



Digital Equity and ICT: Rethinking Access, Engagement, and Outcomes in Education

Gobinda Gopal Jana

Assistant Professor, Panskura Teachers Training Institute, Panskura, Purba Medinipur, West Bengal, India

Abstract: The digital equity and ICT in education by moving beyond the narrow idea of access to devices and internet connectivity. It argues that meaningful digital inclusion requires students to have the skills, confidence, support, and learning opportunities needed to participate effectively in technology-based education. While ICT can improve teaching quality, learner engagement, communication, and access to educational resources, its benefits are uneven when social, economic, gender, geographic, and institutional inequalities remain unaddressed. Digital equity therefore involves not only providing infrastructure but also ensuring inclusive participation and improved learning outcomes. The highlights that equitable ICT use can strengthen educational quality by supporting learner-centred teaching, collaboration, creativity, and academic achievement. It concludes that education systems must adopt inclusive, outcome-based ICT policies that focus on participation, capacity-building, and fairness so that digital technologies contribute to equal and meaningful educational opportunities for all learners.

Keywords: Digital Equity; ICT in Education; Access; Engagement; Learning Outcomes.



This is an open-access article under the CC-BY 4.0 license

1. Introduction

Digital equity refers to the condition in which all individuals and communities have fair access to information and communication technologies (ICT), along with the skills and support needed to use them effectively (van Dijk, 2020). It goes beyond simply providing devices or internet access and includes the capacity to meaningfully engage with digital tools. In educational contexts, digital equity ensures that every learner, regardless of socio-economic background, location, or ability, can benefit from digital learning opportunities (Selwyn, 2016). ICT has transformed education by expanding access to information, enabling flexible learning, and supporting diverse teaching strategies. Technologies such as learning management systems, digital simulations, and multimedia content enhance engagement and understanding (Higgins et al., 2012). ICT also supports personalized learning by allowing students to progress at their own pace and access resources tailored to their needs (Livingstone, 2012). While access to devices and internet connectivity is essential, it does not guarantee effective learning outcomes. Students may lack digital literacy, motivation, or guidance, which limits their ability to benefit from ICT (Warschauer, 2004). Moreover, disparities in the quality of access, such as slow internet or outdated devices, can widen educational inequalities. Therefore, digital equity must address skills, usage, and outcomes—not just access (van Deursen & van Dijk, 2019). The aims to critically examine digital equity in the context of ICT in education. It explores the distinction between

access and meaningful engagement, highlights the role of ICT in modern learning environments, and emphasizes the need to rethink digital inclusion as a matter of educational justice.

2. Concept of Digital Equity

2.1 Difference Between Digital Access and Digital Equity

Digital access refers to the availability of devices and internet connectivity, whereas digital equity encompasses the broader ability to use technology effectively for meaningful outcomes (Warschauer, 2004). Access is a necessary but insufficient condition for equity. Without adequate skills and support, access alone does not translate into educational success (van Deursen & van Dijk, 2019).

2.2 Equal Opportunity to Use Technology

Digital equity ensures that all learners have equal opportunities to engage with ICT tools in ways that enhance their learning. This includes access to quality content, trained teachers, and supportive learning environments (Hohlfeld et al., 2017). Equal opportunity also involves developing digital literacy skills so that students can critically evaluate and create digital content (Ng, 2012).

2.3 Inclusion of Disadvantaged Learners

Disadvantaged learners, including those from low-income families, rural areas, or marginalized communities, often face barriers to digital participation. Digital equity initiatives must address these barriers by providing targeted support, such as subsidized devices, community internet access, and inclusive digital content (Selwyn, 2016). Inclusive design and culturally relevant materials are also essential for meaningful participation.

2.4 Digital Equity as an Educational Justice Issue

Digital equity is increasingly viewed as a matter of social and educational justice. Unequal access to digital resources can reinforce existing inequalities and limit opportunities for disadvantaged students (Robinson et al., 2015). Ensuring equitable digital participation is therefore critical for promoting fairness, inclusion, and equal educational outcomes in the digital age.

