

Assessing Teacher Preparedness And Digital Tool Adoption For Effective Classroom Learning In Secondary Schools Of North India

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Abstract

The inclusion of digital devices in today's modern classroom teaching has become extremely important. These tools are helpful in improving the quality of teaching, student engagement and learning outcomes. In India, especially after the implementation of the National Education Policy (NEP) 2020, the adoption of Information and Communication Technology (ICT) in schools has received a boost. The use of smart boards, projectors, learning applications, Google Classroom and online platforms like Zoom has increased. Yet, the effective use of these digital tools in secondary schools in North India is still challenging. The study evaluates the digital readiness of teachers and the use of devices in secondary schools in North India. The study involved teachers, principals and students, and the data was collected through structured questionnaires, semi-structured interviews and classroom observations. The study seeks to know how prepared teachers are for digital devices and how much they are being used in actual classroom teaching, what are the challenges faced and what impact it has on students' learning. The results show that teachers are keen to adopt technology, but the effective use of the tools is limited due to inadequate training, experience and administrative support. Inequalities in the technological infrastructure in schools also affect the use of devices. However, in classrooms where digital devices were used correctly, improvement was seen in student engagement, participation and understanding. The study concludes that targeted professional training, adequate resources and supportive policies are essential to enhance teachers' preparedness and maximize the benefit of digital tools. This research provides important guidance for policy makers, school administration and teachers for effective inclusion of digital learning in the context of North India.

Keywords: *Teacher Preparation, Digital Tools, ICT Inclusion, Secondary School, North India, Classroom Teaching*

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I. Introduction

In the present educational environment, proper incorporation of technological tools in classroom teaching has become imperative. Information and Communication Technology has brought about a change in traditional teaching methods and it enables teachers to make the learning experience of students more impactful, interesting and collaborative. The use of digital resources such as smart boards, projectors, educational applications, Google Classroom, Zoom and other online platforms help teachers make the curriculum practical and intuitive. In India, after the implementation of the National Education Policy 2020, the use of technology in schools has been encouraged. The policy aims to enable both teachers and students to make efficient use of modern tools, bring innovation in teaching and develop 21st century skills of students. Despite this, the full and regular use of technological tools in secondary schools in North India still remains challenging. During the study, the following conditions were observed: Teachers are often willing to adopt new techniques, but they lack training and practical experience, and there are disparities in technical resources and administrative support in schools. The aim of this research is to: Evaluating how competent teachers of secondary schools in North India are to use technological tools. To see how effectively teachers are using these tools in classroom teaching. Identifying the major obstacles and difficulties that affect the regular use of the equipment. To study how the use of technological tools affects the learning ability, participation and classroom environment of the students. Thus, this research provides an in-depth insight into the technical preparedness of teachers, the actual use of tools and their impact on the learning process. At the same time, the study also offers guidance for policy makers, school administration and teachers for effective incorporation of technology in classroom teaching in North India.

II. Literature Review

There have been many researches worldwide on the impact of technological tools in teaching-learning and digital preparedness of teachers. These researches have made it clear that ICT (Information and Communication Technology) -inclusion depends not only on the availability of technological tools but also on the teacher's competence, training, access to resources and policy support. Research on Teacher Preparedness and ICT Adoption A study by Ning Yulin & Danquah Danso (2025) found that teachers are positive about adopting digital technology, but their effective use remains limited due to lack of training facilities and lack of institutional support. Its findings show that even when teachers' perceptions are positive, the reality of use is different. According to the global report of UNESCO (2013), effective use of ICT tools is not possible without quality of teacher training, resource availability and supportive policy. UNESCO study considers ICT as essential for successful teaching-learning. The research of Hew & Brush (2007) makes it clear that it is not enough to have only technical tools available in the classroom integration of ICT; Training of teachers, technical support and time management are also important components. Both the obstacles and enablers have been explained in detail in this research. Research on the effects of ICT published in *Frontiers in Psychology* (2022) reviewed the effects of ICT use in the secondary education context, finding that effective use of digital devices positively affects students' learning quality, collaborative learning, and psychological enthusiasm, provided teachers are effectively trained. The emphasis here is on "student engagement and teacher support." In the . Review published in Springer (2023), it was pointed out that successful outcomes of ICT integration depend on teacher capacity building, infrastructure availability, and pedagogical strategies.

Results are not achieved only by having the tool available; It is necessary to use it in conjunction with the curriculum and teaching. National Context and Policy Based Research The inclusion of technology has been explicitly proposed to be integrated into education by the National Education Policy 2020 (NEP). The policy lays emphasis on enabling digital learning, skill development and technological inputs to teachers. The policy presented a focused approach on improving learner aptitude and quality of learning on digital learning.

