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# Impact of Digital Divide on Students' Academic Performance at Higher Level

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**Abstract**

This study examines how the digital divide impact students' academic performance at high level. The objectives of the study were to examine the impact of the digital divide on students' academic performance at a higher level and to determine the extent to which students have access to essential digital resources. The study surveyed 337 students from 3 public and 3 private institutions using a questionnaire with a 5-point Likert scale. Descriptive and inferential statistics were used to analyze data. Data analysis revealed that students' access to technology, online learning environment, engagement, participation, support, and assistance significantly affect academic performance. Most students agreed that these factors impacted their academic performance at higher education levels.

***Keywords:*** *Digital divide, Information Communication Technologies, Academic performance, Stages of Digital Divide.*

## Introduction

The incorporation of Information and Communication Technologies (ICTs) has become a fundamental aspect of contemporary education, showcasing its widespread influence across various fields such as business, politics, transportation, communication, and entertainment. The significant effect of ICTs on both teaching and learning is well-established, as educators utilize these resources to present material, develop students' abilities, enhance curricula, and innovate learning experiences (Ertmer et al., 2012). Additionally, new technologies encourage collaboration, making the learning process more interactive and engaging. Their collaborative qualities, especially the read/write capabilities, facilitate knowledge sharing, idea exchange, and teamwork, greatly enriching the educational experience (Goh & Kale, 2015).

The advantages of technology in education depend on students' access to these tools and their capability to use them effectively. This requires not only the availability related to digital devices but also the cultivation of digital literacy skills. Sadly, differences in access to digital tools and varied levels of digital competence have contributed to a rising global concern known as the digital divide (Soomro et al., 2020).In Pakistan, this disparity is particularly salient, with unequal availability of ICTs and the necessary skills to use them effectively, especially among individuals, households, and groups with varied demographic and socioeconomic backgrounds (Norris, 2001).This disparity not only restricts access to technology but also exacerbates existing educational inequalities, as students from underprivileged backgrounds frequently find it challenging to keep up with their peers, resulting in differences in academic

achievement and opportunities (Van Dijk, 2020).In higher education, where digital platforms are increasingly essential for learning, research, and collaboration, the digital divide presents major challenges. Students lacking consistent internet access or personal devices may struggle to participate in online lectures, submit assignments, or engage in virtual group work, all of which are crucial elements of modern academic practices (Selwyn, 2016). In Gujranwala, where socioeconomic disparities are widespread, the digital divide could further isolate students from low-income families, impairing their chances to compete in a growingly digital academic landscape. Tackling this issue necessitates a holistic approach, encompassing infrastructure improvement, digital skills training, and policy measures to guarantee equitable access to ICT resources (Warschauer, 2004).

The digital gap in education denotes the uneven availability of technological tools and digital resources that can influence a student's chances of achieving academic success. This lack can be seen between students from different socioeconomic backgrounds, geographic locations, and demographic groups. The digital divide may appear in several ways, such as unequal access to computers, internet connectivity, software, or other digital tools needed for learning. The problem is related to lower academic achievement, reduced opportunities, and lower economic mobility. So, the study aimed to identify the difficulties educators face due to the digital divide.

**Objective of the Study**

Following were the objectives of the study:

1. To identify the Impact of the digital divide on students' academic performance.
2. To determine the extent to which students have digital to essential digital resources.

**Significance of the Study**

Today the whole world is suffering in educational crisis. The way of education shift from physical to digital, which produces problems for students. In under developing countries including Pakistan have to face more problems in digital learning due to digital divide. This is the most renowned issue in the whole world which identifies the impact of digital divide on students learning outcome.

Digital divide is super important issues. It sheds light on the gap between those who have easy access to the internet and technology, and those who don't. Understanding this may help the government to find the ways to bridge that gap and ensure the students have equal opportunities to use and benefit from digital resources. It may highlight the barriers that certain groups face in terms of digital skills, connectivity, and opportunities. By identifying these issues, it may help teachers, students, researcher, policy maker and stake holders towards developing policies and initiatives to bridge the lack may ensure that everyone has equal access to the digital world.

