Innovations

Exploring Gender Disparities in Digital Divide: A Study of Higher Education

Mrs. I. Ramya Deepthi [*]
Prof. B.Lilly Grace Eunice[**]

Abstract

In the contemporary landscape of higher education, digital literacy has emerged as a pivotal skill, essential for academic success and future professional endeavours. This research paper delves into the gender disparities within the digital divide among university students, focusing on access, utilization, and proficiency in digital technologies. The study employs a null and alternative hypothesis framework, examining the impact of technology as an independent variable on digital literacy as a dependent variable.

The first level of digital divide analysis reveals disparities in access to digital devices, such as laptops and computers, with boys exhibiting a more robust technological presence. The correlation between socio-economic status and access to digital devices indicates a positive relationship for both genders, but boys demonstrate a stronger correlation, suggesting potential gender-based differences in access. Internet access patterns further emphasize distinctions, with girls relying more on mobile data compared to boys. The second level of digital divide scrutiny involves assessing proficiency in using digital tools and the adoption of artificial intelligence (AI) tools. Boys consistently demonstrate higher proficiency levels in various digital tools, and while a slightly higher percentage of girls report using AI tools, boys exhibit higher proficiency in their usage. Confidence levels also highlight disparities, with boys showcasing higher confidence in using digital devices and technology compared to girls.

Overall, the findings substantiate the existence of a gender digital divide, impacting digital literacy among higher education students. The study concludes by emphasizing the importance of targeted interventions, such as tailored digital literacy initiatives and enhanced provision of technological resources, to bridge the gender gap. Addressing these disparities is crucial for promoting equitable

[*] Research Scholar, Department of Economics, College of Arts and Commerce, Andhra University, Visakhapatnam Andhra Pradesh, India.
[**] Professor,Department of Economics, College of Arts and Commerce, Andhra University, Visakhapatnam Andhra Pradesh, India.

access to digital resources and cultivating a diverse and proficient workforce capable of navigating the technologically-driven global landscape adeptly.

***Key words**: Digital Divide, Digital literacy, gender disparities, Technology, Gender gap, Higher education.*

Introduction

In an era characterised by swift technological progress, proficiency in digital literacy emerges as an indispensable competence crucial for both academic attainment and forthcoming vocational pursuits. The pervasive integration of digital realms within educational milieus signifies a profound transformation in pedagogical methodologies, altering the modalities through which students engage in learning, collaborate, and communicate. Nonetheless, amidst the widespread adoption of digital modalities within university settings, a conspicuous divergence in digital literacy attainment between genders has become apparent, eliciting apprehensions regarding the equitable distribution of educational resources and opportunities.

Digital literacy, defined as the ability to use, understand, and critically evaluate digital technologies, has become a fundamental skill in today's interconnected world. It is of paramount importance for university students as it serves as a cornerstone for academic success and future professional endeavours. In the contemporary educational landscape, where technology plays an integral role, possessing strong digital literacy skills is not merely advantageous but imperative. University students equipped with digital literacy can engage more effectively with course materials, conduct thorough and efficient research using online resources, and collaborate seamlessly with peers on digital platforms. Moreover, as the professional world becomes increasingly reliant on digital tools and communication, a high level of digital literacy enhances students' employability, ensuring they are well-prepared for the demands of the modern workplace. Beyond the immediate academic and career benefits, digital literacy fosters critical thinking, problem-solving abilities, and adaptability, empowering university students to navigate the complex and rapidly evolving technological landscape with confidence and competence.

Digital Divide

The digital divide is the gap between people who have access to modern information and communications technology (ICT) and those who don't. This includes access to the internet, smartphones, tablets, laptops, and digital

literacy training. (Bojeand Dragulanescu, 2003)[1]. The term digital divide used mostly in the mid 1990's defines those who can afford computers and software and who cannot. According to Organisation for Economic Co-operation and Development (OECD, 2001)[2], Digital Divide refers to -"the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities"

There are different types of digital divide like rural-urban divide, gender divide, generational divide, age divide, income divide. digital divide can be seen in three levels; first level digital divide explains inequality in access to technology, second level digitaldeals with inequality in social access i.e., inequalities in technical skills used to get benefit from ICT and third level digital divide refers to the inequalities in the ability to mobilize the resources to achieve specific objective. The present paper aims to study gender digital divide among higher education students, it studies first and second level digital divide in Higher education

The gender gap in digital literacy refers to gender digital divide is the differences in the ability of male and female students to navigate, critically evaluate, and effectively utilise digital tools and technologies. objective of the paper is to study the first and second levels of gender digital divide.

