



The Impact of Lack of Personal Interaction in Online HOTS Training for Primary Teachers in Punjab

Farhat Nasim¹, Furrukh Bashir², Kashif Raza³, Snober Fazal⁴

¹Ph.D. Scholar, Department of Education, Bahauddin Zakariya University, Multan, Punjab, Pakistan.

Email: farhatnasim54@gmail.com

²Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Punjab, Pakistan.

Email: furrukh@bzu.edu.pk

³Lecturer, Department of Economics, The Islamia University of Bahawalpur, Bahawalnager Campus, Punjab, Pakistan. Email: kashif.raza@iub.edu.pk

⁴Assistant Professor, Department of Agricultural and Resource Economics, Muhammad Nawaz Sharif University of Agriculture, Multan, Pakistan. Email: snober.fazal@mnsuam.edu.pk

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ABSTRACT

Technology is changing how teachers develop their careers, especially as more primary school teachers in Punjab take online training in Higher Order Thinking Skills (HOTS). The switch to online learning has raised some concerns about the lack of personal interaction and its effects on teaching. This study involved using NVivo 14 to analyze data and 30 primary school teachers who were asked to share their experiences of online training on HOTS. The teachers found more barriers to online professional development than classroom learning, e.g., the delay of feedback, isolation, and lack of interaction. Other barriers include digital illiteracy, quality of internet connection, and availability of outdated technological gadgets, which influence the efficiency of such programs. The study suggests the addition of interactive and instant feedback systems to online-based training programs to improve teacher response and instructional outcomes.

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Corresponding Author's Email: farhatnasim54@gmail.com

1. Introduction

Technology has an important part in the existing system of education. Predictably, technology will continue to influence many things regarding our daily lives in the foreseeable future (Abdulhussain et al., 2025). New information, resources, and technological aids continually incorporate institutions and teaching practitioners. The larger the range of such tools, the more innovative conceptualizations are needed to make it possible to create them, which may include new teaching methods, curriculum designs, and collaborative approaches among educators and technologists (Novoa-Echaurren, Pavez, & Anabalón, 2025). Tarling and Ng'ambi (2016) noted that whenever a new system or tool is introduced, teaching methods and practices shift in different learning settings. Also, educational systems in many countries are working to make sure classrooms at all levels have access to technology and the support they need. Radićuks et al. (2025) has reported that educational institutions have provided various technological tools and gadgets to their students and faculty under the banner of increasing their digital literacy. Skills like higher-order thinking, critical thinking, problem-solving, and creativity are essential for students' cognitive and academic growth.

So, there should be urgent, effective pedagogical techniques possessed by teachers to sculpt HOTS. In recent years, a common approach to HOTS development has been the use of online professional development modules, such as those for primary school teachers (Mat et al., 2025). FOSTIN platforms are adaptable and scalable, and they possess the qualities of remote education that make them attractive to teachers across various geographic contexts, such as the Punjab learning environment (Saeed, 2025). Nevertheless, the shift from traditional face-to-face professional development to online training has caused anxiety, particularly due to the lack of in-person engagement (Aybek & Kaya, 2026). Face-to-face professional growth can enrich participants' deeper needs by engaging the professional growth process live, with instant supportive feedback, while developing as a group and fulfilling the psychological need for a deep learning experience to promote meaningful learning and development (Ragab, 2024). Total HOTS training and its transfer to the classroom might be hindered by the lack of in-person communication in HOTS training, as levels of digital literacy and access to technology differ considerably here in the Punjab. The paper addresses non-interaction issues and focuses on their impact on course, teacher interaction, and learning outcomes in the domain.