## Literature Review

The term "digital divide" typically indicates the disparity between individuals with access to multiple forms of ICT-equipped populations and those without such resources. These forms predominantly include computers and the Internet, and occasionally encompass cellphones,

especially smartphones, along with other digital software and hardware. However, while understanding the digital divide, the first challenge lies in the varied nature of "the concept of access". Often, the term is used casually without recognizing its distinct meanings. Among the various meanings, the most commonly understood one pertains to owning a computer and having a network connection in digital technology. Nonetheless, as claimed in Van Dijk's research in 1999, this definition represents only the second of four sequential forms of access referred to as "hurdles" or "barriers" moving towards a digitally informed and networked society (van Dijk's, 1999).

**Van Dijk Framework Identifies Four Types**

- "Psychological access" denotes a complete lack of digital exposure, which may be caused by disinterest, fear of computers, or a lack of appeal towards modern technology.
- "Material access" indicates the absence of computer ownership and online access
- "Skills access" refers to a shortage of technology competence and digital capabilities brought on Due to poor usability, Insufficient education, or shortage of social support.
- "Usage access" denotes the scarcity of substantial chances to make use of digital resources.

**Three Stages of Digital Divide**

The problem of unequal results from online learning, termed the "digital outcome divide" (Scheerder et al., 2017) Wei is a significant issue, particularly highlighted in the post-pandemic world (Azubuike et al., 2020). This divide represents the disparity in benefits, such as learning achievement, that individuals derive from technology usage (Ragnedda, 2017). It constitutes the third degree of technological disparity framework, following Gaps in technology access and competencies (Riggins & Dewan, 2005). While the outcome divide is crucial and can exacerbate existing social inequalities (Scheerder et al., 2017), research has predominantly focused on the earlier stages of access and skills (Scheerder et al., 2017; Song et al.,), likely due to their relative ease of observation and measurement. Defining and measuring the digital outcome disparity is complicated and context-dependent.

The digital technologies that exhibit the greatest potential for attaining these objectives are mobile phones and the internet, given their notable growth in recent years. According to the SDGs, specifically Target 9.c of SDG 9, there is a growing emphasis on ensuring equitable access to digital technology across all segments of society and geographical regions. Among the 169 targets outlined in the SDGs, three targets, namely 5.b, 9.c, and 17.b, pertain directly to the utilization and availability of ICT (Georgeiva, 2019).

**Understanding the digital divide in higher education**

The connectivity divide signifies the imbalance between populations that who have technological proficiency and connectivity compared to disconnected populations (Shi, 2024). This multi-faceted issue involves disparities in access to computers, laptops, smartphones, internet connectivity, and proficiency in using digital tools. For students in higher education

institutions, these disparities directly impact their ability to fully engage with coursework, access learning materials, and participate in online discussions (Reilly, Lepak & Killion, 2017).

This digital divide has especially affected children from low-income families and marginalized areas, thereby increasing the learning disparity across various high and low-income people nationwide (Jamil & Muschert, 2024). The The gap separating those with digital access from those without is known as the "digital divide." It has emerged as a significant hurdle to education, particularly for disadvantaged children in marginalized and impoverished communities where access to essential digital tools is either minimal or entirely lacking (Aslam et al., 2021).

**Implications of Digital Divide for Higher Education**

The digital divide has extensive consequences for education, affecting various elements that may not be immediately obvious. A key impact is reduced academic performance, as students lacking access to digital devices miss out on essential information that could enhance their education. Furthermore, learners with a background in technology are more prepared to utilize it when seeking further education, giving them an advantage. Conversely, underprivileged students encounter challenges in continuing their education due to insufficient access to digital resources, often leading to increased dropout rates and the discontinuation of their educational journeys. Additionally, students with limited digital access are more inclined to require extra time to meet their learning objectives, which can hinder their ongoing growth. The Missing basic digital resources in educational settings can have enduring effects on children's futures, potentially impairing their ability to compete fairly in the job market. Therefore, it is crucial to recognize the digital divide among students in higher education institutions and examine its effects on their academic outcomes (Safdar, Rauf, Ullah & Rehman, 2020).

