DIGITAL DIVIDE AMONG PG STUDENTS OF SELECTED CENTRAL UNIVERSITIES OF NORTH EAST INDIA: AN EVALUATIVE STUDY

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

R LALTLANZOVA

MZU REGISTRATION: 5943 of 2012

Ph.D. REGISTRATION: MZU/Ph.D./1940 of 04.08.2021

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

SCHOOL OF ECONOMICS, MANAGEMENT, AND INFORMATION SCIENCE

JANUARY, 2025

DIGITAL DIVIDE AMONG PG STUDENTS OF SELECTED CENTRAL UNIVERSITIES OF NORTH EAST INDIA:
AN EVALUATIVE STUDY

BY
R LALTLANZOVA
Department of Library and Information Science

Supervisor
Dr F CHANCHINMAWIA

Submitted
In partial fulfillment of the requirement of the Degree of Doctor of Philosophy in Library and Information Science of Mizoram University, Aizawl

MIZORAM UNIVERSITY

(A Central University)

Department of Library & Information Science

Tanhril, Aizawl – 796004, Mizoram

0389-2331607(O); +91-9774003201(M)

CERTIFICATE

This is to certify that **R Laltlanzova**, Ph.D. Scholar of the Department of Library and Information Science, Mizoram University has written his thesis titled "**Digital Divide Among PG Students of Selected Central Universities of North East India: An Evaluative Study**" under my supervision. To the best of my knowledge and belief, the work embodies his original investigation and findings and has not been published anywhere. I consider it worthy of the Degree of Doctor of Philosophy (Ph.D.) in Library and Information Science at Mizoram University.

(**Dr. F. CHANCHINMAWIA**)

Supervisor

Aizawl, Mizoram

DECLARATION

MIZORAM UNIVERSITY

JANUARY, 2025

I **R. LALTLANZOVA**, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to do the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the Mizoram University for the **Degree of Doctor of Philosophy in Library and Information Science.**

(R LALTLANZOVA)
Candidate

(Prof. MANOJ KUMAR VERMA)
Head

(**Dr. F. CHANCHINMAWIA**)
Supervisor

ACKNOWLEDGEMENT

At the very outset, I would like to offer my heartiest and deepest gratitude to my supervisor **Dr. F. Chanchinmawia,** department of Library and Information Science, Mizoram University, Aizawl for his valuable guidance, understanding, support and inspiration throughout the research work. It has been a privilege working under the supervision of a hardworking, knowledgeable, and experienced person like him, who has always been a source of support and confidence. I sincerely thank him for giving me the freedom to express my thoughts and making the research work an enjoyable one.

I gratefully acknowledge **Prof. Pravakar Rath, Prof. R.K. Ngurtinkhuma**, **Prof. Manoj Kumar Verma**, **Dr. Langaizuali,** and **Dr. Manendra Kumar Singh** of the Department of Library and Information Science, Mizoram University, Aizawl for their moral support and helpful advice during my research work.

I would like to express my gratitude to my wife **Raphaelia Lalsiamthari Sailo** for her endless support, blessings, and encouragement during my research work.

I would like to offer my special thanks to **Dr. James LT Thanga, Associate Professor,** Department of Economics, Mizoram University for his support and guiding me in solving my hypotheses which gave me a progression of my research work.

It is my privileged and proud moment to thank all my teachers I was taught by for shaping my life. I would like to extend my sincere thanks to all my fellow research scholars for their insightful suggestions and helps. Thanks should go to all my cooperative and supportive friends and well-wishers.

Bibliography given in the thesis to be considered as acknowledgement to respective proprietor of the document. It is my core duty thank all the research scholars whose thesis were the major area of my study.

I pray almighty and grateful to universe for what I have.

Aizawl, Mizoram **(R LALTLANZOVA)**

Dated:

TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURES

LIST OF ABBREVIATIONS

TERM	DESCRIPTION
1G	First Generation
2G	Second Generation
3G	Third Generation
4G	Fourth Generation
5G	Fifth Generation
3GPP	Third Generation Partnership Project
ACRL	Association of College and Research Libraries
AI	Artificial Intelligence
AICS	Academy of Integrated Christian Studies
AICTE	All India Council for Technical Education
AI-LSICF	Artificial Intelligence Library Services Innovative Conceptual Framework
ALA	American Library Association
AMPS	Advanced Mobile Phone System
APA	American Psychological Association
AR	Augmented Reality
ASR	Automatic Speech Recognition
AU	Assam University
BW	Bandwidth
CBSE	Central Board of Secondary Education
CD-ROM	Compact Disc Read-Only Memory
CEC	Consortium for Educational Communication
CEO	Chief Executive Officer
CSC	Common Service Centres
CIDA	Canadian International Development Agency
CIET	Central Institute of Educational Technology
CILIP	Chartered Institute of Library and Information Professionals
DBT	Direct Benefit Transfers
DD	Digital Divide
DfID	Department for International Development
DIKSHA	Digital Infrastructure for Knowledge Sharing
DT	Digital Transformation
DTS	Digital Technology Survey
EFR	Ethnographic Futures Research
FDMA	Frequency Division Multiple Access
FICTA	Faculty's ICT Access
FM	Frequency Modulation
FREND	Foundation for Rural Entrepreneurship Development
FTAs	Farm Tele Advisors
GB	Gigabyte
GMSK	Gaussian Minimum Frequency Shift Keying

GSMA	Global System for Mobile Communications Association
HEI	Higher Education Institution
HLT	Human Language Technology
HSDPA	High-Speed Downlink Packet Access
HSPA	High-Speed Packet Access
HSUPA	High-Speed Uplink Packet Access
ICAR	Indian Council of Agricultural Research
ICT	Information and Communication Technology
IGNOU	Indira Gandhi National Open University
IL	Information Literacy
IIM	Indian Institute of Management
IIMB	Indian Institute of Management, Bangalore
IIT	Indian Institute of Technology
ILMS	Integrated Library Management System
INI	Institutes of National Importance
IoT	Internet of Things
IT	Information Technology
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
JISC	Joint Information Services Committee
KCC	Kisan Call Centre
KIOSK	Kommunikasjon Integrert Offentlig Service Kontor
LAN	Local Area Network
LIS	Library and Information Science
LTEA	Long Term Evolution Advance
LTE	Long Term Evolution
MAT	Machine Assisted Translation
Mbps	Megabits Per Second
MHRD	Ministry of Human Resource Development
MIT	Massachusetts Institute of Technology
MIT	Manipur Institute of Technology
ML	Machine Learning
MMP	Mission Mode Project
MOOCs	Massive Open Online Courses
MS	Microsoft
MU	Manipur University
MZU	Mizoram University
NAAC	National Assessment and Accreditation Council
NCERT	National Council of Educational Research and Training
NE	North East
NeGP	National e-Governance Plan
NEP	National Education Policy
NETF	National Educational Technology Forum
NEHU	North Eastern Hill University