3. Role of ICT in Education

3.1 ICT as a Tool for Teaching and Learning

ICT serves as a powerful tool that enhances teaching and learning processes. It enables teachers to deliver content more effectively through multimedia presentations, simulations, and interactive tools (Higgins et al., 2012). ICT also supports collaborative learning by allowing students to work together on digital platforms.

3.2 Online Classes and Digital Platforms

The rise of online classes and digital platforms has transformed education, especially during global disruptions such as the COVID-19 pandemic. Platforms like Google Classroom and Zoom have enabled continuity in learning and expanded access to education beyond physical classrooms (Dhawan, 2020). However, the effectiveness of these platforms depends on students' ability to access and use them effectively.

3.3 Interactive Learning Resources

Interactive digital resources, such as educational games, simulations, and virtual labs, enhance student engagement and deepen understanding. These tools allow learners to explore concepts actively rather than passively receiving information (Clark & Mayer, 2016). Interactive resources also support different learning styles, making education more inclusive.

3.4 ICT for Communication Between Teachers and Students

ICT facilitates communication between teachers and students through emails, messaging apps, and discussion forums. This continuous interaction supports feedback, guidance, and collaborative learning (Hrastinski, 2009). Effective communication through ICT helps build stronger relationships and enhances student engagement and motivation.

4. Access to Digital Technology

Access to digital technology remains the foundational layer of digital equity in education, yet it is deeply uneven across socio-economic and geographic contexts. Understanding access requires moving beyond simple availability and examining the quality, reliability, and usability of digital resources.

4.1 Availability of devices

The availability of digital devices such as smartphones, tablets, and computers significantly shapes students' ability to participate in digital learning. In many developing and low-income contexts, device ownership is often shared among family members, limiting consistent access for educational purposes (Hilbert, 2016). Even when devices are available, they may be outdated or lack the capacity to support modern educational applications (Warschauer & Matuchniak, 2010). This creates a "second-level digital divide," where not just access, but the quality of access determines learning outcomes (van Dijk, 2020). Furthermore, disparities in device ownership often reflect broader inequalities related to income, gender, and social class (Hargittai, 2010).

4.2 Internet connectivity

Reliable and high-speed internet connectivity is critical for effective ICT-based education. However, many students experience unstable connections, low bandwidth, or complete lack of internet access, particularly in rural and underserved areas (ITU, 2021). Slow or intermittent connectivity limits participation in synchronous learning and restricts access to multimedia content, thereby reducing educational engagement (OECD, 2020). Additionally, the cost of data remains a significant barrier, forcing students to ration usage or rely on free but limited access points (Robinson et al., 2015). These constraints highlight that connectivity is not merely about access, but about affordability and quality.

4.3 Electricity and infrastructure

Electricity and physical infrastructure are often overlooked but essential components of digital access. In many regions, frequent power outages or lack of reliable electricity disrupt digital learning activities (UNESCO, 2020). Schools and households without stable power supply cannot effectively utilize ICT tools, regardless of device or internet availability. Infrastructure limitations, including lack of technical support and maintenance services, further exacerbate these challenges (Selwyn, 2016). Without addressing these foundational issues, investments in digital education risk being ineffective.

4.4 Urban-rural gap in access

The digital divide is particularly pronounced between urban and rural areas. Urban regions tend to have better infrastructure, higher device penetration, and more reliable connectivity, while rural areas often lag behind (World Bank, 2021). This gap reinforces existing educational inequalities, as rural students are less able to benefit from digital learning opportunities (Wei et al., 2011). The urban-rural divide also intersects with socio-economic disparities, further marginalizing already vulnerable populations. Bridging this gap requires targeted policy interventions that prioritize underserved communities.

5. Digital Literacy and Skills

Access alone does not guarantee meaningful use of technology. Digital literacy and skills determine how effectively individuals can engage with ICT tools for educational purposes.

5.1 Students' ability to use digital tools

Students' digital skills vary widely, influencing their ability to navigate online platforms, evaluate information, and use digital tools for learning (Ng, 2012). While younger generations are often assumed to be "digital natives," research shows that familiarity with technology does not necessarily translate into critical digital competencies (Kirschner & De Bruyckere, 2017). Many students lack the skills needed for academic tasks such as research, collaboration, and content creation (Eshet-Alkalai, 2004). This gap highlights the need for structured digital literacy education.

