3.81	.66
After the Training	3.80	.70

All professional development scales have shown slightly high mean values above 3.0, which indicates that participants are satisfied with the professional development through the online medium. It also reported that participants in this study held a slightly positive view of the effectiveness of online training in enhancing their professional development. Satisfaction with online training scale has mentioned the highest mean value (M= 3.81), which highlights that primary school teachers are generally satisfied with the online training courses offered by QAED APP. The standard deviation (SD = .66) at the same scale is comparatively small, indicating that responses are clustered around the mean. 'After the Training Program' scale represents a very positive evaluation (M=3.80) of the effectiveness of the online training program after completing the online training program. Participants feel more confident and find online training programs for professional development more effective. The standard deviation (SD = .70) represents a very small margin of variation. These findings are closely related to the mean score of the Motivation scale (M=3.75), which highlighted that participants are still encouraged, motivated, and willing to participate in online EaSTE training programs. Low standard deviation (SD= .75) showed that responses are consistent; only a few responses were deviating from the average, while all others were the same as the motivation level scale. The experience of using the ICT scale reported the lowest mean value(M=3.16), which is closely related to a neutral response. This shows that participants have a reasonably good experience of using ICT, which could be limited to their institutes or their homes or even the residential areas. The standard deviation (SD=.78) reported the moderate variation in the responses, which means that some participants have a very good experience of using ICT while some participants need more training or facilities to use ICT.

The external support scale indicated the mean score (M=3.33), which shows that most of the respondents perceive moderate support from their families, principals, and colleagues. The standard deviation (SD = .76) reported the variation. The mean score (M=3.58) of the technical skills scale indicates that most of the participants agreed that they have learned technical skills with the help of online training programs. The standard deviation (SD = .70) indicates that some participants may have learned at a more advanced level, while others may have learned it at a

basic level. The Pedagogical Skills Scale showed an average mean value (M=3.34). This indicated that participants may have learned pedagogical skills, but they do not find themselves practicing these skills in routine classroom activities. The mean score (M=3.62) of the knowledge scale indicated that participants are satisfied with the quality of training content and the knowledge that was shared on online platforms via the QAED APP.

The Effectiveness of Online Activities scale indicates a mean score (M=3.66) close to satisfactory results. This means that participants were satisfied with the lecture content, reading material, assignments, and presentations, and all assigned tasks during online training programs. The mean score (M=3.54) of the classroom management scale indicates that most of the participants agreed that online training proved helpful in managing daily classroom activities, time management, and other strategies.

Differences Based on the Gender of the Sample (t-test Analysis)

To verify the variation in the effectiveness of the online training program, gender-based differences in the responses of participants were also observed.

There was no significant difference was observed among all professional development scales, except the external support scale, which indicated a significant t-value below that standard ($p>.05$). Based on the external support scale, the difference in the mean values of males (M=3.19, SD=.75) and females (M=3.41, SD=.75) reported that, unexpectedly, males receive less family, friends, and colleagues' support than females.

Table 3: *Mean Values and Differences Based on the Gender of the Sample (t-test Analysis)*

Scales	Male		Female		Mean diff.	Df	F	t-value	P.(2-tailed)	Effect size
	Mean	SD	Mean	SD						(eta^2)
Experience of using ICT	3.15	.91	3.17	.70	-0.15	163	9.91	-.149	.88	----
External support	3.19	.75	3.41	.75	-.229	201	.283	-2.39	.02	-.302
Motivation	3.85	.72	3.73	.65	.121	184	.063	1.47	.12	----
Technical skills	3.58	.72	3.59	.63	-.007	180	1.65	-0.90	.93	----
Pedagogical skills	3.45	.95	3.29	.92	.162	195	.077	1.37	.17	----
Knowledge	3.66	.79	3.61	.72	.049	185	.326	.526	.59	----

Effectiveness of online activities	3.66	.76	3.67	.58	-.018	160	8.03	-.219	.83	----
Classroom management	3.49	.84	3.57	.66	-.081	165	11.0	-.875	.41	----
Satisfaction with professional development through online training	3.83	.69	3.80	.65	.027	191	.139	.320	.75	----
After the online training	3.84	.75	3.78	.67	.057	181	2.39	.643	.52	----

Cohen's (1988 reported in Pallant, 2007, p. 236) formula was used to calculate the effect size for external support scale. It may be argued that the effect size (-3.02) is very small and shows less than 10 percent variance in responses.