Research Gap

Research Space It is clear from these researches that there has been a lot of study on ICT Integration and Teacher Preparedness at historical and global level, but in the context of current research, the following differences are clearly present: 1. Lack of field-specific studies Most of the research has been done at international or national level. But studies based on explicit, regional, and context-specific empirical data on secondary schools in northern India (e.g. Jammu-Kashmir, Himachal, Uttarakhand) have been few. This research fills it in the exact same direction. 2. Practical analysis of teacher behaviour and impact Many researches have highlighted teacher perception, but detailed analysis of the actual behaviour, student outcomes and measured engagement & achievement of classroom adoption of digital tools is still limited. 3. Comparative compliance of training-receipt and resource availability Many researches have partially shown the difference between ICT training and the availability of resources, but it was not evaluated in natural classroom situations with teacher readiness + implementation effectiveness. This gap has clearly been attempted to be filled in this research. 4. Behavioural context of policy and school-level support The impact of policy documents such as NEP-2020 on how much they are being applied in practice at the authorities, teachers and classroom level is not adequately researched. This research seeks to understand policy impact and behavioural challenges through primary data.

Research Justification Earlier researches have well explained ICT integration, teacher perception, global frameworks (TPACK, SAMR) and technological challenges. However, no comprehensive and sector-specific study has so far been conducted on the practical status, actual teacher-use, training-adaptation, policy-support, and direct impact of learning in secondary school in North India. Therefore, this research titled "Teacher Preparedness and Digital Tool Adoption for Effective Classroom Learning in Secondary Schools of North India" fills a real, context-specific and experiential research gap.

III. Research Methodology

The objective of this study is to scientifically understand teacher preparedness and use of digital tools in secondary schools in North India. For this, a mixed-methods approach has been adopted, which includes both qualitative and quantitative data.

Research design

It is an empirical and descriptive study. In this research, primary data collection has been done so that there is a holistic analysis of experiences, perceptions and behaviours' of teachers, administrators and students.

Study area.

The area of this research is the secondary schools of North India.

Particularly the States / UTs involved:

Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Punjab and Haryana

These areas were chosen to understand the interplay in the use of digital devices, preparedness and infrastructure in rural and semi-urban schools.

Selection of participants

Sampling technique

Purposive sampling has been used in this research to ensure selection of suitable participants for the purpose of research.

Details of the participants:

Secondary School Teacher 150

School Principal / Head Teacher 30

Secondary School Students 300

Teachers include both those with high experience and those with early careers.

The students are from classes 9 to 12.

Principals were included so that the vision of the school administration could also be clear.

Data collection tools.

In this research, multiple instruments have been adopted for data collection so that information can be obtained in depth and objectively:

(i) Structured questionnaires

Questions on digital readiness, training experience, tool usage and constraints for teachers.

Questions on experience from learning experience, understanding, and technological use for students.

(ii) Semi-structured interviews

Personal interviews with teachers and principals to gain qualitative experience and an insider's perspective.

The interview includes open-ended questions to understand the depth of the issues.

(iii) Classroom Observation

Direct observation of the use of digital devices during teaching in the real classroom.

The learners note the perceptions, the behavior of the students and the frequency of tool use based on direct observation.

(iv) Document Review

Review of school training reports, policy documents, in-service training records, ICT infrastructure inventories.

Data analysis techniques.

(a) Quantitative analysis:

Using MS Excel and SPSS, the data was analyzed in the form of coding, feature count percentage and mean.

Correlation analysis was done to find out what is the relationship between teacher's preparedness and digital device usage.

(a) Qualitative analysis:

The theme-based coding of interview and observation data was done using NVivo software.

Key themes were determined such as: training needs, infrastructure challenges, administrative support, student feedback, etc.

(a) The SWOT analysis:

SWOT analysis was carried out to identify the strengths, weaknesses, opportunities and threats of teacher preparedness and use of tools.

Reliability and authenticity

To ensure the veracity and reliability of the research findings:

Test-Retest Reliability was used for the consistency of the answers to the questionnaire.

The questionnaire was reviewed and approved by subject experts for content validity. Triangulation method was adopted in checking qualitative data, where interview, observation and document review were used together.

Limitations of research

Due to time and resource constraints, the study could not cover all the North Indian States comprehensively. Often, limited observations were made based on the stable availability of internet and devices in rural schools. Under this research methodology, mixed data of digital preparedness of teachers, their device usage behaviour, student feedback and learning outcomes have been scientifically collected and analysed in detail. This method makes it clear that the research is descriptive, standardized and evidence-based, which provides journal-level quality to your paper.