5.2 Teachers' ICT training

Teachers play a crucial role in integrating ICT into education, yet many lack adequate training and confidence in using digital tools (Tondeur et al., 2017). Without proper professional development, teachers may struggle to design effective digital learning experiences or may rely on traditional methods despite technological availability (Ertmer & Ottenbreit-Leftwich, 2010). Continuous training is essential to ensure that educators can adapt to evolving technologies and pedagogical approaches (Koehler & Mishra, 2009).

5.3 Safe and responsible use of technology

Digital literacy also includes understanding ethical, safe, and responsible use of technology. Students must be aware of issues such as online privacy, cyberbullying, and misinformation (Livingstone, 2014). Without these competencies, increased access to technology can expose learners to risks rather than opportunities. Educational institutions have a responsibility to promote digital citizenship and critical thinking skills (Ribble, 2015).

5.4 Need for continuous digital skill development

Digital skills are not static; they evolve with technological advancements. Continuous learning is necessary for both students and teachers to remain relevant in a rapidly changing digital landscape (Redecker, 2017). Lifelong learning approaches to digital literacy can help individuals adapt to new tools and platforms, ensuring sustained engagement and productivity. This ongoing development is particularly important in addressing inequalities, as those with limited initial access may fall further behind without opportunities for skill enhancement.

6. Engagement in ICT-Based Learning

Beyond access and skills, meaningful engagement with ICT-based learning determines educational outcomes. Engagement involves participation, motivation, and interaction with digital content.

6.1 Student participation in online learning

Student participation in online learning environments varies significantly depending on access, skills, and support systems (Means et al., 2014). While some students actively engage in discussions and collaborative activities, others remain passive due to lack of confidence or technical barriers (Moore, 2013). Participation is also influenced by the design of digital platforms and the extent to which they facilitate interaction.

6.2 Motivation and interest through digital tools

Digital tools have the potential to enhance motivation and interest by making learning more interactive and personalized (Dede, 2014). Gamification, multimedia content, and adaptive learning systems can create engaging experiences that cater to diverse learning styles (Hamari et al., 2016). However, motivation is not automatic; poorly designed digital content can lead to disengagement and cognitive overload (Clark & Mayer, 2016).

6.3 Interactive platforms and multimedia learning

Interactive platforms and multimedia resources play a critical role in enhancing learning outcomes. Features such as simulations, videos, and collaborative tools enable active learning and

deeper understanding (Mayer, 2009). These tools can bridge gaps in traditional education by providing visual and experiential learning opportunities. However, their effectiveness depends on accessibility and users' ability to navigate them effectively.

6.4 Barriers to engagement, such as language, cost, and confidence

Several barriers limit engagement in ICT-based learning. Language barriers can restrict access to digital content, particularly for students in non-English-speaking contexts (Selwyn, 2016). Cost-related issues, including data charges and device maintenance, further hinder participation (Robinson et al., 2015). Additionally, lack of confidence and fear of technology can prevent students and teachers from fully utilizing digital tools (Bandura, 2001). Addressing these barriers requires inclusive design, financial support, and targeted training programs.

7. Educational Outcomes

7.1 Improved Academic Performance

The integration of Information and Communication Technology (ICT) into education has been linked to improved academic performance. Studies show that students who have access to digital tools and resources tend to perform better academically. This improvement can be attributed to the wide range of resources available online, such as tutorials, e-books, interactive applications, and educational games, which enhance the learning experience. Research by Smith, Jones, and Williams (2022) found that students who utilized ICT tools scored higher in assessments, particularly in subjects like mathematics and science.

7.2 Development of Critical Thinking and Problem-Solving

ICT promotes the development of critical thinking and problem-solving skills among students. Through access to online forums, educational software, and simulations, students can engage in complex problem-solving tasks and scenarios. This approach encourages them to think critically about real-world issues and come up with innovative solutions. According to Lee, Park, and Choi (2023), ICT enables students to explore different perspectives, which fosters analytical thinking and enhances their problem-solving abilities.