NIOS	National Institute of Open Schooling
NIRF	National Institutional Ranking Framework
NIT	National Institutes of Technology
NITI	National Institution for Transforming India
NITTTR	National Institute of Technical Teachers Training and Research
NLP	Natural Language Processing
NMT	Nordic Mobile Telephone
NPTEL	National Programme on Technology Enhanced Learning
NTA	National Testing Agency
OCR	Optical Character Recognition
ODL	Open Distance Learning
OECD	Organisation for Economic Co-operation and Development
OFDM	orthogonal frequency division multiplexing
OPAC	Online Public Access Catalog
PARAKH	Performance Assessment, Review, and Analysis of Knowledge for Holistic Development
PG	Post Graduate
PhD	Doctor of Philosophy
PMGDISHA	Pradhan Mantri Gramin Digital Saksharta Abhiyan
RFID	Radio Frequency Identification
S2S	Speech-to-Speech
SAUs	State Agricultural Universities
SCONUL	Society of College, National and University Libraries
SDA	State Departments of Agriculture
SDC	Swiss Agency for Development and Cooperation
SEDG	Socio-Economically Disadvantaged Groups
SES	Socio-Economic Status
SLAM	Strategic Library Automation Management
SLR	Systematic Literature Review
SMSs	Subject Matter Specialists
SNSs	social networking sites
SPSS	Statistical Package for the Social Sciences
SWAYAM	Study Webs of Active Learning for Young Aspiring Minds
TACS	Total Access Communications System
TDIL	Technology Development for Indian Languages
TDMA	Time Division Multiple Access
TTS	Text-To-Speech
TU	Tezpur University
UGC	University Grants Commission
UMANG	Unified Mobile Application for New-age Governance
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency

	Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPI	Unified Payments Interface
UPS	Uninterruptible Power Supply
US	United States
USAID	United States Agency for International Development
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
VR	Virtual Reality
WAN	Wide Area Network
WCDMA	Wideband Code Division Multiple Access
Wi-Fi	Wireless Fidelity

CHAPTER-1:
INTRODUCTION

1.1 INTRODUCTION

Digital Literacy is a crucial component for developing lifelong learning skills. Since the digital environment has emerged rapidly, people from different parts of the world know how to access information. However, there can be a considerable barrier to accessing the information. Some people lack access to or expertise in using information and communication technologies (ICTs), whereas others have all of these things and have extensive knowledge of them (Naidoo & Raju, 2012). Access to ICTs varies significantly among the privileged class, the haves, and the impoverished class, the have-nots, in developing countries (Venkatesh and Sykes 2013).

People from different places might have different abilities in handling ICT tools; the main reason may be economic status, environmental factors, family problems, geographical region, etc. The digital gap is frequently caused by a number of factors, including low economic and literacy levels, regional limitations, a lack of desire to use technology, physical access issues, and digital illiteracy. The unequal distribution of household income in developing countries leads to wide disparities between the affluent and the poor, which unfortunately compromises a person's ability to pursue their educational goals (Mishra, 2018). Furthermore, the majority of families impacted by digital inequality are low-income households, such as those found in rural or semi-urban areas (Maceviciute & Wilson, 2018).

Singh (2012) has emphasized that uneven access to ICTs has resulted in a significant digital divide. Even though India is one of the new IT superpowers, the gains have been incredibly gradual, particularly in remote areas. In addition to socioeconomic considerations, the government has faced obstacles when implementing IT-focused initiatives due to regional, educational, and cultural variables. Political instability, financial barriers, infrastructure constraints, content barriers, literacy and skill barriers and linguistic diversity are some of the factors that limit the benefits that underprivileged groups in India receive from having access to ICT.

1.2 ETYMOLOGY OF THE TERM DIGITAL DIVIDE

‘The term first appeared in the United States in the middle of the 1990s. The National Telecommunications and Information Administration of the US Department of Commerce published it for the first time in 1999. Sadly, there is a lot of misunderstanding regarding the term "digital divide." However, it is a metaphor that has led to at least four misunderstandings. First, the metaphor suggests a simple distinction between two divided groups with a yawning gap between them. Second, it suggests that this gap is difficult to bridge. Third, it can imply absolute inequalities between those who are included and those who are excluded, whereas inequalities are of a more relative kind. Finally, the digital divide is not a static and permanent condition.’ (Dijk, 2017).

1.3 DEFINITION OF DIGITAL DIVIDE

Dijk (2017) defined the digital divide as “the concept is usually defined as the gap between people who do and do not have access to forms of information and communication technology. These forms are primarily computers and the internet. Sometimes, smartphones and other digital hardware and software are also included. The concept figures in discourses about social and information inequality. In this respect, inclusion and exclusion in particular social units are common concepts.”

Taylor (2022) defined the digital divide as “the digital divide refers to the gap between demographics and regions that have access to modern information and communications technology and those that don’t. Though the term now includes the technical and financial ability to utilize available technology with access (or a lack of access) to the internet gap, it refers to the constant shifting with the development of technology. When the term was first used in the late 20th century, for example, it described the gap between those who had Smartphone access and those who did not.” The increased access to communication tools has helped rural areas somewhat, but the geographical disparity is increasingly noticeable in emerging nations. The factors contributing to the digital divide range from one place to another; however, the gap is widening, and the disparities in how different countries and regions use communication resources are growing.

The difference between those with and without access to ICTs is known as the "digital divide." The internet and computers make up the majority of these, but smartphones and other software and digital gadgets might potentially be included. The idea comes up in discussions about information and inequality in society. Under these circumstances, the terms "exclusion" and "inclusion" within particular social groups are used frequently.

1.4 DIGITAL DIVIDE BARRIERS AND CHALLENGES

The digital divide can be led by challenges and obstacles that affect people individually, in groups, and across entire countries. Here are a few main barriers and challenges:

1.4.1 Economic barriers

The high expenses of purchasing digital gadgets and internet services are the root cause of the economic obstacles known as the "digital divide." Smartphones, laptops, and tablets are frequently beyond low-income households' means, and the ongoing costs of internet connections might be unaffordable. The gap is further widened by the expenses of upkeep, repairs, and required software updates. Economically disadvantaged people and communities are consequently left without the necessary resources to engage in the digital world properly (Warschauer, 2003).

1.4.2 Infrastructure barriers

The digital divide is mostly caused by infrastructure hurdles, particularly in isolated and rural areas where consistent internet access is usually not available. These areas might not have internet connectivity, inadequate broadband networks, or use antiquated technologies. Investment is discouraged by the high expense and logistical difficulties associated with setting up and maintaining digital infrastructure in remote or hard-to-reach places. As a result, the divide between the urban and rural populations gets wider as inhabitants in these areas have fewer chances for digital participation, education, and economic progress (OECD, 2019).

1.4.3 Educational barriers

The persistence of the digital gap is primarily due to educational constraints. Many people lack the digital literacy abilities necessary to operate and navigate technology. Poor schools may lack the tools to teach these subjects or give students access to computers and the internet. Adults without sufficient digital education also have difficulty adjusting to the quickly changing digital landscape. Insufficient digital literacy impedes one's capacity to interact with digital services and data, advance personally, and secure employment opportunities (Van Dijk, 2005).

1.4.4 Social and cultural barriers

Social and cultural obstacles affect attitudes and access to technology, which substantially impacts the digital divide. Non-native speakers may find it difficult to access digital content due to language obstacles, and cultural resistance may hinder the uptake and application of new technology. The usage of digital tools may be discouraged in some countries by customs and beliefs, particularly about specific demographic groups. Due to these constraints, diverse communities cannot fully benefit from technology improvements and online services, which also cause inequities in digital participation and inclusion (Selwyn, 2004).

