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From Chalkboards To Screens: Tech Integration Challenges For Pre- Service Teachers

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Abstract: Pre-service teachers have the responsibility of establishing the future course of education and hence it becomes imperative to find out and understand the challenges which they face at the training ground. The present study aimed at analyzing the prevalence of difficulty perceived by pre-service teachers in targeted colleges of Uttar Pradesh and establishing the acceptability of suggested approaches to counter those challenges. Using a mixed-method research design, quantitative and qualitative data were gathered. By conducting a semi-structured interview of 10 pre-service teachers and a close-ended questionnaire prepared by themselves gathering feedback from 50 participants, findings indicated that pre-service teachers faced minor challenges in support areas such as administrative support, insufficient workshops and seminars, related activities, and learning environment. The research also pointed out certain challenges like variability among students, supervisors, and peers, poor facilities, poor accessibility of ICT equipment, network connectivity, and poor preparation and training. The resolutions for the challenges put forward were rather satisfactory. These results reinforce that there is a need for more institutional support, quality training programs, and increased accessibility to technology tools to ensure a better learning environment for pre-service teachers.

Keywords- Lesson planning, Pre-service teachers, Technology integration

I. INTRODUCTION

Incorporation of technology in pedagogy is a pre-service requirement for teachers, particularly internships where application of digital media is increasing. Nevertheless, a majority of the pre-service teachers face difficulties such as poor preparation in technology incorporation, poor resources, and inefficient mentorship. Teacher education courses are largely lagging in getting future teachers prepared for technology classrooms, and as such, a majority of them will turn back to conventional pedagogies (Tondeur et al., 2017). Insufficient experience, resistance based on attitudes, and low self-efficacy also hinder technology adoption

(Ertmer, 2005; Chen, 2010). Also, the absence of ICT in schools deprives pre-service teachers of practical experiences that are appropriate (Buabeng-Andoh, 2012). Professional development, reflective practice, and formal mentorship close such gaps (Feiman-Nemser, 2001). The TPACK model justifies combining pedagogy, content knowledge, and technology in an synergetic way (Mishra & Koehler, 2006). The elimination of barriers through effective training, technical assistance, and collaborative learning will allow pre-service teachers to enhance teaching, enhance student motivation, and develop 21st-century teaching capacities (Ertmer & Ottenbreit-Leftwich, 2013).

2. RESEARCH OBJECTIVES

1. Effect of ICT on Lesson Delivery and Feedback – To examine how technology assists pre-service teachers in delivering feedback and the quality of lesson delivery, including motivation and student focus.
2. ICT Training and Teacher Support – To assess the extent of ICT training and organizational support to pre-service teachers and the effect of such support and training on lesson planning.
3. ICT Integration Obstacles – To discover obstacles to the integration of ICT, e.g., technical issues, training requirements, and issues in communicating intangible concepts.
4. Accessibility of ICT Infrastructure – To evaluate accessibility of ICT facilities like smartboards, internet, and multimedia and their impact on teaching.
5. Technology-Facilitated Test Issues – To discover issues related to computer-based tests like ease of use, time constraint, and appropriateness of computer-based tools**.**

3. RESEARCH QUESTIONS

1. What challenges do pre-service teachers face in using ICT for lesson delivery, motivation, and student engagement?
2. How adequate is the ICT training provided to pre-service teachers, and how does it impact their ability to use technology in teaching?
3. How accessible are essential ICT resources such as smartboards, internet, and multimedia tools for pre-service teachers?