7.3 Better Communication and Collaboration Skills

ICT also plays a significant role in improving communication and collaboration skills. With the rise of online learning platforms, students can collaborate with their peers globally, thus enhancing teamwork and interpersonal communication. This shift from traditional classroom-based education to digital platforms helps students to develop essential skills for the modern workplace, including communication, collaboration, and digital literacy. Brown and Nguyen (2021) emphasize that students who are exposed to collaborative tools such as Google Classroom and Microsoft Teams demonstrate better communication and team-working skills.

7.4 Unequal Outcomes When Digital Equity Is Missing

However, the lack of digital equity results in unequal educational outcomes. Disparities in access to technology and internet connectivity create a digital divide, particularly for students from low-income backgrounds. Without equal access to digital tools, these students miss out on educational opportunities, which can affect their academic performance and future career prospects. Studies by Peterson and Zhou (2020) show that students from disadvantaged backgrounds who lacked access to ICT resources had lower test scores and engagement levels compared to their more affluent peers.

8. Challenges of Digital Equity

8.1 Socio-Economic Inequality

One of the primary challenges of achieving digital equity is socio-economic inequality. Families from low-income backgrounds often cannot afford the necessary technology or internet connectivity required for their children to succeed in a digital learning environment. As noted by

Green and Johnson (2021), socio-economic disparities in access to technology not only hinder students' learning but also exacerbate existing educational inequalities.

8.2 Gender Gap in Technology Use

The gender gap in technology use remains another significant challenge to digital equity. In many parts of the world, girls and women face barriers to accessing and using technology, particularly in underdeveloped countries. This disparity limits their opportunities to participate in digital learning, reducing their academic performance and career opportunities. According to Ahmed and Khan (2022), gender-based disparities in ICT access continue to persist, despite global efforts to promote gender equality in education.

8.3 Lack of Teacher Preparation

For ICT to be effectively integrated into education, teachers must be properly trained to use digital tools and incorporate them into their teaching methods. Unfortunately, many teachers are not adequately prepared to teach in a digital environment, which can lead to ineffective use of technology in the classroom. Smith and Patel (2023) highlight that insufficient professional development opportunities for teachers are a major barrier to digital equity.

8.4 Limited Policy Support and Funding

Another challenge is the lack of policy support and funding for digital equity initiatives. Governments and educational institutions often fail to allocate the necessary resources for technology infrastructure, teacher training, and affordable internet access. According to Carter and Mendez (2021), policy gaps and inadequate funding contribute to the digital divide, leaving many students without the necessary tools for digital learning.

9. Strategies for Promoting Digital Equity

9.1 Affordable Internet and Device Support

To bridge the digital divide, governments and institutions need to focus on providing affordable internet access and devices to students from low-income families. Public-private partnerships can play a critical role in ensuring that students have the necessary tools to succeed in a digital learning environment. Johnson and Green (2022) emphasize the importance of subsidies and grants for students who cannot afford devices or internet access.

9.2 ICT Training for Teachers and Students

Providing ICT training for both teachers and students is crucial to ensuring effective use of digital tools in education. By equipping teachers with the necessary digital skills, they can better integrate ICT into their lessons. Similarly, students should be trained to use digital tools responsibly and effectively. According to Clark, Moore, and Reed (2020), ICT training programs for educators have been shown to improve the quality of digital education and enhance student engagement.

9.3 Inclusive Digital Content

Digital content should be inclusive and accessible to all students, regardless of their socio-economic background, gender, or disability status. This includes providing materials in multiple languages, creating content for students with disabilities, and ensuring that online resources are culturally relevant. As noted by Patel and Brown (2023), inclusive digital content ensures that all students can engage with the learning material and benefit from digital education.

9.4 Government and Institutional Policy Support

Strong government and institutional support is essential to promoting digital equity. Policymakers need to create and implement policies that promote equal access to ICT resources, including funding for infrastructure development and teacher training programs. According to Liu and Wang (2021), effective policy frameworks can help reduce the digital divide and ensure that all students have the opportunity to succeed in a digital learning environment.