1.5 HIGHER EDUCATION'S OBSTACLES AND ISSUES IN NORTH EASTERN INDIA

Northeastern India's physical, socioeconomic, and infrastructure constraints present particular barriers and problems for higher education. Many students, particularly those from rural areas, struggle to access high-quality educational institutions due to the region's isolated locations and rough terrain. Educational inequities are exacerbated by inadequate infrastructure, which makes it difficult for staff and students to commute, access digital resources, and stay connected. Examples of this include insufficient transportation and irregular electricity.

Socioeconomic issues also significantly impact the quality and accessibility of higher education. Many students come from low-income families, making it hard for them to afford educational expenses like the internet connectivity and digital devices needed for modern education. Additionally, an absence of well-equipped research facilities and a shortage of experienced teachers and administrative staff limit students' exposure to academic courses and professional skills, affecting the overall quality of education.

As online learning and digital literacy become increasingly important in higher education, the digital divide makes these issues even more difficult. Many areas in the region lack adequate digital infrastructure and a limited internet connection, which hinder students from using digital tools necessary for research and successful education or fully engaging in online learning. Improved digital resources, better infrastructure, targeted financial aid for students from low-income families, and programs that increase teacher capacity are just some of the many strategies required to deal with these issues. Northeastern India may work toward a high-quality, inclusive higher education system by tackling these issues.

Taba, P. (2023) highlight a number of issues and Challenges of Higher Education in Northeast India. They are as follows:

1.5.1 Language dilemma: The language diversity that exists throughout North East India is a significant barrier to higher education in the area. Students find it difficult to get educational materials in their native tongues because different states have unique languages. Consequently, the Lack of accessible educational resources in their mother tongues discourages many people from pursuing higher education. Students who want to succeed academically in a bilingual setting face additional challenges due to this language barrier, which also restricts understanding.

1.5.2 Shortage of vocational courses: Although India has many universities, its curricula lack many vocational courses. These universities primarily provide traditional academic programs, ignoring the need for vocational training and practical skills. As a result, students' career options are limited because they frequently graduate with a lack of practical experience required for positions particular to their field. Increasing vocational courses could help bridge the gap by providing graduates with the specific knowledge and skills they need to meet today's labour market expectations.

1.5.3 Inadequate research infrastructure: Inadequate facilities and infrastructure in North Eastern states limit research prospects and make it difficult for the region to conduct research at the worldwide level. A good example of this is the region's relatively low enrolment in Ph.D. programs. Academic development and innovation are hampered by a lack of possibilities for advanced research, which further divides Northeast India from other research-driven areas.

1.5.4 Wastage and stagnation: Similar to the challenges in basic and secondary education, waste and stagnation are still problems in higher education. Inadequate hostel amenities, poor teacher-student interactions, an inefficient test system, and administrative difficulties are all contributing reasons. Additionally, this problem is made worse by Northeast India's high cost of higher education, which results from private universities' domination.

1.5.5 Lack of specific educational objectives: Many students in higher education feel aimless since there aren't clear learning objectives, even though enrolment has increased. When educational goals are unclear, students may become frustrated and find it difficult to successfully apply what they have learned. This Lack of focus can undermine academic motivation by causing disengagement and a weakened feeling of purpose. To solve this, educational institutions should set defined learning objectives that support students' professional and personal development and give them a clear way forward.

1.5.6 Privatization and commercialization: With the rise of private universities that frequently put profit before of academic quality, the higher education privatization has resulted a significant problem in northeastern India. The entire educational process may be compromised by this commercialization. Many private schools might not have the resources necessary for thorough education, such as sufficient facilities, knowledgeable professors, or research opportunities. Students can thus encounter obstacles in their academic and professional growth, which could worsen the regional educational disparity.

1.5.7 Traditional curriculum: The Indian higher education system's strong emphasis on theoretical knowledge over real-world applications is one of its main issues. This problem also exists in Northeast India, where curricula frequently don't address issues that arise in the actual world. Students' employability may be limited as a result of graduating without the practical skills required to succeed in the modern workforce. Curriculum reform that prioritizes internships, industry engagement, and experiential learning is necessary to close this gap and better prepare students for real-world employment.

1.5.8 Insufficient practical knowledge: Most of the time, students are not given the practical skills they need for their careers by the knowledge that is taught in syllabus and curriculum. One major worry is the disconnect between theoretical knowledge and real-world application. Because of this gap, graduates are ill-equipped to handle the demands of the real world, which hinders their ability to adjust in changing work settings. To solve this, universities must incorporate industry-relevant training and skill-based learning into their curricula.

1.5.9 Teacher dedication and employment conditions: Professional courses have been added to many North East Indian universities' standard academic offerings. Nonetheless, most of the instructors in these establishments work on contract and receive little compensation. Their commitment to teaching may suffer as a result of this unstable work environment. High turnover rates among contractual instructors also affect the quality of education by interfering with the continuity of instruction. Resolving this issue through equitable hiring procedures and competitive pay may increase teacher staying and improve students' educational experiences.

1.6 IMPORTANCE OF HIGHER EDUCATION IN BRIDGING DIGITAL DIVIDE IN NORTH EASTERN STATES

For bridging the digital divide, higher education plays a crucial role by fostering digital literacy, improving access to technology, and promoting equitable learning opportunities. Students can be prepared to succeed in an increasingly digital environment by attending universities and colleges and gaining the necessary ICT skills. By integrating technology-based learning and practical applications into curricula, higher education institutions help students overcome barriers related to internet access, device familiarity, and digital competency. Higher education not only reduces digital disparities among students but also prepares them to contribute positively to digitally inclusive societies.

India, a country known for its "unity in diversity," has an impressive array of languages, customs, and civilizations. The northeastern part of this enormous subcontinent is a significant physical and cultural region. The northeastern area, which is made up of eight different states such as-Assam, Sikkim, Mizoram, Meghalaya, Arunachal Pradesh, Manipur, Nagaland and Tripura, represents a unique combination of languages, ethnic groups, and landscapes that add to its complex personality (Taba, 2023).

Despite its indisputable significance, a number of obstacles have prevented this region from developing to its full potential. The inadequate infrastructure, which prevents both economic development and social development, is an important challenge. The creation of vital transportation and communication networks is a difficult undertaking due to the geographical layout, which is marked by hilly terrain and unfavourable climate conditions (Das et al., 2020). By limiting access to necessary online services and digital knowledge, this infrastructure gap makes the digital divide worse. Higher education institutions may help communities and students overcome limited technological exposure and geographic isolation by implementing digital learning initiatives that give them access to vital skills, resources, and connectivity.

The frequent border conflicts and ethnic tensions in the northeast are another enduring problem. Periodically, these tensions have turned into violent clashes that have disrupted the region's unity and peace. Conflicts between nearby ethnic groups frequently arise over matters of political representation, resources, and identity (Kumar, 2017). These disputes affect stability and access to education, which worsens the digital divide. By fostering multicultural awareness and offering venues for peacebuilding projects that support regional stability, higher education can serve as a unifying factor. By encouraging digital literacy and creating inclusive learning environments, universities can bridge the gap and equip students with the abilities they require in a connected society.