4. LITERATURE REVIEW

While exploring the literature related to the challenges faced by the pre-service teachers to incorporate technology in the classroom, following literature found out to be useful moving towards in that direction. Pre-service teachers encounter several challenges in incorporating technology during the lesson planning process, including inappropriate training, insufficient access to facilities, attitude resistance, insufficient mentorship, and resistance to change. A number of researches have studied the challenges in applying ICT during planning and instruction among pre-service teachers, pointing to the necessity of formal preparation, mentoring, and organizational backing. Mishra and Koehler (2006) developed the Technological Pedagogical Content Knowledge (TPACK) framework that takes into account the significance of blending knowledge of technology, pedagogy, and subject matter in teaching. They concluded, based on conceptual analysis and case studies, that pre-service teachers are not provided any ICT training and therefore do not incorporate technology into lesson planning. They recommended that teacher education programs have

technology training incorporated in pedagogy and content knowledge. Similarly, Tondeur et al. (2012) examined ICT training impact on teacher preparedness with quantitative questionnaires. Their study revealed that the pre-service teachers possessed low levels of ICT training, and it affected their confidence and competence in using technology. The study emphasized the need for curriculum-based ICT training and hands-on experience through school-based experience.

Howard et al. (2015) and Buabeng-Andoh (2012) succeeded in determining ICT adoption barriers, where Howard et al. made use of the use of semi-structured interviews and Buabeng-Andoh made use of the use of a literature review. Their outcomes presented some of the major barriers as not getting training, inadequate access to ICT facilities, and teacher attitude that hindered ICT integration. Ertmer (2005) and Hew & Brush (2007) also explored the impact of teacher self-efficacy, attitudes, and beliefs on ICT adoption in case studies, classroom practice observations by teachers, and meta-analysis. Findings revealed that low self-efficacy, technophobia, and confidence were major predictors against technology use in the classroom. Teacher confidence was suggested to be developed through professional development workshops and experiential training to enhance ICT adoption.

Mentorship was also found to have a critical role to play in mentoring pre-service teachers towards ICT integration. Feiman-Nemser (2001) conducted longitudinal studies, and Mouza (2011) used case studies to trace the development of teachers who had benefited from ICT mentorship. They confirmed that without formal mentorship and practical ICT training, it was challenging for pre-service teachers to cross the theory-practice gap. To solve, they promoted formal mentoring programs, school-based ICT exposure, and peer tasks to promote teacher confidence for technology use. Tondeur et al. (2017) and Teo (2011) also investigated the basis on which pre-service teachers would opt for traditional teaching over technology-enhanced teaching through surveys, focus groups, and quantitative content analysis. Their studies had revealed that the teachers liked the traditional pedagogies due to limited exposure to student-centered, technology-based modes of teaching, and underlining the importance of experiential exposure to web- based resources in teacher training.

Since these are some of the key concerns, Ertmer & Ottenbreit-Leftwich (2013) researched institutional and training program support for ICT adoption through interviews, surveys, and literature review. They identified significant solutions like systematic professional development, school-based field experiences, mentoring programs, and institutional support. Their work reinforced the fact that ongoing training and access to ICT resources are instrumental in overcoming technology constraints in education.

In total, these studies underscore the value of training, mentoring, access to resources, and institutional support for effective ICT integration into teacher training. Hindrances such as inadequate training, opposition to change, absence of facilities, and low self- efficacy continue to restrict technology use in classrooms. However, through organized professional development, experience-based practice, and strong institutional support, pre-service teachers can effectively be prepared to integrate technology into instruction, enabling 21st-century learning and student participation.

5. METHODOLOGY

5.1. Research Design

The research utilized a mixed-methods research design, combining quantitative and qualitative methods to ensure an in-depth understanding of the problems experienced by pre-service teachers in incorporating technology in lesson planning. Descriptive survey design was utilized to gather quantitative data, while semi-structured interviews were used to obtain qualitative information, ensuring a holistic analysis.

5.2. Participants and Sampling

50 pre-service students in a Bachelor of Education (B.Ed.) program were taken into account from a random selection technique to allow for a fair and representative population. Out of the respondents, 90.7% consisted of females while 9.3% included males, approximating the population gender distribution on teacher training schemes.

Participants	Percentage
Male	9.3%
Female	90.7%

In addition, 10 pre-service teachers were selected on purpose for semi-structured interviews to gain more insight into their experiences and perceptions about technology integration. Participation in both the survey and interviews was conducted with informed consent collected from all participants to have an ethical compliance.

