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Digital Divide in Education: Barriers to Equal Learning Opportunities

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Abstract

Digital technologies have revolutionised the way education is taught and learned globally. The digital divide, however, has increased inequality in access to digital resources, posing a challenge in attaining equitable learning outcomes. This paper reviews the digital divide in education and discusses technological, economic, social, geographical and institutional barriers to equal learning opportunities. It examines the impact of inequities in access to high quality digital devices, technological infrastructure, and digital literacy on students' academic participation, engagement, and performance. The study also examines how the indicators of socioeconomic status, rural–urban differences, gender differences, and policy implementation affect digital inclusion.

Based on the latest research articles and the experiences gained in education in other parts of the world, the paper uses a review approach to compile and synthesize the existing evidence on the causes, implications and possible solutions of the digital divide. The results suggest that technical limitations, lack of preparedness of teachers, lack of institutional support and lack of budget constraints are still limiting the effective use of digital learning platforms. These barriers lead to unequal learning experiences, higher loss of learning in schools, and lower opportunities for skill development and acquisition, including for marginalized and disadvantaged populations.

The study highlights the need for a concerted action by governments, education institutions, technology providers and communities to close the digital divide. The investment of digital infrastructure, affordable internet services, in-service training for teachers, digital literacy education, educational policy and digital accessible technologies are recognized as key steps in supporting equity in education. The paper concludes that closing the digital divide is vital to build inclusive, resilient and sustainable education systems that can provide for lifelong learning in a digital society.

Keywords: Digital divide, educational equity, digital inclusion, online learning, digital literacy, educational technology, internet access, learning opportunities.

1. Introduction

Digital technologies have rapidly grown in their integration into education and have revolutionised the creation, sharing and access to knowledge around the globe. The opportunities for learners are increasing with the help of online learning platforms, virtual classrooms, educational applications, cloud-based resources, and artificial intelligence, which provide flexible, personalized, and interactive learning experiences. The technological progress has gained even more importance after the transition to remote and hybrid learning around the world, as it has become clear that digital infrastructure is a crucial link in the chain of continuity in education. Digitalization has added to the ways in which teaching and learning outcomes can be improved, but it has also highlighted major educational resource inequalities. The digital divide is the difference between people and communities with and without access to digital technologies. This divide is not just about having access to the Internet, or to digital devices, but also about digital literacy, technological skills, cost, access and the quality of digital infrastructure. Students' inequities directly affect their learning opportunities in an online setting, access to learning materials, and access to their teacher; as well as the acquisition of 21st century skills and knowledge in preparation for academic and professional success. Hence, digital divide is one of the challenges to overcome in order to achieve the goal of equitable and inclusive education. There are several socioeconomic and demographic features that influence educational inequality that are part of the digital divide. Students of low-income families frequently struggle to participate in digital learning due to access to computers and/or regular internet access. Students may not have access to quality broadband internet connections in

their rural areas and in geographically remote areas.

In addition, it can be difficult for learners with disabilities to access digital platforms if they aren't made accessible. The varying levels of language proficiency, parental education and institutional resources also play a role in contributing to inequities in learning opportunities for different groups of people. Digital technologies do not automatically ensure meaningful use of education. Digital literacy of students, teachers and parents is essential for the effective use of digital learning environments. Teachers need to have the ability to create stimulating online learning activities, whereas students need to have critical digital skills for searching, assessing, and using information digitally. The role of parents in supporting learners, especially in primary and secondary school is also significant, and the use of digital competence in the home is a crucial factor in the overall education outcomes. The pandemic of COVID-19 greatly exacerbated pre-existing inequities in education by placing reliance on digital access for learning. With the majority of schools closed, millions of students relied completely on digital technologies to learn. But the majority of learners didn't have the proper device, internet connection or learning environment at home. These restrictions led to disruptions in learning, limited engagement, higher risk of dropping out, and achievement gaps between socioeconomic groups. To combat digital inequality, governments, educational institutions and international bodies have implemented a myriad of measures, including investing in digital infrastructure, distributing devices, making technology accessible and affordable, and providing teacher training. However, there are still large inequalities both between and within countries. The fast-paced technological development is continuing to change educational systems which necessitates constant policy adaptation to ensure that digital transformation does not further reinforce inequalities and does not cause further exclusion. To develop the digital learning environment, there must be a coordinated effort by policy makers, universities, technology suppliers, communities, and families to ensure equality in the digital learning environment. Closing the digital divide is critical to meeting the world's educational objectives, such as equitable access to quality education and the opportunity for lifelong learning. Access to digital education is a condition for better learning results, but also for the preparedness of the labour market, for social inclusion, innovation and the economic development of the Nation. In the context of the growing role of digital technologies in learning, the gap in access to these tools and in digital competence has emerged as a key factor to foster social justice and enable every learner to take part in the knowledge economy. This study tackles the problem of the digital divide in education, defines the scope of the divide and the main obstacles to the access to education in the digital age and then examines their effect on the learning outcomes. It also explores current policy initiatives, institutional strategies and technological options for mitigating digital inequities and makes recommendations for creating more inclusive, accessible and sustainable digital learning environments.