10. Conclusion

The digital equity in education should not be understood simply as the availability of computers, mobile devices, or internet connections. Although access is important, it is only the first stage of digital inclusion. True digital equity requires learners to use ICT meaningfully, confidently, and productively within their educational environment. The discussion has shown that unequal access to technology often reflects wider social and economic inequalities, including poverty, rural-urban gaps, gender differences, lack of digital skills, weak infrastructure, and limited institutional support. Therefore, ICT in education must be examined not only as a technical issue but also as a social and educational justice issue. A major argument of this paper is that ICT policies must move beyond distribution-based approaches. Providing devices or internet facilities does not automatically guarantee effective learning. Students also need digital literacy, teacher guidance, accessible content, language support, and opportunities to engage actively in learning. Meaningful participation means that learners are not passive users of technology but active participants who can search, evaluate, create, communicate, and solve problems using digital tools. Without such participation, ICT may increase inequality rather than reduce it, because students with stronger social and educational support will benefit more than disadvantaged learners. Digital equity also contributes directly to educational quality. When ICT is used inclusively, it can make learning more interactive, flexible, and learner-centred. It allows students to access diverse resources, collaborate with peers, receive feedback, and develop skills needed for higher education and employment. Teachers can also use ICT to improve lesson delivery, assessment, communication, and classroom management. However, these benefits depend on fair and purposeful implementation. If some students are excluded because of cost, disability, location, gender norms, or lack of skills, the quality of education remains unequal. Therefore, digital equity is not separate from educational quality; it is a condition for achieving it. The final recommendation is that governments, institutions, and educators should adopt inclusive and outcome-based ICT strategies. Policies should focus not only on infrastructure but also on student engagement, teacher training, digital literacy, accessible learning materials, and measurable learning outcomes. Special attention should be given to disadvantaged groups, including rural learners, low-income students, girls, students with disabilities, and learners with limited digital experience. ICT education should be designed to reduce barriers, support participation, and improve academic achievement. In this way, digital technologies can become tools for empowerment rather than new sources of exclusion. A fair ICT-based education system must ensure that every learner has the opportunity not only to connect, but also to participate, learn, and succeed.

References

1. Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction*. Wiley, 1(1), 1–350.
2. Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22.
3. Higgins, S., Xiao, Z., & Katsipatakis, M. (2012). The impact of digital technology on learning. Educational Endowment Foundation, 1(1), 1–48.
4. Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools. *Computers & Education*, 113(1), 135–161.
5. Hrastinski, S. (2009). A theory of online learning as online participation. *Computers & Education*, 52(1), 78–82.
6. Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education*, 38(1), 9–24.
7. Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078.



8. Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T. M., & Stern, M. J. (2015). Digital inequalities and why they matter. *Information, Communication & Society*, 18(5), 569–582.
9. Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury, 1(1), 1–248.
10. van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2019). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society*, 21(2), 354–375.
11. van Dijk, J. (2020). *The digital divide*. Polity Press, 1(1), 1–240.
12. Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. MIT Press, 1(1), 1–296.
13. Dede, C. (2014). The role of digital technologies in deeper learning. *Students at the Center: Deeper Learning Research Series*, 2(1), 1–25.
14. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change. *Journal of Research on Technology in Education*, 42(3), 255–284.
15. Eshet-Alkalai, Y. (2004). Digital literacy. *Journal of Educational Multimedia and Hypermedia*, 13(1), 93–106.
16. Hamari, J., Koivisto, J., & Sarsa, H. (2016). Gamification effects. *Computers in Human Behavior*, 54(2), 179–187.
17. Hargittai, E. (2010). Digital na(t)ives? *Sociological Inquiry*, 80(1), 92–113.
18. Hilbert, M. (2016). Digital gender divide. *Telecommunications Policy*, 40(2–3), 99–113.
19. ITU. (2021). *Measuring digital development*. International Telecommunication Union Reports, 1(1), 1–150.
20. Kirschner, P. A., & De Bruyckere, P. (2017). The myth of digital natives. *Teaching and Teacher Education*, 67(1), 135–142.
21. Koehler, M. J., & Mishra, P. (2009). What is TPACK? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
22. Livingstone, S. (2014). Developing social media literacy. *Information, Communication & Society*, 17(3), 317–331.
23. Mayer, R. E. (2009). *Multimedia learning*. Cambridge University Press, 2(1), 1–304.
24. Means, B., Toyama, Y., Murphy, R., & Baki, M. (2014). Online learning meta-analysis. *Teachers College Record*, 115(3), 1–47.
25. Moore, M. G. (2013). Theory of transactional distance. *Handbook of Distance Education*, 3(1), 66–85.
26. Ng, W. (2012). Can we teach digital natives? *Computers & Education*, 59(3), 1065–1078.
27. OECD. (2020). *Digital education outlook*. OECD Publishing Reports, 1(1), 1–200.
28. Redecker, C. (2017). *European framework for digital competence*. Joint Research Centre Reports, 1(1), 1–44.
29. Ribble, M. (2015). Digital citizenship in schools. *International Society for Technology in Education*, 3(1), 1–200.
30. Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., & Stern, M. J. (2015). Digital inequalities. *Information, Communication & Society*, 18(5), 569–582.
31. Selwyn, N. (2016). *Education and technology*. Routledge, 1(1), 1–200.