1.1. Statement of the Problem

The rapid shift from face-to-face professional development to online training has fundamentally changed how teachers in Punjab develop Higher Order Thinking Skills (HOTS). Although online training is more flexible and open to many people, it does not always involve substantive interpersonal interaction, a factor deemed essential to efficient learning. Online training systems lack face-to-face interaction, which discourages the opportunities for receiving real-time feedback, hinders collaboration among peers, and limits reflective discourse, an essential component that must be mastered and effectively applied to utilize Higher-Order Thinking Skills successfully (HOTS) in the classroom. The problem is particularly acute in South Punjab, where the teachers are facing other complications, such as the inability to make use of digital tools, unstable internet connections, and limited access to modern technologies and devices. These limitations, in turn, result in frustration and professional loneliness among the teachers, which reduces motivation and interest for training. This kind of fading motivation has negative implications for the quality of their professional growth and the effective application of the HOTS-based instructional strategies. Despite the growing reliance on online training for higher-order thinking instruction, there is very little empirical evidence on how the decreasing frequency of face-to-face interaction affects the learning process, teachers' active participation, and the effectiveness of their instruction. This study explores teachers' perceptions of the lack of personal interaction in online HOTS training and the impact of training effectiveness and classroom practice in Punjab.

1.2. Objectives of the Study

1. To explore teachers' perceptions of the lack of face-to-face interaction in online training focused on higher-order thinking skills (HOTS) and how this affects their learning experience.
2. To discuss issues that teachers face as a result of the absence of face-to-face interaction in online HOTS training, namely, the effects of online training on training effectiveness and classroom practice.

1.3. Significance of the Study

This research contributes to the existing literature by critically analyzing the effectiveness of online professional development programs in developing Higher Order Thinking Skills (HOTS) among primary school teachers in Punjab and by determining the effects of face-to-face interaction. It identifies the key barriers to motivation, engagement, and the pedagogical implementation of HOTS solutions, particularly in resource-restricted contexts, by analyzing teachers' lived experiences and perceptions of reduced interpersonal contact. The findings advocate for evidence-based recommendations that will enhance online or blended professional development courses. Among the key areas of interest are the importance of effective feedback, peer collaboration, and the creation of the digital support system, which is very crucial for teachers to improve their teaching practices and

enhance student learning outcomes. In addition, the results provide a theoretical framework for future studies on the pedagogical and psychological implications of online professional development for teachers and learners in similar learning environments.

2. Literature Review

The rapid adoption of technology in education in the pedagogical setting has brought about an enormous change in the professional development of educators, especially through online forums of training aimed at the promotion of higher-order thinking skills (HOTS). Regardless of the adaptability and extensiveness that the digital resources offer, empirical studies continue to highlight reduced interpersonal interaction and its consequences on effective teacher learning. In line with the theme of the current study, this literature review raises the following research questions: (a) How far does interpersonal interaction interact with teacher development? (b) What are the obstacles facing online HOTS training in the Punjab context, and (c) what are the consequences of a lack of interpersonal interaction in terms of teacher engagement and educational achievement?

2.1. Importance of Personal Interaction in Teacher Training

Personal communication, also known as personal interaction, peer work, and immediate feedback, has always been considered a component of effective teacher professional development (He & Bagwell, 2023). Conventional training environments enable teachers to pose questions, exchange experience, receive immediate feedback, and have a reflective discussion, i.e., the principles of deep learning and the embodiment of pedagogical professionalism (Gao, 2023). This message has shown that it can be applied to have a positive effect on motivation and professional learning communities and facilitate contextualization of the knowledge in classroom practice (Chiu, Lin, & Lonka, 2021). Conversely, online training systems tend to restrict discussions and freedom of speech, which impairs the process of deep learning and decreases the chances of reflective discourse between teachers, ultimately leading to a less cooperative and supportive learning environment compared to traditional training environments. The lack of real-time feedback and peer constructive discussion could reduce the confidence and willingness of the teachers to work actively and attentively. According to previous studies, professional development that involves minimal substantive interaction can be ineffective in meeting the psychological and instructional needs of teachers, especially when the training targets more complex skills (e.g., higher-order thinking skills (HOTS) that cannot be effectively learned without discussion, modelling, and reflection) (Liu & Correia, 2021).