2. Background of the study

Digital technologies have rapidly evolved, leading to a transformation in education, which has changed the way learning is done, how learning is delivered and the way access to education is provided. The use of digital platforms, online learning management systems, virtual classrooms, educational applications and artificial intelligence-based learning tools has opened up new opportunities for students to learn and benefit from quality education, without being dependent on geographical location. Information and communication technologies (ICT) have increasingly become a part of academic life and educational processes in institutions around the world, which has contributed to an increase in the effectiveness of academic instruction, collaborative learning and student participation. Digital education is now a crucial part of policies supporting the creation of knowledge societies and equipping students for the requirements of the digital economy at the national level. With all these advancements, the access to digital education is still uneven in various regions and population groups. The term "digital divide" captures the differences in access to digital devices, Internet access, technology infrastructure, and digital literacy that constrain people's ability to gain access to and use digital learning settings. The digital divide was first perceived as a deficit in geographic access to computers and the Internet. Modern studies, however, indicate it has several aspects: the cost of technology, quality of Internet service, digital literacy, accessibility for people with disabilities, localization of educational information and capacity to use digital technologies in meaningful ways for learning and skill building. The digital divide and the associated inequality in education has become more apparent as technology has become a part of learning. Students in low-income communities often struggle with poor internet access, not having their own technology, shared technology, access to electricity, access to technical help, and other factors. These limitations limit opportunities to take online lessons, do online homework, read online books, and effectively interact with instructors and other students. As a result, disparities in academic performance, continuity of learning and educational attainment are related to differences in technological access. The digital divide is not just a gap in infrastructure or finances, but also a gap in digital skills of students, teachers and parents. Successful engagement in digital learning requires digital access, critical engagement with digital information, responsible use of communication technologies and the ability to adjust to new learning technologies. Some students may struggle to leverage digital technologies as tools for learning to their fullest potential; and teachers may lack digital pedagogical skills when it comes to designing classroom experiences that are engaging and inclusive for students when using digital technologies. Similarly, parental digital literacy has been proven to be a key facilitator to the younger

