



Equity and innovation in Teacher Education in India; A critical Analysis of Digital literacy and Technological Access

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ABSTRACT

The role of teacher education in enhancing the quality of education is in focus and in this age of digitalization, equity and innovation is key to the teacher training. This study critically analyses the issue of equity and innovation in teacher education in India focusing on the aspect of Digital literacy and access to technological resources. The aims of the study is to ventilate the concept of equity in teacher training, measuring digital competence of teacher educators and student teachers, discuss the availability and accessibility of the technology, examine the role of digital innovations in improving teacher preparation, and propose measures for increasing teacher preparation in an equitable and innovative way. This study follows a qualitative research methodology and secondary data is obtained from Government reports, policy documents, research articles, books and publications of national and international organizations. The data gathered were analyses using thematic analysis which sought to examine the important emerging themes, problems and opportunities for equity and digital praxis in

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teacher education. The results reveal that while India has made considerable efforts in implementing technology in teacher training through initiatives like National Education Policy (NEP) 2020 and various digital learning platforms, there are huge gaps in digital infrastructural systems, internet connectivity, and access to technological resources among institutions and regions. Limited use of technology in teaching and learning is also due to the digital literacy gap of teacher educators and trainee teachers. They are especially for institutions in remote and deprived communities. This study finds it is not simply the implementation of digital technologies that is enough for meaningful innovation to occur in teacher education. It requires access to digital resources which is equitable, continuous capacity building, supportive institutional policies, and inclusive practices which will enable all teacher educators and student teachers to access technological advancement equally. This is crucial to build a future-ready inclusive and quality teacher education system in India.

Introduction

Teachers constitute a critical component of an education system and their roles are important in the learning of students, implementation of education policies and national and social development; and this is not a problem that cannot be ignored since teacher education is considered as the pillar of education systems. Success of any educational reform measures to a large extent relies on the quality of teachers and their professional training before reaching the teaching profession. Therefore, teacher preparation is not solely defined by the acquisition of content knowledge and pedagogical skill; it is also about how teachers can embrace new instructional needs, technology developments and various classroom settings. The Information Communication Technology (ICT) has already created a significant change in educational practices around the world in the twenty-first century, and digital competence is now a fundamental part of teacher education (UNESCO, 2018). The embedding of digital technologies in teacher education has led to new possibilities for the enhancement of teaching, learning, evaluation and communication as well as professional development. Digital platforms, online learning management systems, virtual classrooms, educational applications, open educational resources (OER), and artificial intelligence (AI)-based learning tools have increased access to knowledge and flexible and learner-centered approaches to teacher preparation. To



enhance quality, access and lifelong professional development of teachers, several policy initiatives have been taken by the Government of India like NEP 2020, DIKSHA, SWAYAM, PM eVIDYA, and NISHTHA, creating opportunities to use digital technologies as part of teacher education. This has paved the way for opportunities to use digital technologies as part of teacher education in India, such as National Education Policy (NEP) 2020, DIKSHA, SWAYAM, PM eVIDYA and NISHTHA initiatives designed to improve the quality, access, and lifelong professional development of teachers. These initiatives have been taken to prepare future educators for the teaching needs of classrooms equipped with technology tools that demand them, and to foster innovation in teaching methods (Government of India, 2020). However, the advantages of digitalization have not been evenly distributed to society's various parts. Teachers lack access to computer and the digital divide is a real problem in India's teacher education. Socio-economic status, geographical location, institutional resources, gender and access to digital infrastructure still have a differential effect on opportunities for technology-based learning. In rural and remote school teacher education institutions, the internet connection, the environment of the classrooms (computers and digital devices), the power supply and technological support may not be adequate. At the same time, economically disadvantaged trainee teachers face limited digital resources and finance constraints to utilize online learning as a source. Likewise, financially driven and resource driven Hardy learners face challenges in accessing online learning as a resource. These inequalities have a detrimental impact on their chances of learning core digital skills and engaging effectively with teacher education programmes that are more technologically advanced (World Bank, 2020). Digital literacy has become one of the most relevant skills needed by the 21st century teacher. It is more than just being able to use a computer or a digital device; requires the ability to access, assess, develop, share and use digital information ethically and proficiently. The teacher educators and trainee teachers must be digitally literate to incorporate digital tools in their pedagogy, plan for engaging learning experiences, incorporate digital assessment tools and facilitate collaborative learning. A few research have, however, revealed significant differences between the sensitivity of teacher educators' and student teachers' digital competencies, which are often caused by unequal opportunities for teacher training regarding technology, technological resources and institutional support. If digital literacy is not sufficiently developed, the use of innovative teaching practices does not go very far. The pre-Pandemic system of teacher education was also tested by the COVID-19 situation, revealing its weaknesses and strengths. When educational institutions were closed nationwide, teacher education programmes quickly transitioned from Traditional Education to Learning in new online and blended learning spaces. Some institutions adapted well by leveraging digital platforms and virtual learning tools; however, many institutions experienced significant setbacks due to inadequate infrastructure, weak