5.3. Tools for Data Collection

1. Self-Developed Questionnaire -A questionnaire was designed after extensive literature review and pilot-tested by subject experts in educational technology and teacher training.

It consisted of closed-ended and Likert-scale questions for evaluating the degree of issues encountered while integrating technology, availability of resources, and institutional support.

2. Semi-Structured Interviews - In addition to the quantitative results, 10 pre-service teachers also participated in semi-structured interviews to have a better understanding of their coping issues and strategies.

The interview questions were centered around salient themes such as technology problems, teaching problems, accessibility problems, and technology-based readiness for teaching.

5.4. Data Collection Procedure

Data collection was done via physical and electronic distribution of questionnaires to facilitate convenience and ease of access on the part of the participants. Quantitative data gathered using the questionnaire came before qualitative interviewing to allow the study to make sense of and detail statistical results using individual experiences and pre-service teachers' perspectives.

5.5 Data Analysis

·Quantitative Data: The responses to the questionnaires were methodically sorted, coded, and analyzed through descriptive statistical techniques. Frequencies, percentages, and mean scores were determined for accurate interpretation of the results.

·Qualitative Data: Transcribed interviewee responses were analyzed in light of thematic analysis, where commonalities, key issues, and recommendations made regarding the inclusion of technology in lesson planning were noted. This served to contextualize the statistical data by making the statistics real in addition to giving the statistics real-life perceptions and experiences to attach. Through the use of a mixed-methods approach, this research provided a solid and comprehensive view of the technology-related issues that pre-service teachers encounter, both statistically in the form of trends and individually in the form of testimonies, to guide future development in teacher education programs.

5.6. Data Analysis and Interpretation

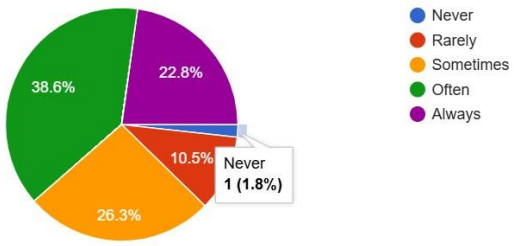

Fig.1 Formal training on using ICT in education

The responses indicated that the majority of the pre-service teachers had been formally trained to some degree in the application of ICT for teaching purposes, but the degree varied. About 38.6% indicated they had been so trained frequently, and 26.3% indicated that they had been trained sometimes. A minority of 22.8% indicated that they had always been trained in ICT formals. However, 10.5% of them reported seldom being offered such training, and 1.8% admitted never having received any formal ICT training at all. These results showed that although most were exposed to training, variations in frequency and exposure could have influenced their preparedness to use technology in teaching effectively.

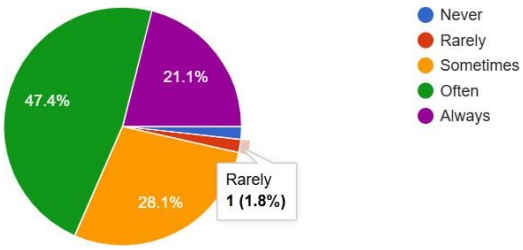

Fig.2. Proper support provided to integrate ICT into lesson plan

The answers indicated that the pre-service teachers were not unanimous in what they believed about ICT use when planning lessons. More than half of the participants (47.4%) reported always getting sufficient support, while 28.1% reported sometimes getting sufficient assistance. But 21.1% reported always getting assistance, indicating that there are individuals who have this as a normalized and institutionalized practice.

Nonetheless, just 1.8% of respondents reported that they seldom got that kind of help, which suggests that some might have struggled on their own.