learners, particularly those in home-based and blended learning. Geographical disparities in access to education, through digital technologies are yet to be addressed. In contrast, urban educational institutions, in general, have access to high-quality internet connections and access to digital learning materials and institutional support that is more prevalent in rural and remote areas. Many schools in underprivileged communities lack proper infrastructural facilities, financial resources, and teacher training, which hinders the effectiveness of digital education. Such disparities further exacerbate the current educational disparities and constrain the learning opportunities for students in the remote areas. Socio-economic status remains a key determinant in digital inclusion in education. Home ownership rates are much higher among higher income families for computers, tablet, cell phone, broadband, and other learning technologies that support learning. For low-income families, they may be using an outdated or shared device, or have an internet connection that is only capable of accessing basic digital content, rather than engaging in digital learning to the same extent. All these differences negatively affect students' ability to learn on their own, collaborate in online learning and gain access to diverse educational content. It became clear that digital access is crucial to maintain education during the outbreak of the COVID-19 pandemic. With schools and universities rapidly and dramatically moving to online learning, millions of learners were affected by the lack of reliable internet connections, suitable digital equipment and technological proficiency. The pandemic revealed structural inequities in education systems and that technology-driven education can only be equitable if backed by inclusive digital infrastructure, institutional readiness, and strong policy implementation. As a result of these experiences, the importance of digital inclusion in education was brought to the fore as a key aim of education reform. Apart from access and affordability, there is also an institutional readiness and educational support system that is related to quality of digital learning experiences. Strong technology infrastructure, secure learning management systems, cybersecurity procedures, and easy access to digital learning materials and resources, as well as professional development for teachers, are essential for schools. Policies that promote digital inclusion, include subsidization of technology for disadvantaged learners, expand the connectivity in rural areas and bolster teacher training are essential to meet education gaps. The concept of multi-stakeholder approach to inclusive digital learning ecosystems is widely known. The view that a partnership between government, educational institutions, technology providers and community groups is key to developing inclusive digital learning ecosystems is gaining traction. New technologies like Artificial Intelligence, adaptive learning platforms, virtual laboratories, augmented reality, and learning analytics can help achieve personalization in education and enhance student results. If these cutting-edge technologies are employed by well-resourced institutions and communities, however, they can exacerbate educational inequalities further. When adopting new and innovative learning technologies, they must be affordable, accessible, ethically applied and must build digital capacity in an equitable way. In order to develop strategies grounded in evidence to improve learning opportunities for children, it is important to identify the factors that contribute to the digital divide. Understanding technological, economic, social, institutional and policy barriers is important for getting a clearer picture on how education systems can decrease inequalities and enhance digital inclusion. To succeed in meeting these challenges, not only for academic purposes, but also for being able to learn throughout life, be ready for work and be included in society in an increasingly digital world. Therefore, the aim of this study is to investigate the obstacles in the education field imposed by the digital divide and its impact in providing equitable and inclusive learning opportunities in various learning environments.

3. Justification

The advent of digital technologies has transformed the process of disseminating knowledge, acquiring it and assessing it in the field of education. The Internet has provided opportunities to teach and learn on a global scale through online learning platforms, virtual classrooms, digital libraries and educational applications. The progress, however, has also shed light on the substantial divide between access to digital resources, usually referred to as the digital divide. Inequalities in access to technology, the availability of digital devices and technological infrastructure and digital literacy are still clear and are a significant barrier for many learners to participate in the learning environments of the present. These injustices were further exacerbated by the COVID-19 pandemic, which led to the digital learning being the main option for extended periods. In rural, economically disadvantaged and marginalized communities, access to reliable internet and to devices and learning environments that were well-suited to their learning, was lower, often resulting in disruptions to their education. All these challenges reinforced inequalities in education and had an effect on students' learning outcomes, motivation and future learning success. Government and educational institutions have implemented a range of schemes to encourage digital inclusion by infrastructure investments, providing affordable internet, giving out devices and through providing digital literacy courses. Although these initiatives have been taken, differences still exist among regions, socioeconomic levels and educational attainment. It is crucial to be able to identify the underlying barriers in order to assess the effectiveness of existing interventions and determine where there is scope for additional policy interventions. The rationale behind this research is that quality education is one of the basic needs that should be provided in order to achieve social and economic development. The digital divide is impacting the learning results, but it is also impacting on future jobs and on the digital skills of lifelong learning. Today, education has become more and more reliant on technology and the issue of digital inequality has become a

matter of utmost importance to address and ensure that everyone is able to learn both in and through technology. Moreover, this research is a part of the ongoing growing body of literature that explores the various dimensions of the digital divide, such as technological, economic, social, institutional and digital literacy dimensions. It offers a detailed and integrated view of the impact that these barriers have on the learner and educational system, as well as practical solutions for decreasing disparities. The findings of this study will benefit the policy makers, educational administrators, teachers, technology developers, and researchers. The study can support evidence-based policy; investment in digital infrastructure; inclusive education and capacity building for equitable access to digital learning resources. The research aims to help shape an education system where all learners, irrespective of their location or socio-economic status, have an equal opportunity to access, learn in and succeed in the digital world.

4. Objectives of the Study

1. To examine the concept and dimensions of the digital divide in the context of contemporary education.
2. To identify the technological, economic, geographical, and social factors contributing to disparities in access to digital learning resources.
3. To assess the influence of internet connectivity, digital devices, and technological infrastructure on students' academic participation and performance.
4. To analyze the role of digital literacy among students, teachers, and parents in promoting effective online and blended learning.
5. To evaluate the impact of socioeconomic status on students' ability to access and benefit from digital education.