2.2. Challenges of Online HOTS Training in Punjab

The training on higher-order thinking skills (HOTS) in online training in Punjab for primary school teachers is still ineffective, but mainly because of contextual constraints (Saeed, 2025). Though the idea of online professional development is supposed to be more inclusive, there are certain obstacles, especially concerning the differences in digital literacy, internet access, and computer facilities, which are acute in the countryside (Gu et al., 2025). According to Rahiem (2020), educators often find it difficult to enter the field of online interaction due to the lack of technical skills and knowledge, outdated technologies, and the absence of a sufficient and speedy internet connection. These conditions impede the process of long-term communication with instructional resources and subsequently reduce the acquisition of higher-order thinking abilities (Agormedah et al., 2020). In addition, the poor institutional support and the inability to access high-quality digital resources weaken the implementation of HOTS-oriented training. Online training and the opportunity to clarify a conceptual ambiguity via interactive discussion require teachers to conduct the training process (Mardiana & Yakub, 2025). Based on the literature, online training based on HOTS in the Punjab educational situation might be practically useless but theoretically effective without the above-identified infrastructural and capacity-related issues (Saeed, 2025).

2.3. Impact of Reduced Interaction on Teacher Engagement and Learning Outcomes

Collaborative problem-solving, discussion-based learning, and guided reflection are key mechanisms for developing higher-order thinking skills (HOTS). Empirical results show that the mitigation of personal contact in online training modalities negatively affects teacher engagement, motivation, and understanding (Bergdahl, 2022). Sibley et al. (2024) indicate that teachers enrolled in non-interactive online courses often feel frustrated, lonely, and detached, and this, in turn, reduces their ability to put theoretical constructs into practice in a real classroom. Besides, the lack of collaborative group practices and instructor feedback is one of the factors that sabotage reflective practice, an essential element of HOTS development. Online learning environments are considered unfavorable because they lack interaction, thereby hampering the substantive development of the profession in modern learning settings (Ragab, 2024). Puspitasari (2025) found that the lack of interaction is associated with the lack of training efficacy and the lowered usage of HOTS strategies in the classroom, especially in resource-deprived settings.

2.4. Technological Barriers in Online Teacher Training

Studies have always found that slow internet, old equipment, and lack of digital resources are the major factors that significantly hinder the ability of teachers to undertake online training programs. Poor internet connectivity, especially in rural areas of Punjab, is a deterrent to real-time communication, and this makes it difficult to get training content and contact instructors. Additionally, the lack of digital literacy and the lack of official training also limit the involvement of teachers in higher-order thinking skills (HOTS) at an earlier stage, which may lead to frustration and isolation (Rahiem, 2020). Although these technological barriers have been well documented, the literature indicates a significant gap in terms of the strategies that teachers use to overcome them. Although these issues are detected in the majority of studies, they do not look at solutions, including the way in which teachers can adjust to poor internet connections or poor digital skills. Additionally, the empirical evidence on interventions, such as digital literacy programs or infrastructure enhancements, is limited, which confirms the necessity to conduct further research in order to come up with successful strategies to help address those barriers (Chauhan, Visnu, & Kumar, 2025; Rahiem, 2020).

2.5. Synthesis and Research Gap

The available literature supports the fact mentioned in the introduction that, despite the logistical advantages of online training on higher-order thinking skills (HOTS), a tangible effect on the effectiveness of the latter can be observed due to the lack of physical interaction (Pishchukhina & Watson, 2021). The potential of direct communication, cooperation, and feedback already links the motivation, engagement, and capacity of teachers to apply HOTS strategies. Online professional development programs are starting to become common in Punjab, but not much research has been done on how fewer interactive teachers feel about them and how that affects the quality of training and classroom practice (Qaisra & Haider, 2024). This research paper aims to fill this gap by critiquing the ways in which teachers understand the lack of interpersonal interaction in an online Higher-Order Thinking Skills (HOTS) training and questioning the possible implications of this limitation on learning processes and professional practice in Punjab.