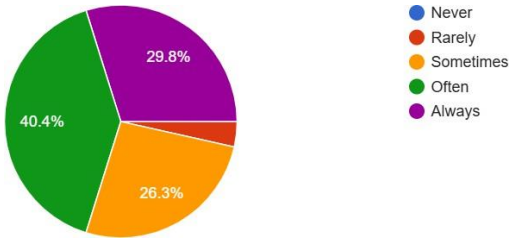

Fig.3. ICT resources beneficial for teaching

Based on the answers, pre-service teachers had various perceptions of what ICT resources would be most appropriate for application in the classroom. Of these, 29.8% believed that the same resources were always useful, and approximately 40.4% believed that ICT tools would prove to be continuously useful for teaching. Though 26.3% of them believed ICT resources were occasionally useful, this implied that usefulness can be context-dependent. An extremely small proportion of participants reported that they rarely benefited from using such resources, but this was found to indicate that teachers tended to appreciate utilizing ICT in their instruction.

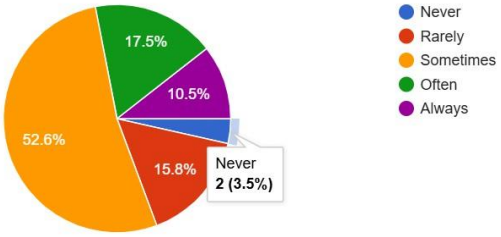

Fig.4 Challenges faced while integrating ICT into lesson plan

Most of the pre-service teachers found it challenging when they were integrating ICT into their lesson plans. Most (52.6%) found it challenging at times, that is, although ICT was helpful, it was not simple to integrate. Moreover, 17.5% of the pre-service teachers found it challenging often to integrate ICT, and 10.5% found it challenging always, that is, some teachers did not have the necessary resources, training, or support. In the meantime, 15.8% seldom experienced any issues at all, and fewer (3.5%) never experienced any. The pattern again confirms that although ICT may potentially optimize teaching, the majority of teachers still required extra training, guidance, or greater access to materials in order to use it effectively in their classrooms.

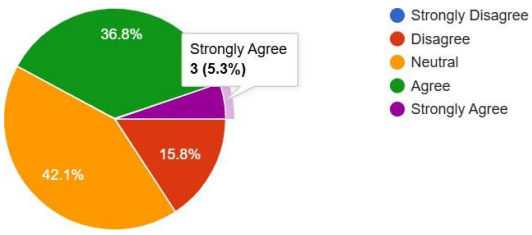

Fig.5 Find difficult to access reliable technology for set induction

Accessing certain technologies to perform pre-determined induction activities was a challenge for most respondents. Perhaps their experiences depended on context since a significant 42.1% remained neutral. Around 36.8% of the respondents indicated that they found it difficult accessing certain technological content, although 15.8% of them refuted this, implying continuous access. Only 5.3% of the respondents, or hardly any at all, strongly suggested that they found it difficult. Altogether, the responses gave a mix of experiences with nearly all of the respondents declaring a certain level of difficulty in getting reliable technology to work with early classroom exercises.

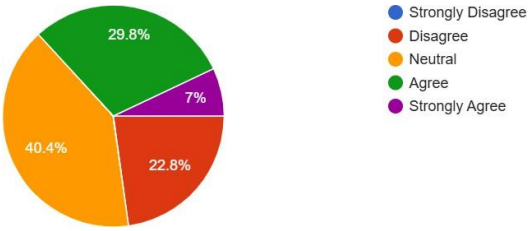

Fig.6 Lack of training hinders ability to effectively use technology at the start of lessons

The majority of the participants struggled to apply technology efficiently at the beginning of lessons due to inadequate teaching. 40.4% of the respondents expressed a neutral view, which could be an indication of hesitation or doubt regarding whether or not the training had a technological effect on them. In contrast, 22.8% disagreed, showing that they were sure even with insufficient training, and 29.8% agreed that one of the significant factors hindering their capacity to integrate with technology was a lack of training.

Just 7% of respondents strongly agreed that they were affected by this issue. Most of the participants recognized that training had enhanced their ability to utilize technology as effectively as possible at the beginning of classes, which reflects a generally balanced experience.