internet connectivity, insufficient digital devices, and faculty and student teacher's technological unpreparedness. The Pandemic is a stark reminder that access to technology alone is not enough, however, but allowed for a meaningful involvement in the program as well: digital skills, institutional readiness, inclusive educational policies. (Government of India, 2020). All of these experiences highlighted the importance of enhancing digital learning and access to that practice for learners of all means. Equity has therefore grown in salience as a criterion in present day teacher preparation. Equity is more than just an equal opportunity; it is also about fairness and takes into account differences in learners and their access to learning resources and their backgrounds. A fair and balanced teacher education system provides adequate support, technology and learning experience to all teacher educators and all teacher trainees, without distinction for gender, socio-economic status, disability or geographic location. Equity is crucial in this context not only to tackle the learning inequalities, but also to develop teachers that are able to reduce educational disparities and work with diversity and inclusion in school classrooms. The same applies to innovation in teacher training. Teacher training for the requirements of modern education is also vital in terms of innovation. Educational innovation is the use of innovative pedagogical approaches, new digital technologies, learning strategies for collaborative work, competency approach to teaching, innovative forms of evaluation, all of which have a positive effect on the effectiveness of teaching and the learning of students. Innovation, however, is only meaningful if accompanied by equal access to technology tools and enough professional development. Broadly speaking, it is the inadequate infrastructure and digital capacity that institutions and services often have that make it difficult to engage in innovative practices, increasing the already present divide in education. In the present scenario the emphasis of this study is on teacher education issues related to equity and innovation along with major focus on digital literacy and technological access in the context of India. This study aims to explore the relationship between inequalities in digital infrastructure and digital competencies, on one hand, and technology-based teacher education, on the other, and also examines the existing policy initiatives to solve these problems. In addition, it examines the potential of digital innovations for enhancing teacher preparation and how they can be hindered. The research will be based on the examination of the related literature, policy, government reports, and scholarly works, which will result in an understanding of the engagement among equity, digital literacy, technology access, and innovation within teacher education. The results will be useful as inputs to policy makers, teacher educators and educational institutions in developing teacher education programs in a future-oriented, inclusive and equitable approach to teacher education for the future requirements of the digital age.

Need and of the Significance



The increasing use of digital technologies in education has transformed teacher education by creating Given the transformation of teacher education in recent years due to the growing role of digital technologies in the educational setting, the rapid development in these new areas will bring different opportunities for learning and for teacher education. Government of India initiatives like the SWAYAM, DIKSHA, PM eVIDYA and the National Education Policy (NEP) 2020 have contributed to adopting technology in teacher education to enhance quality and accessibility in India (Ministry of Education, 2021). But inequitable digital infrastructure, Internet and technology access, however, remains to be a challenge to effective implementation of such efforts, especially in rural and economically disadvantaged institutions. Such gaps emphasize the importance of considering teacher preparation in both an equity and an innovation lens. Current study is important as it studies the impact of digital literacy and technological access on equitable teacher education in India. It highlights the need for the technological innovation to bring positive results as long as all teacher educators and trainee teachers have equal access and opportunities to utilize digital resources effectively (UNESCO, 2017). The study also highlights that digital literacy is one of the twenty first century teaching skills teachers should possess to meet the demands of the twenty first century education (Ng, 2012). Moreover, the paper critically discusses implementation of policy initiatives like the National Education Policy, NEP 2020 and their contribution to inclusive teacher education for technology and technology enabled inclusive teacher education (Government of India, 2020). The results will contribute to informing policy makers, teacher educators, institutional administrators and researchers about creating evidence-based practices to improve digital inclusion, mitigate inequities in education and foster innovative and equitable practices in teacher education throughout India.

Objectives of the study

This study aims to explore how equity relates to innovation in teacher training in India, specifically exploring digital literacy and technological access. The particular goals of the study are: To Discuss the idea and significance of equity in teacher training in Indian context.

- The levels of digital literacy of the teacher educators and trainee teachers were assessed.
- To discover and analyse the availability, accessibility and use of technological infrastructure and digital resources in Teacher Education Institutes.
- To review and discuss the impact of digital technologies and innovative pedagogy on teacher training.
- To advocate for sensible steps to foster equity and inclusion and innovation in teacher education programs.