3. Methodology

3.1. Research Design

This qualitative research study used an exploratory approach to examine teachers' perceptions regarding the lack of face-to-face interaction in online training, with the major objective of developing Higher Order Thinking Skills (HOTS) in primary school teachers in Punjab. A qualitative paradigm was considered appropriate here because of its ability to analyze in detail the live experiences, perceptions, and difficulties faced by participants during the online training.

3.2. Research Setting and Participants

The research was conducted in the districts of Multan and Lodhran, Punjab. It focused on primary school teachers who had completed the compulsory six-week online training in Higher-Order Thinking Skills (HOTS), organized by the School Education Department. Thirty primary school teachers who had finished the HOTS training were selected using purposive sampling. This sampling approach aimed to collect data that was sufficient and relevant to the research objectives.

3.3. Data Collection Methods

The semi-structured interviews were conducted to collect data, and this allowed the researcher enough flexibility to ask the respondents to meet the objectives of the study. The interview guide was carefully prepared to correspond with the research objectives. Specific questions were developed to address major issues, i.e., lack of face-to-face interaction, lack of knowledge about digital literacy, teacher engagement, and learning outcomes, in the context of online higher-order thinking skills training, and the effects on classroom education and the teaching process. The interviews were conducted face-to-face, with all participants lasting between 45 and 60 minutes; they were given freedom to answer, either in English or in Urdu. This procedure, which was audio-recorded, was transcribed verbatim, and the transcripts were analyzed.

3.4. Data Analysis Using NVivo

The NVivo 14 application, a qualitative data analysis tool, was used to analyze the transcribed data. The qualitative analytical strategy used was thematic analysis, which involves a systematic study by complying with traditional procedural steps of familiarizing with data, preliminary coding, theme recognition, theme review, definition and naming of themes, and presentation of results. The existence of word clouds and treemaps was created to clarify the existing patterns and interdependence among the themes. The analysis was in line with the research objectives, thus creating coherence of data interpretation and research focal points.

4. Data Analysis

How do teachers perceive the lack of face-to-face interaction in online training focused on higher-order thinking skills (HOTS) and how this affects their learning experience?

Figure 1: The word cloud of lack of personal interaction in online training and learning experience



The word cloud analysis shows that educators identify a lack of interaction as the main barrier to effectively using higher-order thinking skills (HOTS) in online settings. Many report frustration, isolation, and disengagement, insufficient direct contact with instructors and peers. Without immediate feedback and peer discussions to clear up confusion, respondents say their learning suffers. Mentions of 'motivation' and 'gaps in knowledge' also

learning	teacher	frustration	content	challenge	difficulties	isolation	adapt	applic	assist	asyn	auton	buildi	clarifi
				cognitiv	disengag	low	comm	comp	const	critica	declin	delay	digit
	training	peer	feedback	compreh	emotion	self	direct	fragm	gap	group	increa	individu	influe
				discov	interac	loss	netwo	non	outco	overl			
limited	barriers	reduced	knowled	connecti	engagem	support	discov	involv	partic	reinfo	resour	respo	social
				decrease	gaps	technica	discov	isolat	press	spont	strain	stress	strugg
interaction	collaboration	absence	motivatio	delayed	impact	trust	discus	lack	quest	spont	stude	teach	thinki
				effect	limita	rappo	stagn	stude	time	virtua			

What issues teachers face in the absence of face-to-face interaction in online HOTS training, and the effects of online training on training effectiveness and classroom practice?