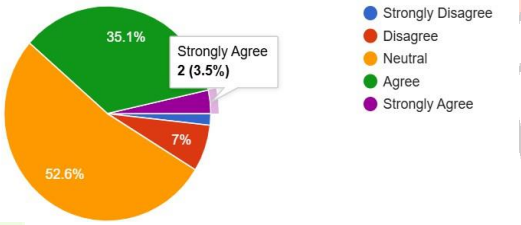

Fig.7 Technical issues often disrupt set induction plan

A half of responders (52.6%) is indifferent to technical complications disrupting their induction schedule. 35.1% agree, and hence over a third are disturbed in some measure due to technical hitches. 3.5% considerably agree and 7% disagree, so most of them that are highly disrupted form only this minority. Overall, the information suggests technical issues may not be a concern for all people, but do affect a notable percentage of instructors and may affect the delivery of lessons.

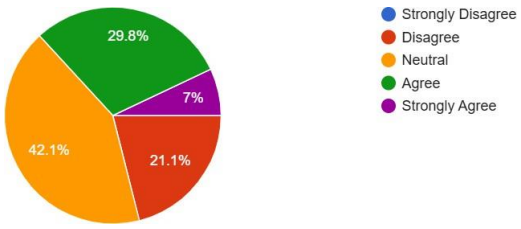

Fig.8 Struggle to find suitable multimedia material for introduction of new topic

As per the pie chart, 42.1% of the respondents have no opinion regarding how difficult it is for them to find suitable multimedia content for new topics. However, 29.8% agree, meaning that nearly one-third of them do experience difficulty in finding suitable information. On the other hand, 21.1% disagree, suggesting that there are instructors who don't consider this an issue, and 7% strongly agree, suggesting a smaller group with extreme problems. In all, while there are some instructors who can access content, there are still many who struggle, suggesting that greater access to multimedia content is necessary.

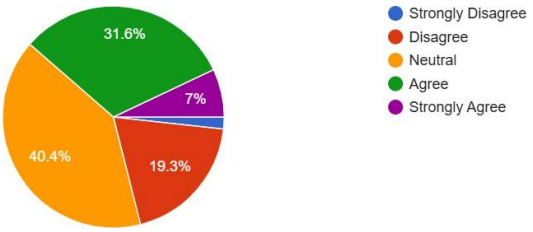

Fig.9 Face challenges in using technology to explain complex concepts

Most of the teachers indicated that teaching difficult concepts through technology was difficult. 40.4% of them were undecided, which could mean that it was a rare problem that they did not consider a serious issue. Around 31.6% agreed with this as applying to them and 7% agreed strongly to indicate that they always had the issue. 19.3% disagreed on the contrary, and this would indicate that they did not face actual barriers, and very few strongly disagreed because they believed they could use technology to describe abstract concepts.

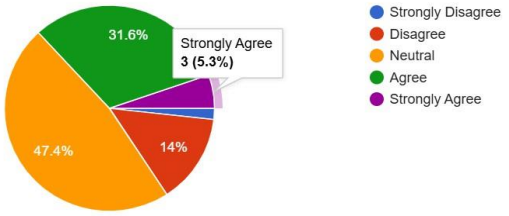

Fig. 10 Insufficient support for incorporating educational software in explanations.

Almost half of the participants (47.4%) did not have an opinion or know about the comment, suggesting they were not aware of it, the research found.But many of the participants agreed with the assertion, with 31.6% of them doing so.In contrast, 14% disagreed, indicating some distrust or dissatisfaction. Few were completely convinced, as indicated by the relatively low percentage of respondents (5.3%) who strongly agreed. Interestingly, strong opposition was either not expressed at all or expressed very minimally. Overall, the findings were that there was definitely a trend towards agreeing rather than opposing, although most people were in the middle.