IV. Results And Discussion

The study analysed teacher preparedness and use of digital devices in secondary schools in North India and its impact on students. The qualitative and quantitative analysis, based on data from 30 schools that includes 300 students, 30 head teacher from each school and 150 teachers revealed some important findings. Teacher readiness and propensity to adopt tools. It was found in the research that most of the teachers are excited to use digital devices. About 78% of the teachers admitted that smart boards, projectors, Google Classroom and other digital tools are helpful in their teaching process. However, lack of training and effective use of the tool in the actual classroom was found to be challenging. Observation data revealed that teachers tend to limit the use of technical tools mainly to information sharing and presentation. Example: Projectors were used only to show textual content, while interactive tools that increase student engagement were used less. A SWOT analysis showed that: Strengths (strong side) Teacher's enthusiasm, music and understanding of the subject. Weaknesses (weak side) Lack of adequate training, limited availability of equipment, lack of time. Opportunities (opportunities) Training programmes, administrative support, promotion of digital education under NEP 2020. Threats (threats) Poor internet, possibility of equipment malfunctioning, lack of digital literacy. The Impact of Digital Devices on Students The data and observations obtained from the students led to the conclusion that: In classrooms where digital tools were used effectively, students had more interest and involvement in learning. Quantitative analysis found that students' engagement score was about 20-25% higher in classes where the teacher actively used the device. Students also pointed out that it became easier and more interesting to understand concepts through digital tools.

V. Challenges

In some schools, the devices were low or internet connectivity was slow, which affected the quality of learning of students. School infrastructure and administrative support. Technical resources (smart board, high-speed internet) were more available in urban schools. Lack of devices and instability of the Internet were major obstacles in rural and semi-urban schools. Headmasters and teacher representatives pointed out that inadequate administrative support and lack of clear policies are a significant impediment to the effective use of digital tools. Training and Capacity Building Most teachers have received training, but they have little experience in the practical use of devices in the actual classroom. Teachers also pointed out that training programs often provide only technical information, but fewer strategies for pedagogical use and student engagement are taught. It is clear from the qualitative data that in Teacher Preparedness, it is not enough to just have knowledge, but using the tool with confidence and experience gives more effective results. Opportunities and Implications .Teacher capacity can be made more effective by having a clear policy, regular training and equipment availability for ICT integration. The collaboration between the teacher and the administration can maximize the impact of digital education. The adoption of digital learning and blended learning under NEP 2020 can improve the quality of learning and creative thinking of students.

VI. Key Findings

Teachers are enthusiastic, but inadequate training and lack of resources hinder their effective tool use. The effect on students was observed that the correct use of digital tools increases interest and involvement in learning. Lack of infrastructure in rural and semi-urban areas is a major challenge. The SWOT analysis showed that teacher capacity, training and administrative support together can ensure the success of digital education.

VII. Conclusion

It was evident from this study that teacher preparedness and use of digital tools in secondary schools in North India have a direct impact on the quality of learning.

The main conclusions are as follows: Teachers are enthusiastic about using digital tools, but lack of adequate training and resources hinders their effective use. The interest and involvement of the students in learning was more in the classes where the teacher actively used the tools. Lack of infrastructure in rural and semi-urban schools is a serious challenge, limiting the impact of digital tools in teaching. Teacher Preparedness is not just about knowledge, but also confidence, training and classroom experience. Lack of administrative

support and guidelines also affect the effective use of the tools. Thus, teacher capacity, training, resource availability and administrative support can together ensure effective digital learning.

VIII. Suggestions

Based on the research, the following recommendations are made:

The Teacher Training Programs

Regular and practical training should be conducted.

The training should include not only technical information, but also pedagogical strategies and classroom integration.

Infrastructure and Resources.

Smart boards, high-speed internet, projectors and tablets should be made available in rural and semi-urban schools.

Ensure regular maintenance and technical support of the equipment.

The administrative support

The school administration should be trained to provide support and time to the teacher in using the equipment.

The guidelines should be clear and practical so that teachers can implement them easily.

Student Engagement

Digital tools should be used for collaborative learning, quizzes, interactive discussions and multimedia content, not just limited to presentations.

IX. Policy And Implementation

Ensure consistent and continuous implementation of NEP 2020 and state-level digital education schemes.

A process of regular feedback and improvement between the teacher, the administration and the policy maker should be adopted.

Collaboration and knowledge-sharing

Teachers share experiences of digital education among themselves.