A word cloud visualization of terms related to digital learning. The most prominent words are 'content', 'knowledge', 'learning', 'communication', 'personalization', 'engagement', 'challenges', 'interaction', 'practice', 'issues', 'reduced', 'disconnect', 'training', 'responses', 'classroom', 'adaptation', 'teacher', 'limited', 'back', 'barriers', 'emotional', 'support', 'autonomy', 'mentorship', 'instructional', 'cultural', 'direct', 'difficulties', 'constraints', 'shallow', 'application', 'overload', 'dynamics', 'digital', 'decline', 'conceptual', 'experience', 'isolation', 'quality', 'skill', 'collaboration', 'inconsistency', 'gap', 'scarcity', 'resources', 'mentoring', 'social', 'technology', 'struggle', 'delayed', 'motivation'.

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worsen the effectiveness of instructional planning. The obstacles to individualization and continuity make classroom training more difficult when there is no clearly defined learning path or practical context. This, in turn, leads to a strong discrepancy between the so-called training experience, the classroom performance, the technical challenges, the deficiency of interaction, the obstacles to learning, the shortage of resources, and the clarity of concepts, which results in reduced instructional efficacy due to the uneven delivery and the lack of immediate feedback. Poor connectivity, low system performance, and limited instructor feedback are barriers to online training that reduce the effectiveness of the Higher-Order Thinking Skills (HOTS) strategy.

Figure 4: The tree map of issues teachers faces in the absence of face-to-face interaction in online HOTS training

content	personalization	communication	disconnect	training	barriers	challenge	classroom	emotional	interaction
			teacher	responses	delayed	experience	motivational	real	technical
	limited	reduced			gap	quality	instructional	isolation	understand
knowledge			issues	lack			adaptation	collaboration	consistency
	practice	learning	engagement	decline	struggle	application	connectivity	inconsistent	overload
					support	digital	difficulties	mentorship	scarcity
								mentorship	shallow
									skill

The tree map highlights the main challenges educators face when helping students develop higher-order thinking skills (HOTS) in online learning. The primary problem is the lack of real-time, face-to-face communication, which can make students feel disconnected, isolated, and less supported by instructors. Other challenges include slow response times and trouble adapting to virtual environments. These issues can reduce students' motivation and interest, potentially affecting learning quality. However, the framework points out that not having in-person interaction does not make online teaching less effective for HOTS or limit its use in regular classrooms.

5. Conclusions

The findings indicate that the absence of face-to-face interaction is a debilitating aspect to the online pedagogical programs aiming to achieve Higher-Order Thinking Skills (HOTS). A lack of interaction that leads to frustration, isolation, and disengagement was one of the key obstacles that teachers cited, and this impacted their ability to successfully apply HOTS strategies. Besides, the effectiveness of online training was also limited by the institutional and technological barriers, inefficient or poor internet connections, limited digital tools, and no feedback mechanisms, which hindered both teachers' ability to implement effective strategies and students' engagement in the learning process. The findings of the research are that, as much as online formats are flexible, meaningful personal interaction is a crucial requirement in the successful design of HOTS and achievement of desired learning outcomes.

6. Discussion

The results of the present research show that online Higher Order Thinking Skills (HOTS) training for primary school teachers in Punjab is not very efficient without face-to-face interaction. The respondents always cited a sense of frustration, loneliness, and a sense of not being involved, and the evidence indicates that meaningful interaction is a very important factor in teacher professional development. These findings are consistent with the past studies that stressed the significance of face-to-face interaction and instant responses to address the cognitive and mental requirements of teachers (Gao, 2023; He & Bagwell, 2023). One issue that was observed in the present investigation is the slow feedback procedure and non-cooperation of the peers, which discouraged the teachers and hindered their ability to understand and implement HOTS most effectively. According to Chiu, Lin and Lonka (2021), motivation in the online learning environment tends to fade because of the

shortage of interaction. Likewise, Liu and Correia (2021) state that less dialogue and collaboration are detrimental to reflective practice, which is critical in acquiring complex pedagogical skills like HOTS. The current study also shows that the failure of teachers to have meaningful discussions to explain the concepts makes them lack confidence to implement HOTS strategies in their classrooms.