Mean Values and Differences Based on the Residential Areas of the Sample (t-test Analysis)

To find the difference in the perceptions of participants from rural and urban areas an independent sample t-t-est was analyzed. The results reported that experience of using ICT, external support, technical skills, and the effectiveness of online training activities scale reported a significant difference of perception among the rural and urban respondents. There is no difference observed in all other scales based on the residential area of respondents.

Table 4: *Mean Values and Differences Based on the Residential Areas of the Sample (t-test Analysis)*

Scales	Rural		Urban		Mean diff.	F	Sig. (df= 271)	P.(2-tailed)	Effect size
	Mean	SD	Mean	SD					
Experience of using ICT	2.99	.75	3.30	.79	-.305	1.58	-3.24	.001	.395
External support	3.24	.79	3.41	.73	-.174	.683	-1.88	.043	.229
Motivation	3.73	.72	3.81	.64	-.081	1.05	-.981	.341	----
Technical skills	3.47	.66	3.68	.66	-.206	.151	-2.56	.012	-.312

Pedagogical skills	3.26	.98	3.42	.89	-.159	3.18	-1.39	.164	----
Knowledge	3.59	.80	3.66	.70	-.069	3.94	-.761	.470	----
Effectiveness of online activities	3.59	.65	3.73	.64	-.135	.028	-1.70	.029	-.208
Classroom management	3.50	.76	3.58	.70	-.082	.842	-.921	.081	----
Satisfaction with professional development through online training	3.70	.69	3.85	.63	.086	1.78	-1.06	.290	----
After the online training	3.72	.74	3.87	.66	-.145	.931	-1.70	.089	----

The results indicate that participants from urban areas reported a comparatively better experience in using ICT during online training programs (M = 3.30, SD = 0.79) than those from rural areas (M = 2.99, SD = 0.75). Although both groups demonstrated a reasonable level of ICT experience, the higher mean score among urban respondents suggests that they may have greater exposure to technology and digital resources. The effect size (Cohen's d = 0.395) indicates a small to moderate difference between the two groups.

A similar pattern was observed for external support. Respondents from urban areas reported receiving slightly more support from family members, colleagues, and school leadership (M = 3.41, SD = 0.73) than respondents from rural areas (M = 3.24, SD = 0.79). Although the difference is not substantial, it suggests that urban participants may have somewhat better access to supportive environments that facilitate participation in online professional development activities. The effect size (Cohen's d = -0.229) further indicates that the difference between the two groups is relatively small.

The findings related to technical skills also revealed a modest advantage for urban participants. Teachers from urban areas obtained a higher mean score (M = 3.68, SD = 0.66) compared to those from rural areas (M = 3.47, SD = 0.66), suggesting that urban respondents felt more confident in the technical competencies required for online training. Although the effect size (Cohen's d = -0.312) was small, the results point toward a slight disparity in digital readiness between the two groups.

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Mean Values and Differences Based on the Districts of the Sample (t-test Analysis)

Based on the districts of respondents, an independent sample t-test reported significant differences in the scales of pedagogical skills, effectiveness of online activities, and classroom management skills.

Table 5: *Mean Values and Differences Based on the Districts of the Sample (t-test Analysis)*

Scales	Gujranwala		Lahore		Mean diff.	Df	F	t-value	P.(2-tailed)	Effect size
	Mean	SD	Mean	SD						(eta^2)
Experience of using ICT	3.09	.74	3.27	.83	-.175	270	2.64	-1.80	0.72	----
External support	3.30	.80	3.38	.70	-.080	270	2.43	-.857	.344	----
Motivation	3.75	.60	3.82	.78	-.074	270	2.35	-.888	.367	----
Technical skills	3.52	.62	3.68	.71	-.165	270	2.78	-2.02	.073	----
Pedagogical skills	3.25	.92	3.52	.93	-.267	270	.114	-2.33	.020	-.28
Knowledge	3.63	.74	3.64	.75	-.012	270	.081	-.131	.889	----
Effectiveness of online activities	3.57	.59	3.81	.70	-.236	270	2.05	-2.98	.001	-.40
Classroom management	3.49	.67	3.63	.80	-.134	208	3.71	-1.44	.007	.33
Satisfaction with professional development through online training	3.77	.66	3.87	.66	-.099	270	.023	-1.20	.230	----
After the online training	3.78	.72	3.84	.66	-.066	270	.443	-.768	1.01	----