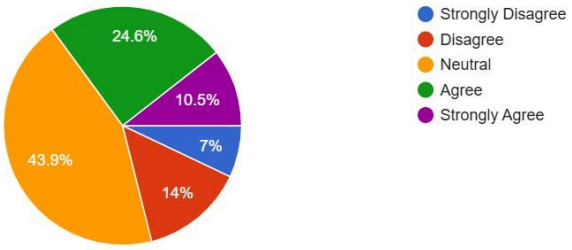

Fig.11 I lack adequate skills to create effective technology-based assessments.

Lacking in self-efficacy or in accordance with divergent experience, most educators (43.9%) were feeling compelled to construct effective technology-based assessments and weren't certain that they could. Further, nearly 24.6% of those questioned perceived that they did not have the appropriate capabilities, 10.5% of them in strong agreement, meaning they felt that they had a real challenge to overcome. While 14% of them disagreed with the notion that they would prefer to use technology in testing in a more natural way, and 7% strongly disagreed, which may be that a few were quite at ease with them without objecting. These two groups of answers indicate that some of them believed they could do it, and the majority found it challenging to develop tests that employed digital technology effectively.

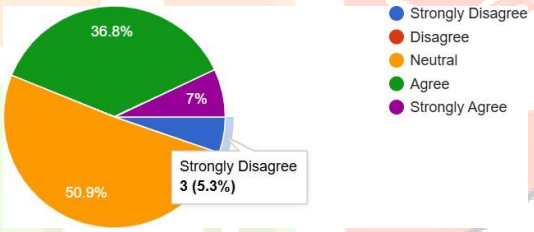

Fig.12 Time constraints make it difficult to integrate technology into evaluations.

Because of a lack of time, most teachers had a hard time incorporating technology into exams. Even though they might have encountered some challenges, over half, or 50.9%, were neutral, which means that it was not a big problem for them all. About 36.8% of the respondents concurred that there was not enough time to be able to utilize technology efficiently, and 7% strongly concurred, implying that it was a problem to them. Conversely, 5.3% of them strongly disagreed, meaning that they did not believe that time was a problem in the utilization of technology for assessment. Hence, although time was a limitation for most of the teachers, some managed to overcome it.

Conclusion

Integrate ICT in the B.Ed curriculum is essential for contemporary education but its application at practice schools too is also confronted with very basic challenges owing to poor infrastructure. 70% of the interns had problems regarding access to ICT, and they used conventional ways of teaching. 60% of the lectures were postponed because of connectivity, and minimal smartboard and Wi-Fi usage interrupted interactive

learning for 50%. And also, 40% of students called for technology-oriented education, but limited resources hindered that. While 20% indicated improvements, ICT institutional support remains low.

Attempts to surmount the shortcomings of ICT were mostly on an individual (60%) basis with little institutional (40%) backing. Pre-service teachers used supplements to the learning through presentations and videos, indicating more institutional support needed.

Improvement areas are professional workshops (60%), internet reliability (50%), technologies like smartboards (40%), AI tools (30%), and online accessibility of material (20%). ICT is valued by pre-service teachers for collaboration and productivity but is hindered by infrastructure needs. Inconsistency in training also affects readiness, where 38.6% received intensive ICT training on a regular basis, but 10.5% received little ICT training.

ICT integration into lesson planning continues to be a challenge, with 52.6% experiencing difficulty, 17.5% often struggling, and 3.5% never experiencing any difficulty. These results confirm the necessity for more training, infrastructure, and institutional support.

Recommendations:

1. Improve ICT infrastructure with reliable internet, smartboards, and basic software.
2. Enhance institutional support with finances, resources, and IT collaborations.
3. Provide regular training and professional development workshops.
4. Offer access to AI tools, interactive platforms, and digital content.
5. Promote blended learning and gamification to engage students.
6. Institute policy interventions that require ICT support in practice schools.
7. Enhance institutional-school collaboration to enhance resource availability.

Resolution of these challenges will further enhance ICT integration in teacher education so that pre-service teachers can use technology effectively in contemporary classrooms.

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