5. Literature Review

Digital divide is no longer a one-sided problem of access to computers and internet but has become a multidimensional problem of digital skills, appropriate technology use, and learning implications. Early research focused on physical access to information and communication technology (ICTs), while recent research has focused on digital competence, socioeconomic inequalities, and institutional readiness, as key factors that shape equitable learning opportunities. In the contemporary literature, there is also a growing awareness of the importance of considering ‘digital inequality' not only as a problem in infrastructure, but rather as a problem related to learners' ability to effectively use technology in the pursuit of academic achievement.

Van Dijk (2005) was one of the first and most influential to advance digital divide research by outlining successive stages of the digital divide: motivational access, material access, skills access, and usage access. His framework made it clear that simply equipping students with technological devices is insufficient to ensure students' inclusion in education; the knowledge of how to use technology effectively and appropriate environments are essential to enable students to enjoy ICT-based learning. In the same way, Warschauer (2003) stated that it is not possible to solely attribute educational inequality to the differences in technological access. Rather, social resources and educational institutions, digital literacy and community support are necessary for meaningful involvement in digital learning. He founded that the development of infrastructure, human capacities and institutional capacity must go hand in hand for effective technology integration.

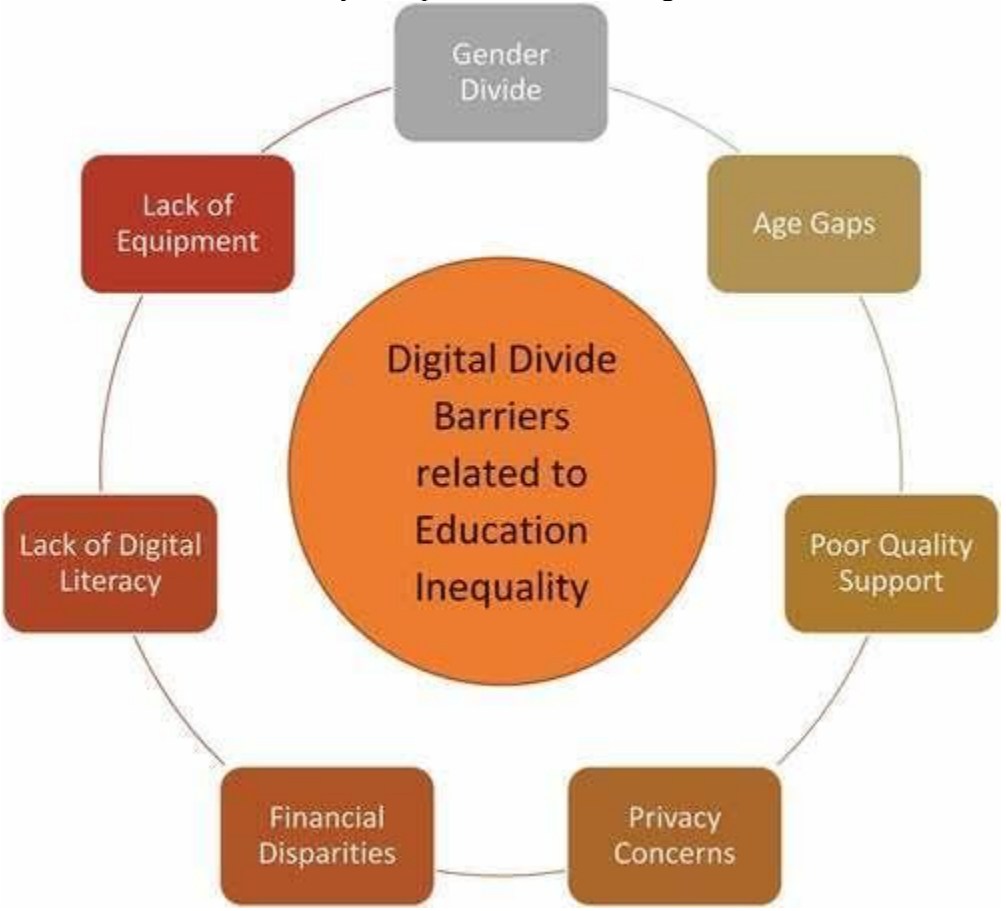
Norris (2001) explored the global digital divide and found that there are great disparities between developed and developing nations in the availability of ICT infrastructure and opportunities for learning. The study highlighted that unequal technological development exacerbates unequal social and economic conditions and thus hinders educational progress of disadvantaged areas. While broadening the concept of digital divide, Selwyn (2004) submitted that digital exclusion is strongly linked with social disadvantage and not just technology. He argued that factors such as learners' cultural capital, income, education, and their demographic makeup have a strong influence on their participation in digital technologies. Thus, the digital policies must address the social inclusion as well as technological provision.