## Methodology

The study examine how researcher investigate the influence of digital divide regarding student academic achievement they used a descriptive approach to understand how universities feel about and are prepared to handle the digital divide. The population consisted of all graduated students from private and public institutions in Gujranwala city. A sample of 337 students was selected using simple random technique. Data was collected through self-constructed questionnaire and data was analyzed through mean standard deviation, correlation and regression using SPSS. The reliability and validity of the research instrument were checked through a pilot study, resulting in a Cronbach's Alpha of 0.7. The questionnaire was revised based on expert feedback, and formatting changes were made to ensure clarity. The study's findings aimed to provide insights into the impact of the digital divide on students' academic performance highlighting the need for universities to address this issue and promote digital inclusivity.

**Reliability analysis of the Questionnaire**

The data was entered into SPSS (version 16.0) to access the reliability of all scales related to the study, and Cronbach's Alpha

coefficient and inter-item mean value were calculated using SPSS. The results are presented in table 1. The access of technology scale has an Alpha value of more than .7 and close to 8, which shows good reliability. In addition, six scales (online learning environment, support and assistance, access to information digital literacy skill, equality and inclusiveness, and academic performance) have an Alpha value of more than 0.6. This shows acceptable reliability, which is also close to 0.7. It is also satisfactory based on the number of items these scales contain.

**Table 1**

*Reliability measure scale*

| Scale | N | Cronbach's Alpha |
|---|---|---|
| Access of technology | 4 | .776 |
| Online learning environment | 4 | .616 |
| Support and assistance | 3 | .626 |
| Engagement and participation | 4 | .674 |
| Access to information and resources | 3 | .664 |
| Equality and inclusion | 3 | .668 |
| Academic performance | 11 | .696 |

The table presents the reliability analysis of various scales using Cronbach's Alpha, which measures internal consistency. Each scale is listed alongside the number of items (N) used to assess it and its corresponding Cronbach's Alpha value. The Access to Technology scale consists of four items and has a reliability score of 0.776, indicating good internal consistency. The Online Learning Environment scale also has four items, with a lower reliability score of 0.616. The Support and Assistance scale includes three items, with a Cronbach's Alpha of 0.626. Similarly, the Engagement and Participation scale, made up of four items, has a reliability value of 0.674. The Access to Information and Resources scale, based on three items, has a score of 0.664, while Equality and Inclusion, also with three items, has a reliability of 0.668. Lastly, the Academic Performance scale, which consists of 11 items, has a Cronbach's Alpha of 0.696, indicating moderate reliability.

**Factor wise Mean and Standard deviation**

Descriptive statistics including the mean and standard deviation of all factors, were measured by using SPSS (26.0).

The results are presented in Table 4.2.

**Table**

***Descriptive Statistics***

| Factors | Mean | Std. Deviation |
|---|---|---|
| Access to Technology | 3.37 | .70 |
| Online Learning Environment | 3.10 | .71 |
| Support and Assistance | 3.26 | .73 |
| Access to information and resources | 2.95 | .73 |
| Digital literacy and skills | 3.38 | .75 |
| Equality and inclusion | 3.62 | .74 |
| Academic Performance | 3.49 | .68 |
| Impact of Digital Divide | 3.79 | .83 |

The table presents the mean and standard deviation values for various factors related to online learning. The Impact of Digital Divide has the highest mean (3.79) and the largest standard deviation (0.83), indicating significant variation in perceptions. Equality

and Inclusion rank second, with a mean of 3.62 and a standard deviation of 0.74, suggesting a relatively positive but varied outlook on inclusivity in learning. Access to Technology (mean 3.37, SD 0.70) and Digital Literacy and Skills (mean 3.38, SD 0.75) both show moderate agreement but with a fair range of opinions. Factors such as Support and Assistance (mean 3.26, SD 0.73) and Online Learning Environment (mean 3.10, SD 0.71) reflect moderate satisfaction but also a notable level of variation in responses. The factor with the lowest mean is Access to Information and Resources (mean 2.95, SD 0.73), indicating relatively less satisfaction.