Hypothesis

The study used null and alternative hypothesis with technology as an independent variable and digital literacy as dependent variable.

H_0(Null Hypothesis): Unequal access to technology and divergent usage patterns between genders 'o' not significantly contribute to the gender gap in digital literacy.

This hypothesis essentially states that there is no significant relationship between gender differences in access to technology and usage patterns with digital literacy. In other words, it suggests that any observed gender gap in digital literacy can be attributed to factors other than technology access and usage patterns.

H_1(Alternative Hypothesis): Disparities in technology access and varying usage patterns play a crucial role in shaping the observed gender divide in digital literacy.

[1]Boje, C., and Dragulanescu, N. G., "Digital divide" in Eastern European countries and its social impact, Proc. of the 2003 American Society for Engineering Education Annual Conference and Ex-position, 2003.
[2] Organisation for Economic Co-operation and Development. (2001). Understanding the Digital Divide. Retrieved from www.oecd.org

Conversely, the alternative hypothesis posits that there is a significant relationship between gender differences in technology access and usage patterns with digital literacy. It suggests that the observed gender gap in digital literacy can be attributed, at least in part, to differences in access to technology and varying usage patterns between genders.

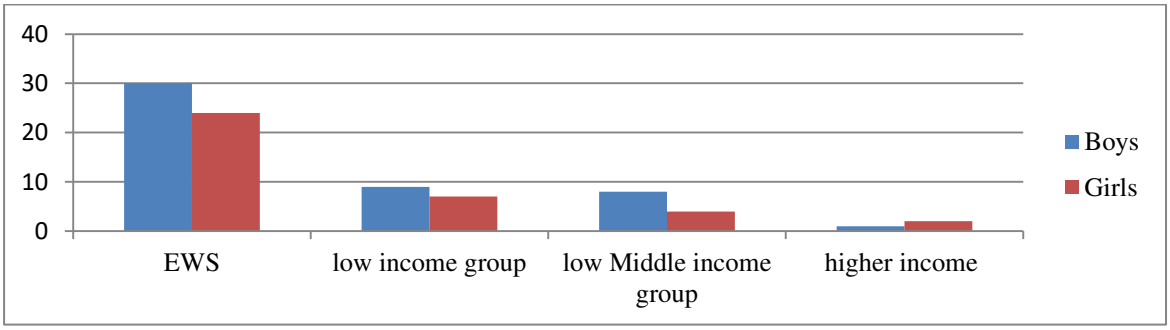
Finding: After the data was collated and analysed, the Null Hypothesis was rejected and the Alternative Hypothesis was accepted.

Methodology

The study used descriptive research design. The data required for the study has been collected through primary sources. Survey method was adopted by using questionnaire as primary tool to collect data. Statistical tools like correlation and per centages were used for analysing data.Using purposive sampling technique, a survey has been conducted in the department of economics in Andhra University among 78 students among them 39 girls and 39 boys.

Both boys and girls have a significant representation in the Economically Weaker Section (EWS), suggesting a shared economic background for a majority of respondents. The distribution across income groups is relatively similar for both boys and girls, with EWS being the dominant category, followed by low-income and lower-middle-income groups. Both genders show some diversity, with a few responses falling into the higher income categories (6-12 lakhs pa and 12-18 lakhs pa).

Fig - 1: Economic status of Participants



First Level Digital Divide

The first level digital divide represents the gaps between haves and have nots in terms of digital devices like smart phones, computers, laptops etc. and internet access which are seems to be very essential for 21st century without which life is burdensome. It is associated with the socio economic conditions of the population.

Access to technology

Technology is like super power for the world, it facilitates handy tools to increase efficiency, connectivity, communication, provides easy information which helps everyone in their daily and professional life.

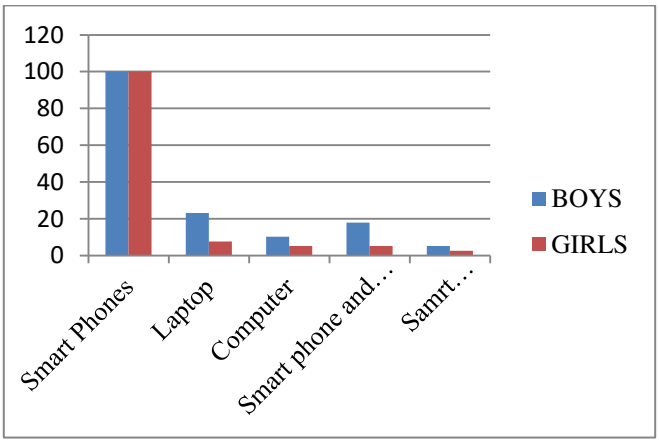
Having digital device has became an integral part of education in this digital era, especially in higher levels of education where assignments, research, and collaborative projects may require a more robust computing device.