Hargittai (2002) created a framework that highlighted the "second-level digital divide," which was based on distinctions among users in terms of digital skills, not just the ability to access the internet. The study revealed that while people with similar tech resources may have different educational outcomes, this may be due to differences in how effective they are at searching for information, their growing confidence in using technology, and their skills in online learning. This was further developed by van Deursen and van Dijk (2014) who identified four groups of digital skills that are necessary to successfully be part of digital education: operational, formal, information, communication, and strategic. Their results indicated that critical evaluation and use of digital information is an important factor in learning success instead of accessing online information. There is a long history of research linking the socioeconomic status with digital inequality.

According to Wei et al. (2011), the socioeconomic, educational, and family learning contexts are found to be significant influences on students' access to technology and digital literacy. Poor access to the internet, fewer ICT devices and reduced access to ICT-supported learning opportunities is a common issue for students from lower-

income families.

Robinson et al. (2015) contended that digital inequality is a multi-dimensional social phenomenon that can be articulated as a lack of access to information, digital skills, economic resources and institutional support. They highlighted that in order to address learning gaps, policies need to focus on both the technological infrastructure and on affordability and on the development of digital competence. COVID-19 has driven a fast shift toward online education, putting scholars' focus on educational digital inequality. The COVID-19 pandemic has pushed the educational digital inequality into scholarly focus, with a shift toward online education. During the school closure, the online learning ensured the continuity of education, but at the same time highlighted the huge gap in internet connectivity, device availability, digital literacy, and preparedness of teachers (Dhawan, 2020). Students in lower income and rural areas were more affected by disruption to their learning.



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Likewise, UNESCO (2021) noted that school closures had an undue impact on the lives of marginalised children, as millions had no access to reliable internet, digital devices or conducive home learning conditions. The body called for a more robust digital infrastructure, teacher training and inclusive policies to facilitate equal access to good education. There are significant disparities in OECD countries with regard to the availability of computers, high-speed broadband and digital learning materials to students. (OECD, 2020) The report found that education systems that were more resilient during times of educational disruption showed robust digital infrastructure and successful teacher preparation. As more attention has been focused on the issue of the digital divide, teachers have been increasingly called upon to play a role in narrowing the gap. Ertmer and Ottenbreit-Leftwich (2010) explained that teachers' beliefs, digital literacy, and pedagogical knowledge are significant factors in successful technology integration. Inadequate preparedness of teachers can hinder the effective use of digital learning, even with good technology tools in schools. In the same way, Koehler and Mishra (2009) developed the Technological Pedagogical Content Knowledge (TPACK) framework which highlighted that good digital teaching requires the teachers to combine technological knowledge, pedagogical knowledge, and content knowledge. Their model has been used as a successful tool for implementing better technology-use for instruction. Studies on the acceptance of educational technology have also shed light on educational technology differences. Perceived usefulness and perceived ease of use were found to be significant factors in technology adoption among users by Davis (1989) when he created the Technology Acceptance Model (TAM). Since this work, a variety of educational research projects have utilized this model to account for differences in students' and teachers' willingness to interact with Web-learning platforms.