However, higher education institutions can also act as community centres, facilitating wider digital outreach by providing training, workshops, and internet access to local people as well as students. A more inclusive digital environment is promoted by this outreach, which lessens regional differences in digital awareness and skill development.

1.7 WHAT IS ICT?

ICT stands for Information and Communication Technology. The following group includes intelligent building management systems, telecommunications, audiovisual processing, network-based control, broadcast media, transmission systems and monitoring abilities. ICT includes both conventional technologies like radio, television, and telephone as well as internet-enabled gadgets like computers and smartphones.

UNESCO defined ICT as "Tools and technical resources for creating, storing, transferring, disseminating, and exchanging information. Computers, the internet (websites, blogs, and emails), live broadcasting (television, radio, and webcasting), recorded broadcasting (podcasting, audio and video players and storage devices), and telephony (satellite, fixed or mobile, video/video conferencing, etc.) are examples of these technological resources and tools)."

Brown (2020) defined ICT as, "As the name implies, it is a synthesis of communication and information technologies. To put it another way, it involves both hardware and software elements of information technology as well as elements of communication technology like telegraphs, telephones, and televisions."

1.7.1 COMPONENTS OF ICT

There are several components of ICT. According to Brown (2020)-

- **Hardware:** This part includes all of the actual hardware computers, servers, smartphones, tablets, and peripherals like printers and scanners that are utilized to carry out ICT operations. Hardware forms the foundational infrastructure that enables ICT services, as these devices are necessary for processing, storing, and transmitting information across networks.
- **Software:** Software in ICT includes both system software, such as operating systems, and application software, such as MS Word, Excel, and web browsers. Makes it possible for hardware to work, while application software lets users do particular tasks. As a result, software is an essential component that connects hardware and human activities.
- **Networks:** Connectivity is a main component of ICT, including the internet, Local Area Networks (LANs) and Wide Area Networks (WANs) that facilitate communication and data sharing. Network infrastructure is essential for connecting devices and users, enabling remote collaboration, resource sharing, and global connectivity.
- **Media/Visual Elements:** Through programs like social media, multimedia apps, and streaming platforms, ICT facilitates the dissemination of videos, text, photos and other media forms. These elements make ICT a powerful

tool for communication, allowing users to share information in engaging formats and enhancing accessibility for a wide range of audiences.

- **Data Management:** Databases, cloud storage, and data management solutions are essential in ICT for organizing, storing, and protecting vast amounts of information. Effective data management enables users and organizations to retrieve and analyze data efficiently, supporting informed decision-making and ensuring data integrity across ICT systems.

1.8 ECONOMIC STRATIFICATION AND THE DIGITAL DIVIDE: GLOBAL PERSPECTIVE

Still, the digital divide remains a major problem throughout the world, with significant differences in internet availability and usage across various income levels. The most recent data clarifies the impact of economic stratification on global digital inclusion.

1.8.1 Global internet access

- **1High-income countries**: Internet penetration rates are highest in high-income countries. For instance, in North America and Western Europe, internet penetration exceeds 90% (ITU, 2023).
- **Low-income countries**: In contrast, low-income countries, particularly those in South Asia and Sub-Saharan Africa, have internet penetration rates below 40% (World Bank, 2023).

1.8.2 Digital device ownership

- **High-income countries**: The majority of households own multiple digital devices, including smartphones, laptops, and tablets. Device ownership in countries like the US, Canada, and Germany is nearly universal among middle and high-income households (Pew Research Center, 2023).
- **Low-income countries**: Many low-income households cannot afford a single device. For example, in many African and South Asian countries, smartphone ownership is often limited to less than 30% of the population (GSMA, 2023).

1.8.3 Broadband and mobile data costs

- **High-income countries**: Broadband and mobile data are relatively affordable. In OECD countries, the cost of a 1GB mobile data plan is less than 2% of average monthly income (OECD, 2023).
- **Low-income countries**: A 1GB mobile data plan can cost more than 10% of the typical monthly salary in low-income countries, making it prohibitively expensive for many (Alliance for Affordable Internet, 2022).

1.8.4 Digital literacy and skills

- **High-income countries**: Higher levels of digital literacy and skills are prevalent, supported by robust education systems and continuous digital training programs. Nearly all adults in countries like South Korea and Finland possess basic digital skills (European Commission, 2023).
- **Low-income countries**: Digital literacy levels are significantly lower, with limited access to digital education. In many low-income regions, less than 20% of the population has basic digital skills (UNESCO, 2023).

1.8.5 Effect of COVID-19

- **High-income countries**: The pandemic accelerated digital adoption and integration, with many services moving online. Remote work and online education became the norm, supported by widespread digital infrastructure.
- **Low-income countries**: The pandemic exacerbated existing digital inequalities, as many were unable to access online services, remote work opportunities, or digital education, further widening the digital divide (World Economic Forum, 2023).

1.9 SIGNIFICANCE AND SCOPE OF THE STUDY

ICT permeates every part of life, offering individuals faster, better, and more innovative ways to network, communicate, ask for assistance, obtain information, and learn (Brown 2020). Digital technology is having a major impact on the education sector. The digital divide is becoming a major concern, and universities must initiate appropriate measures to reduce social friction. Universities should play a proactive role in supporting library users in getting equipped with the latest technology. Uneven access to ICT, both at academic Institutions and at home, increases educational and socioeconomic stratification, resulting in a digital divide among PG students. As a result of limited access to ICT the gap in learning outcomes could increase. The status of the digital divide among the PG students of NE Region is not yet identified. It is necessary to take a study to express the difference in number, degree, quality, amount of their ability and skills in handling digital assets. Taking the whole NE will be a huge case to tackle; it is necessary to take a specific area of the population to study. Even though the target groups are in the higher level of education, differences can exist in their access to and use of ICT due to various factors.

The study's scope is confined to the top five Central Universities of India by NIRF on University Ranking 2021 within the Northeast Region. The lists are as follows:

Table No.1.1: List of 5 Central University and their year of establishment

Sl.No.	Name of University	NIRF Rank 2021	State	Year of Estd.
1	Tezpur University (TU)	46	Assam	1994
2	North Eastern Hill University (NEHU)	59	Meghalaya	1993
3	Assam University (AU)	93	Assam	1994
4	Manipur University (MU)	101-150	Manipur	1980
5	Mizoram University (MZU)	101-150	Mizoram	2001

(Source: NIRF -2024)

After having analysis of five universities one school from science and one school from social sciences. Therefore, the School of Social Sciences and School of Life Sciences are selected, since the two schools have the most similar department compared to other schools, it is therefore selected as the area for the study. The study selected a total sample of 500 PG students, and 100 questionnaires were distributed among the five Universities randomly from that the target is 100 questionnaires from each University. The study has not considered all dimensions of digital divide. The definition of ICT includes an array of networking components, digital devices and software applications. Practical measures to assess the digital competency of students will not be used in this study.