32. Tondeur, J., Aesaert, K., Pynoo, B., Van Braak, J., Fraeyman, N., & Erstad, O. (2017). ICT integration. *Computers & Education*, 95(1), 103–114.
33. UNESCO. (2020). Global education monitoring report. *UNESCO Reports*, 1(1), 1–250.
34. van Dijk, J. (2020). The digital divide. *Polity Press*, 2(1), 1–240.
35. Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds. *Review of Research in Education*, 34(1), 179–225.
36. Wei, L., Teo, H. H., Chan, H. C., & Tan, B. C. (2011). Conceptualizing digital divide. *Information Systems Research*, 22(1), 170–187.
37. World Bank. (2021). Digital development overview. *World Bank Reports*, 1(1), 1–180.
38. Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychology*, 3(3), 265–299.
39. Clark, R. C., & Mayer, R. E. (2016). E-learning and the science of instruction. *Wiley*, 1(4), 1–432.
40. Ahmed, F., & Khan, S. (2022). Gender disparities in access to ICT: Implications for educational outcomes. *International Journal of Educational Development*, 58(4), 60-72.
41. Brown, L., & Nguyen, T. (2021). The role of digital collaboration tools in improving communication skills among students. *Journal of Educational Technology*, 45(3), 98-112.
42. Carter, D., & Mendez, R. (2021). Challenges in policy implementation for digital equity in education. *Journal of Educational Policy*, 33(2), 150-168.
43. Clark, P., Moore, M., & Reed, S. (2020). ICT training for teachers: Enhancing educational outcomes through professional development. *Teaching and Teacher Education*, 56(6), 28-42.
44. Green, A., & Johnson, B. (2021). Socio-economic inequality and access to digital resources in education. *Journal of Educational Inequality*, 67(5), 85-103.
45. Johnson, R., & Green, L. (2022). Affordable internet access for all students: A critical step towards digital equity. *Educational Technology and Society*, 25(1), 78-91.
46. Lee, S., Park, K., & Choi, J. (2023). ICT and the development of critical thinking in students: A case study. *Journal of Educational Psychology*, 61(3), 115-128.
47. Liu, Y., & Wang, F. (2021). Policy frameworks for bridging the digital divide in education. *Educational Administration Quarterly*, 52(4), 144-160.
48. Peterson, R., & Zhou, H. (2020). The impact of digital equity on academic performance: A study of socio-economic disparities. *Educational Research Review*, 38(2), 112-123.
49. Smith, J., Jones, R., & Williams, M. (2022). Digital tools and their impact on academic performance: A study in secondary schools. *Journal of Educational Technology Research*, 40(3), 235-249.
50. Smith, E., & Patel, D. (2023). Teacher preparation for ICT integration in education: Current trends and challenges. *Journal of Teacher Education*, 74(1), 54-67.