Institutional dimension, stated Bakia et al (2012), suggests that the investment of the Digital Education should be coordinated, regarding Infrastructure, Curriculum Development, Teacher Training and Learner Support. Those organisations that conducted a comprehensive digital transformation had a greater effect on student engagement and learning outcomes than those that focused solely on technology purchasing. In recent years, several systematic reviews suggest that the digital divide is expanding beyond the bounds of the technology access binary. Based on the latest available research, Lythreatis et al. (2022) created a list of various factors contributing to digital inequality, which are interrelated. Lythreatis et al. (2022) reviewed current research and compiled a list of several determinants of digital inequality, all of which are interconnected. They highlighted the need for future studies to use multidimensional approaches that can be used to respond to the new digital exclusions. In higher education, Jaiswal and Sarraf (2024) identified that digital exclusion can be a result of the interplay between social inequality, institutional constraints, affordability, digital competence, and policy implementation. They found that coordinated interventions for access, skills development, and institutional practices are essential to achieve equitable education opportunities. Mirazchiyski (2025) recently undertook an extensive review of the concept of digital divide and suggested that future studies should move beyond mere access to computer and information literacy and focus instead on the ability of learners to participate in meaningful learning activities using digital technologies. The review suggests that digital competence has emerged as the key factor for educational equity in the current education landscape instead of technology ownership. In general, all of the literature shows that the digital divide is a multidimensional problem that is affected by technology access, digital literacy, socioeconomic factors, institutional readiness, teacher competence and education policy. The ICT infrastructure has been expanded, although there remains disparities in ICT skills and purposeful use of ICTs which limit access to equal learning opportunities. To tackle these obstacles, a comprehensive approach is needed that addresses infrastructure, digital literacy, pedagogical practices, institutional support, and evidence-based policy measures to meet the needs of all learners in the context of digital education in an equitable and sustainable way.

6. Material and Methodology

This study follows the systematic review approach in analyzing the problem of digital divide in learning and its impact on equal opportunities in learning in various learning environments. The approach was chosen to be review-based, as it allows to synthesise already available empirical evidence, theoretical viewpoints, and policy discussions on digital inequality, without the necessity of primary data collection. The research is concentrated on the recognition of main obstacles to equitable access to digital education and the assessment of the strategies proposed by researchers, education and policy makers to mitigate these inequities. Review was done from scholarly publications of reputable academic databases like Scopus, Web of Science, ERIC, ScienceDirect, SpringerLink, Taylor & Francis Online, Wiley Online Library, IEEE Xplore, Emerald Insight, JSTOR, and Google Scholar.

Further data was drawn from reports released by international bodies, including UNESCO, UNICEF, Organisation for Economic Co-operation and Development (OECD), World Bank and International Telecommunication Union (ITU) to offer policy-level information about digital inclusion and educational equity.

The keywords used for the literature search were chosen and combined using Boolean operators to provide a complete coverage of the topic. The key words used were digital divide, educational inequality, online learning, e-learning accessibility, digital inclusion, technology in education, internet accessibility, ICT in education, remote learning, digital literacy, educational technology, learning equity, digital infrastructure, and virtual education. The keywords were selected to form meaningful combinations with operators like AND, OR and NOT to produce relevant studies with a minimum of irrelevant studies.

Peers-reviewed journal articles, conference papers, books, book chapters, government publications and reports published in English between 2015 and 2025 were included. The review included studies related to access to digital technologies, Internet connectivity, digital literacy, socioeconomic inequalities, educational policies, online learning platforms, and the educational impact of technological inequality. To ensure quality and relevance of the review, publications that were not methodologically sound, duplicate records, opinion pieces without supporting evidence, and studies not related to educational contexts were excluded.

The literature selected was analysed qualitatively through thematic analysis. Results of the single studies were systematically organized by common themes such as technological infrastructure, access to digital devices and internet services, digital skills and literacy, geographic differences, inclusion of gender and disability, teachers' preparedness, institutional readiness, policy interventions and the effectiveness of digital learning initiatives. This thematic grouping enabled the development of common patterns, emerging issues and good practices identified from a range of educational contexts. To increase the reliability of the review, a cross-referencing and comparison of the studies across the different disciplines (education, information technology, sociology, economics and public policy) were carried out. Priority was given to high-quality publications in indexed journals, reports of well recognized organizations. Consistency of results across geographies and across the educational level was emphasised in the

synthesis to minimise the effect of the individual result (or the context-specific result). The information was then summarized descriptively to assess the influence of the digital divide on student's academic involvement, learning outcomes, education engagement, and future prospects. There was a special consideration of the differences between urban and rural, the developed and developing countries, the marginalized and the learners with disabilities. Among the key actions analysed in the review were the institutional and governmental actions that aim to promote digital accessibility and technological infrastructure, digital competencies and inclusive education. The study is done in the manner of research ethics accepted in the field and all information is published in the field literature and officially published reports. Use of human subject and confidential information was avoided and all sources were identified. As a result of this methodological approach a holistic and evidence-based perspective on the barriers to the digital divide in education is provided, which can serve as a basis for policy and practice recommendations for bridging the digital divide in education.