The results reported that pedagogical skills taught during online training showed a difference among the perception of respondents of Gujranwala district (M=3.25, SD= .92) and Lahore district (M=3.52, SD=.93). Respondents from Lahore are more actively involved in the pedagogical skills practices as compare to the respondents of Gujranwala district. However, the reported Cohens' d effect size -.28 was small. On a same pattern the participants of Lahore

district were slightly more sure, as compared to their counterparts from Gujranwala, about the effectiveness of the online training program and its impact on their classroom management skills.

Analysis Of Variance (ANOVA) Based on Qualification

Table 6: *Analysis Of Variance (ANOVA) Based on Qualification*

Scales	Sample	Mean	SD	F	P	Sequence of difference	Effect size (eta^2)
Experience of using ICT	Masters and below	3.08	.76	2.58	.07	----	----
	MPhil	3.28	.79				
	PhD	3.66	1.41				
External support	Masters and below	3.35	.78	.266	.76	----	----
	M.Phil.	3.32	.81				
	PhD	3.00	.74				
Motivation	Masters and below	3.79	.63	.312	.732	----	----
	M.Phil.	3.75	.74				
	PhD	4.10	1.27				
Technical skills	Masters and below	3.59	.61	.828	.438	----	----
	M.Phil.	3.58	.73				
	PhD	4.20	.56				
Pedagogical skills	Masters and below	3.44	.85	3.12	.046	2< 3,1	.02
	M.Phil.	3.21	1.02				
	PhD	4.30	.42				
Knowledge	Masters and below	3.61	.69	.189	.827	----	----
	M.Phil.	3.66	.82				
	PhD	3.66	.47				
Effectiveness of online activities	Masters and below	3.72	.58	2.23	.109	----	----
	M.Phil.	3.59	.73				
	PhD	4.30	.42				
Classroom management	Masters and below	3.58	.69	1.44	.238	----	- ---
	M.Phil.	3.48	.78				
	PhD	4.20	.28				
Satisfaction with	Masters and below	3.77	.62	1.34	.263	----	----

professional development through online training							
	M.Phil.	3.86	.71				
	PhD	4.37	.53				
After the training	Masters and below	3.83	.61	1.12	.325	----	----
	M.Phil.	3.75	.81				
	PhD	4.37	.53				

The analysis of variance (ANOVA)was conducted based on the qualifications of the participants of this study. The results revealed that only the Pedagogical Skills scale showed a significant difference among the participants of PhD (M= 4.30, SD= .42), MPhil (M=3.21, SD =1.02), and Masters and below (M= 3.44, SD=.85). It reported that pedagogical skills among the MPhil respondents may be slightly less developed than the other two as the Cohen's d effect size (.02) is very small.

Analysis Of Variance Based on Age

Table 7: *Analysis of Variance Based on Age*

Scales	Sample	Mean	SD	F	P	Sequence of difference	Effect size (eta^2)
Experience in using ICT	20-30	3.29	.70	8.17	<.001	4<3,1,2	.08
	31-40	3.10	.79				
	41-50	3.43	.72				
	51-60	2.43	.65				
External support	20-30	3.18	.70	1.63	.182	----	----
	31-40	3.35	.76				
	41-50	3.45	.76				
	51-60	3.10	.84				
Motivation	20-30	3.78	.78	.931	.426	----	----
	31-40	3.74	.74				
	41-50	3.90	.46				
	51-60	3.67	.42				
Technical skills	20-30	3.52	.74	.422	.737	----	----
	31-40	3.62	.64				
	41-50	3.60	.71				
	51-60	3.47	.51				