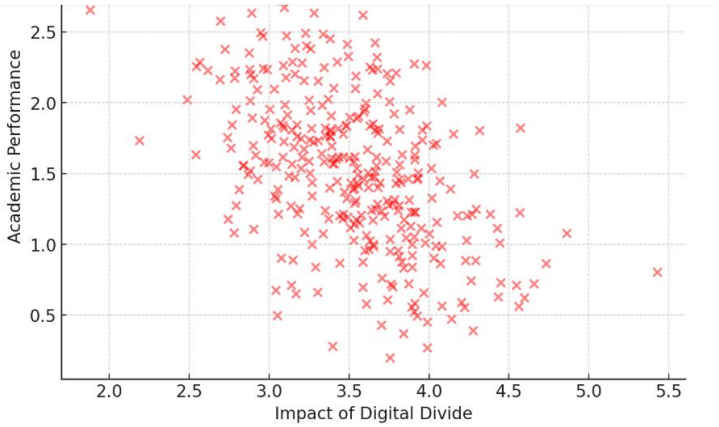
**Inferential statistics**

**Correlation**

The results show a moderate negative correlation (-0.55) between Digital Divide impact and Academic Performance, indicating that as the digital divide increases, academic performance tends to decrease. This suggests that students with shortage of digital resources encounter various difficulties in their studies, leading to lower academic achievement. The p-value (0.000) confirms that this correlation is statistically significant, meaning the relationship is not due to chance. However, while the digital divide appears to negatively affect academic performance, other factors such as teaching quality, socioeconomic background, and personal effort may also play a role. Therefore, addressing digital access issues could help improve students' educational outcomes.

**Graph 2:**

**Scatter plot: Impact of digital divide on Academic performance**




This is a scatter plot illustrating the relationship between the impact of the digital divide and academic performance. The x-axis represents the impact of the digital divide, ranging approximately from 2.0 to 5.5, while the y-axis represents academic performance, spanning from around 0.5 to 2.5. The plot consists of numerous red data points scattered across the graph, indicating varying levels of impact and performance. The distribution suggests a weak or unclear correlation between the two variables, , as the points appear dispersed without a strong visible trend.

**Table 3**

*Relationship between digital divide and academic performance*

| | Correlation | Impact of digital divide | Academic performance |
|---|---|---|---|
| Impact of digital Divide | Person correlate<br>(Sig 2 tailed)<br>N | 1<br>337 | -0.55<br>000<br>337 |
| Academic performance | Person correlate<br>(Sig 2 tailed)<br>N | -0.55<br>000<br>337 | 1<br>337 |

**Regression**

The regression analysis reveals a negative impact of the Digital Divide on Academic performance (B = -0.039, Beta = -1.522).

This suggests that as students experience greater digital barriers, their academic success declines. The negative t-value (-1.781) confirms the direction of this relationship, and the p-value (0.000) indicates strong statistical significance. These findings align with the correlation result (r = -0.55) and highlight the need to address digital access issues. Improving technology availability, digital literacy, and online learning resources could help minimize the academic performance gap caused by the digital divide.

**Table 4**

*Regression analysis of access of technology*

| Variable | Correlation | Impact of digital divide | Academic performance |
|---|---|---|---|
| Impact of digital Divide | Person correlate<br>(Sig 2 tailed)<br>N | 1<br>337 | -0.55<br>000<br>337 |
| Academic performance | Person correlate<br>(Sig 2 tailed)<br>N | -0.55<br>000<br>337 | 1<br>337 |

**Findings**

1. The factor with the lowest mean is Access to Information and Resources (mean 2.95, SD 0.73), indicating relatively less satisfaction.
2. This study reported a negative correlation between the digital divide and students' academic performance.
3. The digital divide strongly impacts students' academic performance, with a standardized coefficient (Beta) of -1.522 and a significance level of 0.000.
4. Findings of this study reported that the more digital divide problems students face, the more their academic performance decreases.
5. The findings suggest that students have varying levels of access to digital resources, which affects their academic performance

**Conclusion**

The study aims to identify the impact of the digital divide on students' academic performance. The respondents generally agree that the digital divide has an impact on their academic performance. Students reported that they have limited access to technology and digital resources. There is a negative correlation between the digital divide and academic performance. As the digital divide increases (i.e., students have less access to technology, internet, or digital resources), their academic performance tends to decline. Regression analysis reveals that the digital divide has a significant impact on academic performance. The regression analysis confirms the findings of the correlation analysis, indicating a negative relationship between the digital divide and academic performance. As digital barriers increase, students' academic success tends to decline. The statistically significant results highlight the importance of reducing the digital divide through better access to technology, digital literacy programs, and improved online learning resources to enhance student performance.

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