The isolation of teachers due to the lack of synchronous interaction was also a phenomenon linked to the lack of peer learning and collaborative problem-solving (Ostovar-Nameghi & Sheikahmadi, 2016). These obstacles play an important role in maintaining professional development interest. Li et al. (2025) noted that low digital competence, combined with the absence of interaction, restricts the engagement of teachers in the online learning platform. Although online training offers flexibility and freedom, these results indicate that human intervention and teaching support cannot be replaced by flexibility. Technological and infrastructural difficulties also made the adverse effect of decreased interaction even more severe. Inadequate internet connectivity, old and outdated equipment, and low levels of digital literacy in rural Punjab were major impediments to the idea of teachers accessing online HOTS education. These results can be correlated with other studies by Rahiem (2020) and Dhawan (2020) that highlight that technical inadequacies hinder the success of online learning, at least in developing countries. These barriers, together with a lack of interaction, created fragmented learning processes that weakened the implementation of HOTS in teaching practice.

Moreover, the research provides the idea that because of the lack of interaction in online training, the concept of HOTS can be superficially understood. El-Sherbiny (2025) said that cognitive development is hampered by the absence of collaborative learning in the online environment, and Khadka et al. (2025) believe that the structure of activities, constant feedback, and guided reflections should be included, which are challenging to provide when the training is purely non-interactive. Altogether, although online professional development programs may widen their access to training, they have a drastically limited ability to train HOTS via online methods due to the lack of in-person communication. These findings are consistent with the current literature, which supports the thesis that interaction can be considered a core aspect of significant teacher learning (Ragab, 2024). This study, therefore, has a lot of support to grant blended learning models through which the learning flexibility of online learning is coupled with the opportunities of communication, collaboration, and feedback that are indispensable. In order to overcome the issues of low connectivity, outdated technology, and low digital literacy levels, a number of effective measures may be taken. The first option is that teachers can change by using offline materials and asynchronous learning resources that cannot be used in real-time (Li et al., 2025). Creation of peer support groups would also help decrease the sense of isolation and promote cooperation, which will positively influence the learning process (He & Bagwell, 2023). They should also provide regular digital literacy workshops to help teachers acquire the skills required to operate on online platforms so that they can consume as much of the training material as possible (Rahiem, 2020). Lastly, the effectiveness of online professional development programs could be greatly improved by means of improving the digital infrastructure and ensuring that the internet connection in rural settings is reliable (Gao, 2023).

6.1. Recommendations

1. Online HOTS training modules should embrace the concept of blended learning, which incorporates online education and face-to-face communication.
2. Online training should have interactive and timely feedback systems to boost the involvement of teachers and overall learning.
3. There is a need to promote digital infrastructure and strong internet connectivity in the state of Punjab, especially in rural areas, to ensure successful online training.
4. The constant training of teachers in digital-skills training should also be provided to enhance their ability to participate in online professional development.
5. Peer learning communities are also needed to facilitate collaboration, exchange of knowledge, and long-lasting professional support.

6.2. Future Research Gap

1. Future research ought to focus on the impact of online education on higher-order thinking skills (HOTS) on the academic performance of teachers in the long run and, therefore, clarify the long-term benefits of online education.
2. The future research should consider alternative methodologies of online training, such as blended learning or gamification, to determine whether these are effective in engaging teachers and reducing the lack of personal interaction.
3. Future studies should examine the long-term impact of the blended learning models on the participation of teachers and the application of HOTS by conducting longitudinal case studies to track the long-term outcomes.
4. The experimental approaches to engage digital literacy interventions and build peer-collaboration clusters might provide some insights into the improvement of the effectiveness of online HOTS training, particularly in rural settings.
5. Future research ought to use larger and more heterogeneous samples across different regions to support the external validity of the findings, enabling results to be extrapolated to resource-constrained settings across the globe.

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