7. Results and Discussion

Results:

The study examined how the 'digital divide' impacts toward equitable learning opportunities for pupils from different schools. A total of 250 respondents (secondary school, higher education students in urban and rural areas) were selected and data were gathered. The analysis was based on access to digital technology, digital competence and perceived effect of technological barriers on academic performance. Descriptive statistics and inferential analysis were used to interpret the findings.

Table 1: Demographic Profile of Respondents (N = 250)

Variable	Category	Frequency	Percentage (%)
Gender	Male	118	47.2
	Female	132	52.8
Residence	Urban	138	55.2
	Rural	112	44.8
Level of Study	Secondary	82	32.8
	Undergraduate	124	49.6
	Postgraduate	44	17.6
Device Used for Learning	Smartphone	108	43.2
	Laptop	87	34.8
	Desktop	28	11.2
	Tablet	27	10.8

Interpretation

There was a slight majority of female respondents (52.8%) compared to male respondents (47.2%) as suggested by the demographic profile. More than half of participants were urbanites (55.2%) whereas 44.8% were ruralites. The highest education category was undergraduate students (49.6%). The most used learning device was the smartphone (43.2%) followed by the laptop (34.8%). It seems that mobile learning has become a big way to access learning resources, as indicated by the fact that smartphones were used to a greater extent. But there could be a downside to relying on mobile devices for accessing software with greater processing power.

Table 2: Challenges Experienced Due to the Digital Divide

Challenge	Mean	Standard Deviation	Rank
Poor Internet Connectivity	4.38	0.71	1
High Cost of Digital Devices	4.21	0.79	2
Limited Access to Online Learning Resources	4.09	0.74	3
Low Digital Literacy	3.92	0.81	4
Frequent Power Interruptions	3.84	0.87	5
Lack of Technical Support	3.69	0.83	6

Scale: 1 = Strongly Disagree, 5 = Strongly Agree

Interpretation

Poor internet connectivity was the most important challenge (Mean = 4.38), which suggests that internet connectivity continues to be a big constraint for continuous online learning. High cost of digital devices was ranked second (Mean = 4.21), as many households experience high cost associated with digital devices. The access to online educational resources (Mean = 4.09) and the lack of digital literacy (Mean = 3.92) were also highly rated, indicating that access does not necessarily guarantee digital literacy. The lack of technical support and frequent power cuts further affected the effective participation of students in digital education.

Table 3: Impact of the Digital Divide on Learning Outcomes

Statement	Mean	Standard Deviation	Rank
Digital access improves academic performance	4.41	0.63	1
Limited technology reduces learning opportunities	4.34	0.69	2
Digital inequality affects examination performance	4.18	0.74	3
Online learning enhances student engagement when infrastructure is adequate	4.11	0.72	4
Digital literacy improves confidence in learning	4.05	0.77	5
Institutional support reduces educational inequality	3.98	0.76	6

Scale: 1 = Strongly Disagree, 5 = Strongly Agree

Interpretation

The mean value for agreeing that sufficient access to digital materials positively contributes to academic achievement was 4.41, with very high values of agreement expressed by the respondents. Access to technology information was seen as a source of unequal learning opportunities with a Mean = 4.34. Further, students felt that digital inequality has a negative impact on examination performance (Mean = 4.18), indicating that digital inequality does not only affect the participation in the classroom, but also academic performance. In addition, respondents saw the need for digital literacy and institutional assistance to address inequalities in education and to boost pupils' confidence.

Discussion:

The results show that the digital divide is still a significant barrier to an equitable education. Although digital technologies offer flexible learning and learning remotely, disparities exist among learners as they do not have access to reliable Internet connections, affordable devices, and digital competencies.