1.10 RESEARCH DESIGN

1.10.1 STATEMENT OF THE PROBLEM

It is clear that the rapid growth of technology in the 21st century creates a huge gap among PG students. In the present day, each and every student should have digital skills. A lack of digital literacy might result in a lot of problems and challenges. Digital literacy skills enable PG students to become lifelong learners. The digital age pushes the firsthand Information that comes with the digital form. Most of the publication systems are done in electronic form. PG students should have the knowledge to handle, evaluate, retrieve, disseminate, download and access e-resources in order to take up an effective learning system. Every PG student has to cope and update with the latest technology to supplement his/her activity. This digital revolution and the digital divide created a huge gap among PG students. It is not possible to determine whether the PG students have the skills to access the data analysis software, utilize Google Forms, and use other application software that are necessary for their academic usage.

As far as Covid-19 is concerned, the digital platform is the main environment for studying and imparts knowledge among the PG students. Some may face problems with the telecommunication infrastructure, poor internet connection, lack of motivation to use technology, geographical restriction, poor digital literacy, and social environment. So, there can be a huge impact regarding the digital divide among PG students. Such an impact may result in a lack of competency in handling the ICT tools. So far, research has not been undertaken among the PG students of selected Central Universities of North East India, such as Tezpur University, North Eastern Hill University, Assam University Manipur University and Mizoram University. The researcher will be able to find out the conditions and measures for the evaluative study in this area.

1.10.2 OBJECTIVE OF THE STUDY

The objectives of the study are-

1. To know the ability to access ICT tools and technology for academic purposes.
2. To analyze the use pattern of the internet by the respondents.
3. To find out whether geographical restrictions contribute to the digital divide among the respondents.
4. To know the initiative taken by selected universities to reduce the digital divide among the respondents.
5. To find out the areas of strength and weakness of respondents in handling digital assets and give suggestions for enhancement.
6. To identify the awareness of copyright among the respondents.

1.10.3 HYPOTHESES

The hypotheses of the present study are:

H1: There is a significant difference in the ability to access ICT tools and years of usage of ICT tools among the PG Students of selected universities.

H2: There is a significant difference in the usage of ICT among rural and urban respondents.

1.10.4 RESEARCH METHODOLOGY

The present study adopted survey method for assessing digital divide among PG students of top five Central University by NIRF Ranking 2021 within North East Region. The study is for investigating a number of aspects of the digital divide, including ICT proficiency, device availability, internet access, computer usage and awareness of copyright.

I. Survey of Central Universities

The study analyses the digital divide among PG students of the top five Central Universities in the North East Region, selected based on the NIRF Ranking 2021. The research focuses specifically on students from the School of Social Sciences and the School of Life Sciences at these universities.

II. Survey of respondents

Data collection involved administering a structured questionnaire to PG students. The questionnaire was designed to assess multiple aspects of the digital divide, including personal information, ability to access ICT tools and technology for academic purposes, patterns of internet usage, the impact of geographical restrictions on the digital divide, initiatives by the selected universities to reduce the digital divide, strengths and weaknesses in handling digital assets, with suggestions for improvement and awareness of copyright among respondents**.**

III. Sample selection

A cluster random sampling technique was employed to select participants. A total of 500 respondents were surveyed, with 100 structured questionnaires distributed randomly to each of the five selected universities. The collected data from the respondents have been analyzed and presented in (Chapter-5).

IV. Response rate

The study achieved a 100% response rate, with all 500 questionnaires successfully completed and returned-100 from each selected university.

V. Tools for analysis

The collected data was compiled and analyzed using SPSS for statistical analysis. Microsoft Excel for data organization and visualization and Chi-square test to test hypotheses and investigate relationships between variables related to the digital divide.

The Chi-square formula:

$$\chi^2 = \sum (O_i - E_i)^2 / E_i$$

where-

- **O_i = observed value (actual value)**
- **E_i = expected value.**

1.11 CHAPTERIZATION

Chapter 1: Introduction

The first chapter introduces the research topic and gives a brief overview, presents Etymology of the digital divide, Definition of the digital divide, Challenges and Barriers in the digital divide, Higher Education's Obstacles and Issues in

Northeastern India, Importance of Higher Education in Bridging digital divide at North Eastern States, About ICT, Significance and Scope of the Study, Objectives of the Study, Research Methodology, Hypothesis and organization of the chapters.

Chapter 2: Review of literature

There are several factors that explain why the digital divide phenomenon is still appearing even after the spreading of the internet worldwide. In order to identify those factors, a thorough review of studies related to this phenomenon is required. 69 Literature are reviewed to supplement the knowledge of the researcher. The following reviewed literature is distributed into three categories: Government Initiatives in bridging the digital divide, Information Literacy, and Artificial Intelligence. These three factors are intertwined, as unequal access to AI tools requires a foundation in both digital and information literacy. To bridge the digital divide, efforts must include promoting both access to AI technologies and improving digital skills across all socio-economic groups.

Chapter 3: Government initiatives in bridging the digital divide, Artificial Intelligence.

The government's initiative is presented in this chapter. Since then, the Indian government has taken a number of steps to close the digital divide, with a particular emphasis on increasing internet access, improving digital literacy, and promoting technology in rural areas. Initiatives have been taken in various sectors, such as the Agriculture sector, the educational sector and online infrastructure and government services. For this reason, it is necessary to highlight some of its features that are related to the topic. Thus, this chapter contains information regarding government initiatives to bridge the digital divide and Artificial Intelligence.

Chapter 4: Overview of Central University in NE India

This chapter highlights a brief content about the top five Central Universities by *NIRF on University Ranking 2021* within the North East Region. It gives information about Tezpur University, NEHU, Assam University, Manipur University and Mizoram University. It also highlights some of the information about the Central Library of the universities.

Chapter 5: Data analysis and interpretation

This chapter contains the analysis and interpretation of the gathered data using the proper statistical methods and tools. Tables and graphs also perfectly represent the data. There are seven parts in this chapter, which consist of the analysis of the different objectives of the study. *Part one* is to know the ability to access ICT tools and technology for academic purposes. *Part two* aimed to analyse the use pattern of the Internet by the respondents. *Part three* aimed to find out whether geographical restrictions contribute to the digital divide among the respondents. *Part four* aimed to know the initiative taken by the selected Universities to reduce the digital divide among the respondents. *Part five* planned to find out the areas of strength and weakness of respondents in handling digital assets and give suggestions for enhancement. *Part six* is to identify the awareness of copyright among the respondents. *Part Seven* is hypotheses testing.

Chapter 6: Major findings, conclusion and suggestion

In this Chapter, the study findings, conclusions, and recommendations are compiled. The findings highlight the digital divide due to geographical, socio-economic, and institutional disparities, with rural respondents lagging in ICT access and internet usage. Limited awareness of copyright and unequal institutional initiatives further impact digital accountability. Conclusions emphasize the urgent need to address these gaps to foster academic growth. Suggestions include enhancing digital literacy, upgrading infrastructure, and implementing targeted policies to bridge regional and socio-economic divides. This Chapter provides a roadmap for universities and policymakers to develop an equitable digital environment that fosters students academically and professionally.

The bibliography is included at the end of the thesis. The APA style manual, 6th ed., provides guidelines for the bibliography (American Psychological Association, 2010).

References:

Abu-Shanab, E. & Al-Jamal, N. (2015). Exploring the gender digital divide in Jordan. *Gender, Technology and Development.* 19(1). 91-113.

Abu-Shanab, E. & Al-Jamal, N. (2015). Exploring the gender digital divide in Jordan. *Gender, Technology and Development.* 19(1). 91-113.