Research Methodology

For the purpose of the present study, a qualitative and descriptive secondary data research was carried out. Government reports, policy documents, peer-reviewed journal articles, books, reports of international organizations and official educational websites were used to collect information. The important sources are: National Education Policy 2020, UNESCO documents, Publications of World Bank, documents presented by Ministry of Education. The collected data were analyzed using content analysis technique to determine the main themes observed concerning equity, digital literacy, access to technology and innovations in teacher preparation. This allowed a comprehensive understanding and analysis of existing literature and policy documents, which offered insights into the opportunities, challenges, and policy implications of promoting equitable and technology-driven teacher education in India (Cohen et al., 2018).

Results and Finding

The analysis of secondary data suggests that there are significant differences in digital infrastructure and technology access in different teacher education institutes of India. Urban institutions and the private sector tend to own better computers, have faster internet connections, smart classrooms, and own digital learning platforms as opposed to rural and economically disadvantaged ones. Government teacher education institutions still suffer from poor infrastructure, a lack of internet, and a lack of technological resources to optimize the use of digital technology in education and teaching (Government of India, 2019; World Bank, 2020). The study further unveils substantial differences in the grade of digital literacy of teacher's educators and trainees' teachers. Some teachers are capable of incorporating technology into their classroom, many are not trained, or do not feel confident enough, in using digital tools for pedagogical reasons. This gap can be augmented by the lack of continuous professional development opportunities (UNESCO, 2018). Further, gender, socio-economic status and language are all factors that affect access to digital resources and opportunities for learning. Women teacher trainees and students from marginalized communities also have additional challenges in their access to reliable internet connection and personal digital devices. The results also demonstrate that initiatives like SWAYAM, DIKSHA, PM eVIDYA and other online learning platforms have played a significant role in augmenting learning resources and professional development opportunities at the national level. They differ in their effectiveness by institutions, however, depending on the infrastructure, the digital competencies and readiness of the institutions. The results indicate that technological innovations cannot be a solution by themselves if accompanied by fair access and proper institutional capabilities.



Discussion

The results show here that the concepts of equity and innovation are linked in the context of teacher education. With the development of digital technologies, instructional research and practice have witnessed new possibilities for enhancing the quality of teacher preparation learning with online learning, blended learning, virtual classrooms, digital assessment, and collaborative learning. These innovations can be transformative for teacher education, enabling the learning process to be flexible, accessible, learner-centered and fostering lifelong learning (LPs) (UNESCO, 2018). But the report also identifies that there are still disparities in access to technology that hinder the advantages of digital innovation. Use of technology in teaching cannot be implemented fully in the institutions that do not have proper infrastructure and digital facilities. Likewise, when teacher educators lack digital literacy, it becomes ineffective to involve technology in the teaching of teacher education programmes. The challenges identified point to a need for capacity building, institutional support, as well as inclusive policies to support innovation being built but also technological investments. The National Education Policy (NEP) 2020 strengthens the cadre of digitalization in teacher training by promoting technology integration, teacher training, and access equity. However, the implementation of such activities is a long-term process and needs sustained investment in digital infrastructure, continuous professional development as well as regular monitoring to ensure that the fruits of digital innovation are available to all teacher education institutions, including marginalised and rural areas.

Conclusion

The study concludes that the two key aspects of good teacher education in India are equity and innovation, which compliment well. In the ever-changing landscape of education, digital technologies are playing a growing role in how the field operates and preparing confident and competent teachers for the future. A technology-literacy empowering the teacher requires equitable access to technological resources and robust development of teachers' digital literacy. Despite the advent of National Education Policy (NEP) 2020, DIKSHA, SWAYAM and PM eVIDYA, there remain huge opportunities and resources for digital learning and professional development; but there are persistent inequalities in access to infrastructure, digital skills, and institutional capacity as a whole to achieve the goals of these policy instruments fully. The results prioritize the need for digital literacy to be considered as a key professional competency instead of a technical competency. Sharing and encouragement of teachers and teacher educators takes place in the background as continuous developments of teachers are guided through continuous training and institutional support in technology integration into teaching and learning, as well as assessment. Simultaneously, there



should be targeted actions taken towards enhancing digital infrastructure, internet connectivity and access to quality digital resources especially in rural and disadvantaged institutions. In short, the study emphasizes how innovative and sustainable improvement and enhancement of teacher preparation will only be possible when technological developments are coupled with equity, inclusion, and ongoing capacity development. A comprehensive framework involving policy measures, enhancements in infrastructure, professional development and access to digital opportunities in an equitable manner shall help build up Teacher Education and can play a role in building an inclusive and quality education system in India.

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