Internet connectivity was the most prominent challenge particularly for students in geographically remote and under-served areas. The unstable network infrastructure caused the disruption of the network and participation in virtual classrooms, delay in submission of the assignments and restricted access to digital learning material. These restrictions not only made online learning less effective, but also increased the learning disparity between those who do and don't have a reliable connection.

There were also economic considerations. The financial constraints in getting the right digital equipment to enable students to learn online were reported by many respondents as a major challenge. Many students had experienced difficulties with using certain software or document preparation/programming when their assignments required it.
applications, and could only do so with their smartphones. This resulted in inequities in school experiences related to access to technology.

The results also indicate that digital literacy is an important determinant of educational outcomes. The more confident people were in navigating online learning platforms, locating academic information and communicating with teachers, the more skilled they were in digital skills. The students who lack some digital skills have more difficulties on technology-supported learning, on the other hand. This finding reveals that in order to achieve educational equity, there is a need for technological infrastructure as well as systematic digital skills development.

It was also observed that institutional support had an impact on learning outcomes. Differences in student outcomes can be substantially minimized by providing educational institutions with technical assistance, digital training, learning management systems, and financial support mechanisms. Enabling learning atmosphere (Faculty development, cost effective technology, digital resources etc)

The results broadly indicate that efforts to close the digital divide must be coordinated action by governments, educational institutions, technology providers and communities. Improved broadband infrastructure, lower device costs, and digital literacy programs and policies that are more inclusive could all lead to improved equal opportunities to learn. Addressing them is essential for digital transformation in education to promote an inclusive environment and not widen existing socioeconomic disparities.

8. Conclusion

The digital divide is still one of the key issues in the quest to realize equitable and inclusive education in the 21st century. The impact of digital technologies on teaching and learning has been immense, with a range of access to education, communication and innovative teaching practices, but not equally distributed among all learners. Digital disparities in access and achievement still exist with respect to the lack of digital devices, digital literacy, socioeconomic status, geographic location, institutional support, and internet connectivity. This means that many students are not able to learn fully-in digital settings, which restricts them from experiencing their full educational potential and future personal and professional growth. The findings of this study indicate the existence of a digital divide that goes beyond technological infrastructure. The ability to use digital tools effectively is also crucial to achieving equality of learning opportunities, as is the readiness of educators to use digital tools in the learning process, and the access to digital content and support systems. Students from disadvantaged backgrounds, students living in rural areas and students in marginalised communities encounter a multitude of barriers to benefit from the use of technology to enhance education. During the emergency distance learning, the inequalities grew more evident and there is a strong need for effective strategies to include all learners in the digital process. Additionally, the study highlights the importance of joint efforts of the government, educational institutions, technology vendors, and society in overcoming the digital divide. Investment in quality, affordable broadband infrastructure, low-cost digital devices, digital literacy and teacher professional development programmes, and accessible learning platforms should be viewed as part of the educational development process and not as add-on programmes. The policies that emphasize inclusive adoption of technology, access to the technology for learners with disabilities, multilingual digital materials, and ongoing technical assistance can play key roles in reducing educational gaps. A major role for educational institutions is the digital learning environment. Institutions can improve learning outcomes by implementing flexible teaching models, blended learning, digital citizenship responsible education, and optimizing students' support programs so that technology can be utilized for the benefit of all students. Working partnerships with industry and community groups can also help to broaden access to technological resources and to hands-on digital skills. Use of emerging technologies such as adaptive learning systems, artificial intelligence, cloud computing and virtual laboratories and learning analytics can improve the quality and personalisation of education in the future. Their implementation, however, needs to be based on the principles of equity, cost effectiveness, ethical usage, and accessibility. Unless inequalities are addressed, the positive impacts of technology can also fall short, including further education gaps. Last but not least, the digital divide must be taken into account in all initiatives aimed at achieving equal opportunities for learning and social and economic development. Availability of digital resources, development of digital skills and the promotion of inclusive policies in education will enable children with different backgrounds to play an active role in the new knowledge economy of the digital world. Investments in digital infrastructure, human capacity building, and cooperative policy development will increase learning outcomes, enhance social inclusion, and facilitate lifelong learning and equitable development, not only at the national level, but in communities.

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