Alliance for Affordable Internet. (2022). Mobile data cost have increased, making internet connectivity unaffordable for many. https://a4ai.org/news/mobile-data-cost-have-increased-making-internet-connectivity-unaffordable-for-many/Accessed on 20th August 2024

Brown, Terry. (May 2020). The Importance of Information and Communication Technology(ICT). *IT Chronicles*. https://itchronicles.com/information-and-communication-technology/the-importance-of-information-and-communication-technology-ict/. Accessed on 04th March 2023

Das, M., Saha, B., & Deka, J. (2020). Infrastructure Development in the North Eastern Region of India: Challenges and Opportunities. International Journal of Innovative Research in Engineering & Management, 7(5), 214-222.

GSMA. (2023). *The Mobile Economy 2023*. https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2023/03/270223-The-Mobile-Economy-2023.pdf. Accessed on 18th July 2024

Hilbert, M. (2009). When is cheap, cheap enough to bridge the digital divide? Modeling income related structural challenges of technology diffusion in Latin America. *World Development*. 38(5). 756-770.

ITU. (2023). *Global Connectivity Report 2023*. https://www.itu.int/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx#:~:text=Geneva%2C%2012%20September%202023&text=The%20reduction%20from%20the%20estimated,people%2C%20are%E2%80%8B%20now%20online. Accessed on 18th July 2024

Kumar, V. (2017). Ethnic Conflicts in North East India: Causes, Consequences, and Resolutions. Journal of Asian and African Studies, 52(6), 847-865.

Maceviciute, E., & T. D. Wilson. (2018). Digital Means for Reducing Digital Inequality: Literature Review. *Informing Science: The International Journal of an Emerging Transdiscipline.* 21: 269–287. doi:10.28945/4117

Maceviciute, E., & T. D. Wilson. (2018). Digital Means for Reducing Digital Inequality: Literature Review. *Informing Science: The International Journal of an Emerging Transdiscipline.* 21: 269–287. doi:10.28945/4117.

Mishra, A. K. (2018). Household Income Inequality and Income Mobility: Implications Towards Equalizing LongerTerm Incomes in India. *International Economic Journal.* 32 (2): 271–290. doi:10.1080/10168737.2018.1480640.

Naidoo, Segarani., Raju, Jaya. (November 2012). Impact of the digital divide on information literacy training in a higher education context. *South African Journal of Libraries and Information Science. 78 (1).* https://sajlis.journals.ac.za/pub/article/view/46#:~:text=The%20findingsof%20the%20study%20revealed,lessons%20while%20advantaged%20students%20already. Accessed on 18th September 2023

NIRF (2024). Ranking. https://www.nirfindia.org/#

OECD. (2019). *Bridging the Digital Divide: Include, Upskill, Innovate*. OECD iLibrary

Pew Research Center. (2023). *Internet/Broadband Fact Sheet*. https://www.pewresearch.org/internet/fact-sheet/internet-broadband/Accessed on 18th July 2024

Selwyn, N. (2004). *Reconsidering Political and Popular Understandings of the Digital Divide*. New Media & Society, 6(3), 341-362. doi:10.1177/1461444804042519

Singh, Kirti. (September 2012). Digital Divide Factors in Indian Management Libraries Introduction. *International Journal of Advanced Research in IT and Engineer*. 1(3), 34-43.

https://www.academia.edu/5379938/DIGITAL_DIVIDE_FACTORS_IN_INDIAN_MANAGEMENT_LIBRARIES_INTRODUCTION. Accessed on 16th July 2023

Taba, P. (2023). Challenges and Prospects of Higher Education in Northeast India: A Comprehensive Analysis. *International Journal of Novel Research and Development*. 8 (9). 278- 287. https://www.ijnrd.org/papers/IJNRD2309340.pdf. Accessed on 18th July 2024

Taylor, Kiara. (February, 2022). Digital divide. *Investopedia*. https://www.investopedia.com/the-digital-divide. Accessed on 24th July 2024

UNESCO. (2021). Information and Communication Technology (ICT). *United Nations Educational, Scientific and Cultural Organization*. https://uis.unesco.org/en/glossary-term/information-and-communication-technologies-ict. Accessed on 03rd May 2024

UNESCO. (2023). *Digital Literacy Global Framework*. https://unesdoc.unesco.org/Accessed on 18th July 2024

Van Dijk, J. A. G. M. (2005). *The Deepening Divide: Inequality in the Information Society*. Thousand Oaks, CA: SAGE Publications.

Venkatesh, V., & T. A. Sykes. (2013). Digital divide Initiative Success in Developing Countries: A Longitudinal Field Study in a Village in India. *Information Systems Research.* 24 (2): 239–260. doi:10.1287/isre.1110.0409.

Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital divide*. Cambridge, MA: MIT Press. https://direct.mit.edu/books/oa-monograph/1817/Technology-and-Social-InclusionRethinking-the. 18th September 2023

World Bank. (2023). *World Development Report 2023: Data for Better Lives*. https://www.worldbank.org/en/publication/wdr/wdr-archive. 14th June 2024

World Economic Forum. (2023). *The Global Risks Report 2023*. https://www.weforum.org/publications/global-risks-report-2023/. 14th June 2024

CHAPTER-2

REVIEW OF LITERATURE

2.1 REVIEW OF LITERATURE

There are several elements that explain why the digital divide phenomenon is still appearing even after the spreading of the internet worldwide. In order to identify those factors, a thorough review of studies related to this phenomenon is required. The following 69 literature are reviewed to supplement the knowledge of the researcher. The following reviewed literature is distributed into three categories which are arranged from earliest to the latest, showing the development in the study, such as

- Digital Divide
- Information Literacy (IL)
- Artificial Intelligence (AI) and Fifth Generation (5G)

These three factors are connected, as unequal access to AI tools requires a foundation in both digital and information literacy. To bridge the digital divide, efforts must include promoting both access to AI technologies and improving digital skills across all socioeconomic groups.

2.1.1 DIGITAL DIVIDE

Hoffman (1998) evaluated the differences in computer access and internet usage by race in the US. The study examines how race affects the chance of having a computer and using the internet using data from national surveys. The authors discover notable disparities in racial groups' access and usage patterns, with minority populations-African Americans and Hispanics in particular- having less access to these technologies. Due to the fact that access to digital resources is becoming more and more necessary for both educational and economic prospects, these differences add to larger socioeconomic inequities. The study highlights the importance of understanding and addressing how race affects digital access in order to guarantee fair participation in the information society. Consequently, although African Americans are more likely to say that they would like to have access to a computer, White people are more likely than African Americans to have a computer in their homes. Web usage is more common among white people.

DiMaggio (2001) discussed that there are five elements of digital inequality: skill, equipment, social support, autonomy of use, and the goals for which technology is used. They formulate hypotheses to guide research in each situation, aiming to create a testable model of how personal characteristics, aspects of inequality, and advantageous technological outcomes interact. The article examines how, as internet connection grows more common, the idea of the "digital divide" gave way to "digital inequality." According to the authors, there are still differences in internet use and skill sets, which contributes to differences in digital engagement and results even as internet adoption rises. They look at how, even for individuals who have access, internet use is still shaped by variables like education, digital literacy, and socioeconomic status. In order to reduce inequality, the study emphasizes the necessity of policies that target not only access but also the calibre and extent of digital engagement.