Pedagogical skills	20-30	3.13	1.05	2.42	.066		
	31-40	3.48	.86				
	41-50	3.20	1.01				
	51-60	3.27	.79				
Knowledge	20-30	3.44	.81	2.85	.038	1<3,2,4,	.03
	31-40	3.60	.76				
	41-50	3.85	.63				
	51-60	3.60	.64				
Effectiveness of online activities	20-30	3.67	.76	.043	.988	----	----
	31-40	3.67	.67				
	41-50	3.69	.57				
	51-60	3.62	.38				
Classroom management	20-30	3.43	.73	.546	.652	----	- ---
	31-40	3.56	.77				
	41-50	3.60	.65				
	51-60	3.48	.59				
Satisfaction with professional development through online training	20-30	3.75	.74	.898	.443	----	----
	31-40	3.78	.67				
	41-50	3.93	.64				
	51-60	3.76	.46				
After the training	20-30	3.72	.64	.504	.680	----	----
	31-40	3.83	.72				
	41-50	3.84	.71				
	51-60	3.67	.50				

ANOVA was interpreted based on the age of the respondents of this study. Experience using the ICT scale reported a significant difference among the participants of 20-30 (M= 3.29 SD=70), 31-40 (M=3.10, SD=.79), 41-50 (M=3.43, SD= .72), and 51-60 (M=2.43, SD=.65). The results reported that respondents who belong to age group in between 51 and 60 had a poor experience of using ICT with a mean value below than 3.0. The Cohen's d effect size of this difference is .08 which is very small.

The knowledge scale also showed a significant difference based on age groups. The participants of age groups 20 and 30 seem to have a slightly different perception about the knowledge and content shared in the online training programs of QAED APP.

Discussion and Conclusions

The findings of the present study suggest that online training has contributed positively to the motivation of educators. Teachers reported that support and encouragement from school leadership played an important role in their willingness to participate in and benefit from online professional development activities. These findings are consistent with those of Abdulrab (2023), who emphasized that effective leadership is a key factor in teachers' professional growth and development. When school leaders actively support professional learning opportunities, teachers are more likely to engage meaningfully in online training programs.

The results further indicate that online training is moderately effective in improving the professional development of primary school teachers. This finding aligns with the work of Dabrowski and Mitchell (2021), who argued that online professional development has evolved beyond merely transferring face-to-face training content into digital formats. Instead, it now focuses on continuous learning, digital competence, and the ongoing enhancement of teachers' professional knowledge. Similarly, participants in the present study expressed satisfaction with the training content and believed that it helped them update their knowledge and improve their professional capabilities.

Participants also reported positive experiences regarding communication with tutors and the feedback they received on assignments throughout the training process. These findings are comparable to those of Liu and Zhang (2021), who found that teachers generally have favorable perceptions of online professional development opportunities. Their study highlighted that educators are often satisfied with learning experiences offered through online platforms, particularly when adequate guidance and feedback are provided. The responses of participants in the current study reflect a similar level of satisfaction.

The findings are further supported by the work of Kim and Bonk (2006), who noted that well-designed online instruction and engaging learning materials can increase participants' interest and involvement in training programs. They argued that effective online learning activities encourage active participation and promote meaningful professional learning. In the present study, teachers considered video lectures, online reading materials, presentations, and assignment-based tasks to be valuable components of the training program that contributed to the development of their professional skills.

Limitations and Implications of this Study

Only two districts of Punjab (Gujranwala and Lahore) were added in this study, while the QAED APP training was launched in the whole of Punjab. Teachers' perceptions regarding the effectiveness of online training delivered through the QAED APP may vary based on regions.

Secondly, the research design, method, and limited sample size may not generalize the findings of this study. An adapted and closed-ended questionnaire was shared with participants within a specific timeline. Teachers' experience with technology and technical hindrances may restrict teachers' perceptions toward a few perspectives of effectiveness and professional development.

This study may suggest that the training modules of the QAED APP could be refined according to the diverse needs and aspects of the professional development of primary school teachers. It may also be helpful for the stakeholders to understand the needs and requirements of PSTs for attending and actively participating in the online training programs, and making it more effective. It may also help the resource allocators to provide enough resources to teachers to perform the learned practices in the actual classroom environment. This could be helpful for policymakers to refine education policies based on technology integration in public schools and train teachers through online modes, not only primary school teachers but also secondary and higher secondary school teachers. This research invites other researchers to investigate the effectiveness of online training in enhancing students' academic performance and teachers' personal growth.

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