For students at higher education picks smart phones as handy devices which fulfills their academic needs all students are having Smart phones of thier own. In case of having laptops and computers boys are found to be better off then the girls. Which indicates that girls are not having knowledge about the importance of other devices for their academics.

Table -1: Access to Digital Devices/ Personal device ownership

Access to digital devices	**Boys**	**Girls**
Smart phones	100	100
Laptop	23.07	7.69
Computer	10.25	5.12
Smart phone and laptop	17.94	5.12
Smartphone laptop and computer	5.12	2.56

fig - 2: Access to Digital Devices



Source : Based on Field Work

Correlation between socio- economic status and acsess to digital devices has been calculated used Pearson correlation coefficient

$$r = \frac{\Sigma(xi - \bar{x})(yi - \bar{y})}{\sqrt{\Sigma(xi - \bar{x})^2 \Sigma(yi - \bar{y})^2}}$$

where

r - correlation coefficient

xi – Economic status of family

$\bar{xi}$ - Mean of Economic status of family

yi- Access to digital devices

$\bar{yi}$- Mean of Access to digital devices

Correlation between Socio-Economic Status and access to digital devices among girls is 0.4839.The positive correlation suggests a moderate relationship between the annual income of the family and access to digital devices. As family income increases, access to digital devices to increase. However, for boys' correlation is 0.8242 indicating stronger positive correlation. Higher family income is associated with a higher likelihood of boys having high access to digital devices. It indicates that with increase income levels boys having more chances to have more devices compared to girls.

It is found from the Table 1 all students are owning their own mobile phones, paper attempted to figure out the cost of their mobile phones and their monthly expenditure, 42.5 per cent of girls owing mobile phones with the cost less than 10000 more than their counterparts, 25 per cent of boys falls in this category. Boys are having high cost mobile phones compared to their counterparts. Average monthly expenditure for maintaining gadgets includes recharge, Wi-Fi, Subscriptions etc. of boys on digital devices and tools was Rs.731.87, for girls it is Rs.549.58.

Table – 2: Cost of Mobile Phones

Cost of mobile phones	**Boys**	**Girls**
<10000	25	42.5
10000-20000	50	47.5
20001-30000	17.5	5
30001-40000	7.5	2.5
>40000	5	2.5

Source : Based on Field Work

Access to Internet

In today's world internet plays major role in every aspect of life. Dependency on internet is new normal in this digital era.Internet can be accessed through divergent sources like College Wi-Fi Personal Wi-Fi, mobile data etc. The study found that students mostly depend on their mobile data as primary source to access internet, 86.84 per cent of girls use mobile data to access internet, whereas65.71 per cent of counterparts are using mobile data for internet. No girl is Using their college WIFI, 28.57 per cent of boys are using college WIFI for internet

Table – 3: Source of Internet Access

Source of internet	**Boys**	**Girls**
College WI-FI	28.57	0
Personal WIFI	5.71	13.16
Mobile Data	65.71	86.84

Source : Based on Field Work

By using Likert scale frequency of internet issues faced by the students was collected and it found that in the "Rarely" and "Sometimes" categories, girls generally have higher percentages compared to boys. Boys have a higher percentage in the "Often" category compared to girls.The "Never" category seems to have similar percentages for both boys and girls.

Table 4-Frequency of internet connectivity issues

Frequency	**Boys**	**Girls**
Never	2.86	0
Rarely	28.57	36.84
Sometimes	34.29	44.74
Often	25.71	7.89
Never	11.43	10.53

Source : Based on Field Work

Second Level Digital Divide

Second level digital divide indicates the inequalities in social access of technical skills needed to get benefits from usage of technology.

Table -5: Mean averages of Proficiency

Source : Based on Field Work

Usage of Technology /Digital tools

Using digital tools is crucial for students in today's educational landscape. As technology continues to advance, integrating digital tools into learning environments becomes increasingly essential. Proficient use of these tools enhances students' academic experiences by providing access to a vast array of educational resources, interactive learning platforms, and collaborative tools. Moreover, it fosters crucial skills such as digital literacy, critical thinking, and adaptability, preparing students for the demands of the modern workforce.

Digital tools	**Boys**	**Girls**
Word Processing	3.64	3.12
Spreadsheets	3.07	3.05
Presentations	2.41	2.15
Email	3.79	3.31
Internet Browsing	4.10	3.66
Social Media Platforms	4.07	3.15
Programming or coding skills	2.30	2.07

By using likert scale asked the students to rate there profeciency in using digital tools from 1 to 5. By doing the mean averages for the collected data it is found that boys are having high proficiency in using digital tools compared to girls.