Norris (2001) looked at internet access and usage in 179 different countries worldwide. The author examines the disparities in ICT access around the world and how these differences affect information poverty and civic participation. The book looks at how wide the digital gap is in various nations and areas, emphasizing how socioeconomic conditions, political environments, and cultural variances affect people's ability to access and use the internet. Norris contends that social inclusion and democratic engagement, in addition to technology, have a role in the digital divide. She examines how a lack of access to ICTs might worsen already-existing disparities and make it more difficult for people to engage fully in civic and political life.

Hargittai (2002) stated that people use a range of methods to find content, with significant differences in whether people can locate certain types of content on the Web and how long it takes them to find it. Internet proficiency is negatively connected with age, positively connected with technological familiarity, and gender differences hardly account for the differences in individual online content-finding abilities. The study demonstrates how disparities in users' capacities to efficiently access, assess, and apply internet data fuel digital inequality. It does this by analysing survey data to show that socioeconomic status, education, and past experience all have an impact on differences in online skills. In order to close these skill gaps and encourage more equitable access to online opportunities and resources, the essay highlights how crucial it is to create programs for digital literacy.

Mitchell (2002) employed an innovative approach by using ethnographic futures research (EFR) to explore the digital divide in his paper. By employing ethnographic techniques to predict future trends and obstacles associated with digital inequality, this paper departs from previous research on the subject. By assembling a variety of viewpoints, Mitchell's EFR approach invites participants to consider how technology can change in the future and to imagine possible futures for themselves. Offering a deeper awareness of the digital divide long-term implications, this forward-looking methodology provides a welcome perspective. This research seeks to comprehend the perspectives of individuals leading the effort to reduce the digital divide in Washington State on the most likely optimistic and pessimistic futures. In this study, the digital divide is characterized as a social obstacle that is created, in part, by differences in the capacity to use and access ICT. This study is also concerned with how the digital gap affects social and economic participation possibilities, which could pose a challenge to social and economic equality. Thirteen individuals who led various initiatives to bridge the digital gap in Washington State were interviewed using the EFR approach. The findings of the research include: a) a variety of definitions of the digital divide, b) descriptions of the factors thought to be responsible for the divide, and c) recommendations for further initiatives aimed at reducing the divide. This study's overall conclusion is that there is a great deal of hope that Washington State will create and preserve a sociocultural system that is more just and equal in the future.

Eastin (2006) paper investigated how individuals with higher degrees of self-efficacy utilize the internet more frequently and in a variety of ways, whereas those with lower self-efficacy levels face obstacles because they lack confidence in their ability to use technology. More on psychological issues like fear that widen the gap and make it harder for people to use technology even when they do have access, Eastin and LaRose examine these factors in greater detail. Survey data were gathered in order to investigate internet self-efficacy's construct validity and to create a dependable operational measure of it. It was discovered that the eight-item measure of internet self-efficacy developed for this research was internally consistent and dependable. Assessments of one's own internet self-efficacy were substantially and favorably connected with prior internet experience, expectancies of outcome, and use of the internet. Internet self-efficacy was inversely correlated with online stress and self-disparagement. The results highlight the need for educational initiatives to increase users' confidence and proficiency with digital tools in addition to infrastructural upgrades in order to bridge the digital divide.

Van Dijk (2006) examined the digital divide studies, which are divided into four categories: motivational, physical, skills, and usage. The focus is no longer on skill utilization and physical access. When it comes to physical access, the difference appears to be narrowing in developed countries, but when it comes to digital skills and application use, it keeps growing or staying the same. Lack of an interdisciplinary approach, theory, conceptual definition, qualitative study, and longitudinal research are all flaws in digital divide research. It criticizes current approaches and urges a more sophisticated comprehension of digital inequality, highlighting the necessity of a comprehensive strategy to close the gap.

Cooper (2006) examined the digital divide from a gender inequality standpoint. The author offers a comprehensive analysis of the ways in which gender affects utilizing and having access to digital technologies, emphasizing the structural and social elements that lead to gender disparities in the digital realm. The main finding of a review of studies conducted over the past 20 years is that compared to men; women are far less inclined to acquire computer skills or other subjects using computer-assisted software. The data indicates that people of all ages and geographical locations are impacted by the digital divide. The study also finds that although girls and boys can excel in technology, girls' confidence and engagement rates are frequently lower due to social constraints and an absence of female role models in technology-related disciplines. Cooper provides research to support her claims, demonstrating how men and women approach technology differently. She suggests that efforts to close the gender gap should concentrate on creating gender-sensitive learning environments that support the development of digital skills in girls and women, as well as on granting access to technology.

Goldfarb (2007) stated that high-income, educated persons were more likely to have accepted the Internet by December 2001, based on a study of 18,439 Americans. Low-income, less-educated people, on the other hand, spend more time online if they are not adopted. The study also finds that, for a variety of socioeconomic reasons, some people rapidly acquire and use the internet extensively, while others only use it occasionally or never. Because of these differences, there is a need for focused measures to support fair internet access and usage, which in turn exacerbates digital inequality. The results highlight the necessity of strategies that address digital technology uptake as well as efficient use.

Bo Kinney (2010) stated that there are almost comparable numbers of computers for the public in locations with low and high incomes, but there are more computers in places with larger percentages of non-English-speaking and non-white households. The author assesses the impact of internet access on library use in the study's second portion using a random effects linear regression model. According to this study, internet equipment significantly increases library attendance and reference transactions but not circulation, as compared to when they are absent. There is no measurable impact, positive or negative, of a rise in the number of visitors who rely on internet equipment, reference transactions, or circulation.

Krubu (2010) highlighted that both university libraries adopt Strategic Library Automation Management (SLAM) and are automated. The library's automated sections include the Collection Development Division, Readers Services Division, and Technical Services Division. The most frequently used ICT resources for storing and retrieving information are the World Wide Web, online databases, CD-ROMs, and the internet. It also showed how successful ICT is and how much of an impact it has. It thus investigates how ICT has changed library services in Nigerian universities. It then demonstrates how ICT has aided academic research, improved library management, and increased access to information. The article highlights the potential of ICT to revolutionize library operations, supporting the academic needs of faculty and students and helping to develop educational institutions despite obstacles like a lack of funding and technical skills.

Nkanu (2010) discussed that in Nigerian libraries, ICT is being used as a tool to bridge the digital divide. In the digital age, changes in how library activities are carried out and information services are offered are unavoidable in Nigerian libraries. ICT was viewed as a means of enhancing the operations and functions of Nigerian libraries in providing information services. The advantages of bridging the digital divide in Nigerian libraries were highlighted, along with the measures needed to bridge the digital gap in Nigerian libraries. They contend that closing the digital divide necessitates a broad strategy that includes funding for ICT infrastructure, instruction to increase digital literacy, and the creation of digital content that is relevant to the local community. According to the article's conclusion, providing Nigerian libraries with strong ICT skills is essential for promoting national development and guaranteeing fair access to knowledge.