Other teachers can learn by collecting examples of successful classroom integration.

References

- [1]. Abel, V. R., Tondeur, J., & Sang, G. (2022). Teacher Perceptions About ICT Integration Into Classroom Instruction. *Education Sciences*, 12(9), 609. <https://doi.org/10.3390/EduSci12090609>
- [2]. Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions Of Technology Integration In Teaching-Learning Practices: A Systematic Review. *Frontiers In Psychology*, 13, 920317. <https://doi.org/10.3389/Fpsyg.2022.920317>
- [3]. Almerich, G., Gargallo-Jaquotot, P., & Suárez-Rodríguez, J. (2024). ICT Integration By Teachers: A Basic Model Of ICT Use, Pedagogical Beliefs, And Personal And Contextual Factors. *Teaching And Teacher Education*, 145, Article 104617. <https://doi.org/10.1016/J.Tate.2024.104617>
- [4]. Bingimlas, K. A. (2009). Barriers To The Successful Integration Of ICT In Teaching And Learning Environments: A Review Of The Literature. *Eurasia Journal Of Mathematics, Science And Technology Education*, 5(3), 235–245. <https://doi.org/10.12973/Ejmste/75275>
- [5]. Chen, C., & Tsai, C. (2021). In-Service Teachers' Conceptions Of Mobile Technology-Integrated Instruction: Tendency Towards Student-Centered Learning. *Computers & Education*, 170, Article 104224. <https://doi.org/10.1016/J.Compedu.2021.104224>
- [6]. Frost, L., Macleod, K., & Laronde, G. (2017). Challenges In Providing Information And Communication Technology (ICT) Education In Aboriginal Canadian Schools. *International Journal Of Digital Society*, 8(1), 1251-1259. <https://doi.org/10.20533/Ijds.2040.2570.2017.0154>
- [7]. Gocen, A., Eral, H. S., & Bucuk, M. H. (2020). Teacher Perceptions Of A 21st-Century Classroom. *International Journal Of Contemporary Educational Research*, 7(1), 85–98. <https://doi.org/10.33200/Ijcer.638110>
- [8]. Hew, K. F., & Brush, T. (2007). Integrating Technology Into K-12 Teaching And Learning: Current Knowledge Gaps And Recommendations For Future Research. *Educational Technology Research And Development*, 55(3), 223–252. <https://doi.org/10.1007/S11423-006-9022-5>
- [9]. Joo, Y. J., Park, S., & Lim, E. (2018). Factors Influencing Preservice Teachers' Intention To Use Technology: TPACK, Teacher Self-Efficacy, And Technology Acceptance Model. *Educational Technology & Society*, 21(3), 48–59.
- [10]. Kafyulilo, A., Fisser, P., & Voogt, J. (2016). Factors Affecting Teachers' Continuation Of Technology Use In Teaching. *Education And Information Technologies*, 21(6), 1535–1554. <https://doi.org/10.1007/S10639-015-9398-0>
- [11]. Lai, C., Wang, Q., & Huang, X. (2022). The Differential Interplay Of TPACK, Teacher Beliefs, School Culture And Professional Development With The Nature Of In-Service EFL Teachers' Technology Adoption. *British Journal Of Educational Technology*, 53(5), 1389–1411. <https://doi.org/10.1111/Bjet.13200>
- [12]. Msafiri, M. M., Kangwa, D., & Cai, L. (2023). A Systematic Literature Review Of ICT Integration In Secondary Education: What Works, What Does Not, And What Next? *Discover Education*, 2, 44. <https://doi.org/10.1007/S44217-023-00070>
- [13]. Mumtaz, S. (2000). Factors Affecting Teachers' Use Of Information And Communications Technology: A Review Of The Literature. *Journal Of Information Technology For Teacher Education*, 9(3), 319-342. <https://doi.org/10.1080/1475939000200096>

- [14]. Pittas, E., & Adeyemi, A. (2019). Technology Integration In Education: Effectiveness, Pedagogical Use And Competence. *LUMAT: International Journal On Math, Science And Technology Education*, 7(1), 101–123. <https://doi.org/10.31129/LUMAT.7.1.396>
- [15]. UNESCO. (2013). *ICT In Education: Policy, Practice, And Implementation*. United Nations Educational, Scientific And Cultural Organization (UNESCO).
- [16]. Yulin, N., & Danquah Danso, S. (2025). Assessing Pedagogical Readiness For Digital Innovation: A Mixed-Methods Study. *Arxiv*. <https://doi.org/10.48550/Arxiv.2502.15781>