Usage of Artificial Intelligence is gaining momentum from the last decade. It is pivotal in various fields, enhancing efficiency and innovation. AI contributes more personalised and efficient educational experience for students. In this aspect 58.97 per cent girls and 53.84 percent boys responded positively for using AI tools, In this aspects girls are better off than their counterparts. Digital revolution in terms of AI make a way for personalised learning for students, now a days students to enhance their knowledge they are utaking support of Edtech by using divergent learning apps youtube, Byjus,Unacademy,textbbok etc. both the genders are using learning apps on their own in a similar manner, 64.10 per cent of girls are having their own

leaning apps and boys are slightly higher than girls with 66.66 percent in using their own learning apps.

Table -6 Confidence levels of students in using digital divices and technology

Confidence levels	Boys	Girls
Very Confident	20.51	10.45
Confident	48.71	46.15
Somewhat Confident	23.07	30.76
Not very confident	76.9	12.82
Not confident at all	0	0

Source : Based on Field Work

Boys are very confident and confident in using technology compared to girls. Girls falls more in somewhat confident and not very confident category indicating less confidence levels among girls in using digital technology.

It is found that disparities in technical access and varying usage patterns play a crucial role in shaping the observed gender divide in digital literacy. More surprisingly girls also opined that boys are having more digital knowledge than girls.

Summary

First Level Digital Divide:

Access to Technology: Boys generally have better access to laptops and computers compared to girls. While all students have smartphones, boys tend to have additional devices like laptops and computers, indicating a potential lack of awareness among girls regarding the importance of these devices for academic purposes.

Correlation with Socio-Economic Status: There is a positive correlation between family income and access to digital devices for both boys and girls. However, boys exhibit a stronger correlation, suggesting that higher family income levels are associated with a higher likelihood of boys having access to more digital devices compared to girls.

Cost of Mobile Phones: Boys tend to own higher-cost mobile phones compared to girls, indicating potential differences in purchasing power and preferences between genders.

Internet Access: Girls rely more on mobile data for internet access compared to boys, with no girls using college Wi-Fi. This highlights potential disparities in access to reliable internet connectivity between genders.

Frequency of Internet Connectivity Issues: Girls tend to report higher frequencies of internet connectivity issues, particularly in the "Rarely" and "Sometimes" categories, compared to boys.

Second Level Digital Divide:

Proficiency in Using Digital Tools: Boys demonstrate higher proficiency in using digital tools compared to girls across various categories such as word processing, presentations, and internet browsing.

Usage of Artificial Intelligence (AI) Tools: While a slightly higher per centage of girls reported using AI tools compared to boys, boys exhibit higher proficiency levels in using AI tools, indicating potential differences in familiarity and skill levels between genders.

Confidence Levels: Boys exhibit higher levels of confidence in using digital devices and technology compared to girls, with a larger per centage of boys falling into the "Very Confident" and "Confident" categories.

Overall, the data suggests that disparities in access to technology, proficiency levels, and confidence in using digital tools contribute significantly to the observed gender divide in digital literacy among higher education students. Additionally, girls themselves perceive boys as having more digital knowledge than girls, indicating potential awareness gaps and perceptions within the student population. Addressing these disparities is crucial for promoting equitable access to digital resources and enhancing digital literacy among all students.

Conclusion

This study endeavors to explore the nuanced dimensions of the gender digital divide within higher education, with a focus on delineating the inequities prevalent in access, utilisation, and adeptness with digital technologies between male and female students. The findings elucidate a persistent gender disparity in the digital realm, despite the advancements in technological infrastructure, underscoring the presence of impediments hindering the comprehensive engagement of females within the higher educational digital sphere. Given the perpetual evolution of the digital landscape, it becomes imperative for educational institutions and policymakers to systematically

address these challenges, thereby cultivating an environment conducive to inclusivity and equity.

In this regard, targeted interventions such as tailored digital-literacy initiatives, enhanced provision of technological resources, and the integration of gender-sensitive curricular frameworks emerge as pivotal strategies in ameliorating the gender digital gap. These measures are indispensable in fostering an environment wherein all students, regardless of gender, are afforded equitable opportunities to leverage the transformative potential of digital education. Ultimately, the endeavor to bridge this divide transcends the realm of educational equity, serving as a catalyst for empowering a diverse and proficient workforce poised to navigate the technologically-driven global landscape adeptly.

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