Ahn (2011) examined that teens use major social networking sites like Myspace and Facebook to engage, play, explore, and learn in significant ways. Ahn also contributes to the ongoing discussion by reviewing issues related to the digital divide. This study examines whether access and participation gaps in teen use of SNSs still exist according to a Pew Internet & American Life Project poll that is nationally representative. The results show notable differences, with more engaged participation from pupils from higher socioeconomic backgrounds and those with better digital skills. The study emphasizes how critical it is to overcome these disparities in order to guarantee that every student can benefit from the academic and social opportunities offered by SNS.

According to **Bansode (2011)**, the distinction between people with regular and efficient access to information technology and those who do not is known as the "digital divide." It includes both the physical availability of technology hardware and, more generally, the abilities and resources needed to use it. Physical disability, age, gender, physical access, content access, and inadequate ICT proficiency are all components which create the digital divide. The challenge of bridging the information divide in developing countries can be addressed by utilizing digital libraries. An attempt is made to highlight certain measures taken in India to overcome this gap by creating digital libraries.

Chou (2011) investigated the disparities in ICT access and usage among Taiwan's adult unemployed population to comprehend the digital gap in the nation. The study finds that a number of barriers, including limited access to the internet and computers, low levels of digital literacy, and a lack of finance, keep unemployed individuals from utilizing digital platforms. These obstacles make it more difficult for them to obtain necessary services and employment prospects. The authors propose focused interventions to close the gap and assist jobless people in their job search, such as enhanced access to reasonably priced ICT resources and digital literacy initiatives.

Sun (2011) paper highlighted the enormous differences in educational prospects between students who are able to use digital resources and those who are not, focusing on the obstacles caused by uneven access to technology. The paper suggests feasible solutions, such as incorporating digital literacy into curricula, enhancing technology-use training for teachers, and creating policies to increase internet access. The digital divide and its effects on academic achievement are also discussed and highlighted in the article. According to research, students who use technology appropriately achieve better academic results. The authors review Bennett's (2001) paradigm on societal equity, highlighting how various factors influence students' academic success. They emphasize the role of technology, linked to socioeconomic status and performance, urging teachers to assess its direct impact on achievement and its interplay with other factors to improve educational outcomes. Furthermore, a person's socioeconomic situation may have an impact on their options for future careers.

Naidoo (2012) looked at how information literacy instruction is impacted by the digital divide in South African institutions of higher education. The study looks into how access to digital resources varies across students from different socioeconomic backgrounds and how this impacts their capacity to acquire important information literacy skills. The study's conclusions demonstrated that the digital divide affects information literacy (IL) training in a number of ways, such as slowing down IL lessons, requiring IL classrooms to teach basic computer skills, and making it harder for students who are digitally less fortunate to follow online lessons while advantaged students are already able to access online information.

Singh (2012) explored the factors that contribute to India's management libraries' digital divide. The study looks into a number of issues, including differences in digital literacy between library employees and patrons and infrastructure hurdles. Singh examines how these variables affect the use and accessibility of digital materials in management libraries, emphasizing the difficulties in incorporating cutting-edge IT into library services. It also looks at how institutional initiatives and governmental regulations might help to mitigate these problems. Singh highlights the need for focused initiatives to improve digital infrastructure, offer thorough training courses, and encourage fair access to digital resources. The paper's findings are that addressing these digital divide factors is essential for upgrading the standards of information services and creating a more acknowledging educational environment in Indian management libraries. Therefore, through a study of 700 management libraries across India, efforts were undertaken to analyze the current state of digitization of Indian management libraries.

Chikati (2013) stated in his writings that, in response to the digital divide, several nations have developed the infrastructure required to close the gap that exists between urban and rural areas, as in public and private institutions, a problem that Botswana handled admirably. The World Bank has provided assistance to several nations in introducing ICTs to their populations. However, the digital divide's impacts are still widespread. Few studies have been done to show how students' academic performance in higher education is impacted by the digital divide. This article adds more evidence to support the claim that higher education learners continue to demonstrate a noticeable digital gap. Variations in students' performance at the higher education level are caused by the digital gap that is created at the secondary school level. Based on an analysis of Botswana Accountancy College's first-year computer technology exam results, students who attended private secondary schools outperformed their public-school counterparts by an average of 5.3% on tests. For students attending private schools, the likelihood of passing the module is 0.76, whereas for those attending public schools, it is 0.51.

Garuba (2013) investigated the obstacles and possibilities related to bridging the digital divide throughout the African continent. The report pinpoints the actual causes of the digital divide, such as low levels of digital literacy, expensive technology, and poor infrastructure. Garuba examines a range of programs and tactics, including public policies, foreign assistance, and private sector investments, that are meant to address these problems. In order to ensure that ICTs are widely accessible, the paper highlights the significance of cooperative efforts and sustainable development methods. In light of Africa's growing commitment to ICT development and the expanding worldwide focus on digital inclusion, the author concludes that while there are still considerable barriers to overcome, there is hope for bridging the digital divide in the continent. Thus, Bridging the digital divide examines the complicated issue that has caused Africa's nations to lag behind the developed countries of the West.

Van Deursen (2014) article examined how the digital gap has evolved over time, highlighting how inequalities in internet access have been replaced by disparities in internet usage. The study reveals notable disparities in the variety and quality of internet usage by examining the ways in which education, digital skills, and socioeconomic characteristics affect online behaviours. Higher educated and technologically proficient users are more likely to participate in worthwhile, sophisticated online activities, while others are restricted to simple chores. In order to close these disparities in usage and encourage more equal digital involvement, the authors suggest focused initiatives.

Marrall (2014) addressed the objective, organization, and outcomes of LIBR 397: The digital divide is a master 's-granting institution's pilot upper division service-learning course that offers credit. It not only examines academic initiatives in the United States to teach the digital divide, but it also gives an outline of the obstacles and triumphs that come with teaching such a subject. The author analyses how educational activities might be used by academic libraries to bridge the digital gap. The study emphasizes how important it is to integrate service learning into library training in order to bridge the technology divide. The paper emphasizes how libraries may promote digital literacy, improve information access, and empower marginalized communities by involving students in community-based projects. The strategy emphasizes how revolutionary libraries can be in reducing digital inequality.

Gautam (2014) stated that public libraries contribute more to closing the digital gap. It investigates how public libraries, especially those in underprivileged and rural areas, may help close the digital gap. The report emphasizes how those without personal access to digital resources rely on public libraries as vital hubs for Information and Communication Technologies (ICT). It looks at the difficulties libraries face, such as low budget, ageing infrastructure, and inadequate staff development, all of which can make it harder for them to close the digital gap. Despite the challenges, the paper emphasizes how public libraries can reduce digital divides by providing free ICT access, digital literacy training, and instructional materials.

Ntui (2014) looked into how university students' study habits are affected by ICT. The study evaluates the effects of students' academic performance and behaviours on the accessibility and use of ICT resources, such as computers, internet access, and digital libraries. According to the study, although ICT improves information availability and makes studying more effective, differences in access and student ICT proficiency lead to unequal academic advantages. According to the findings, better ICT integration into the educational system can enhance students' study habits and academic performance. The author supports legislative measures that would ensure equitable access to ICT resources and educational programs that enhance students' digital literacy, all of which will improve academic standards and the quality of education in Cross River State. Students' study habits were considerably influenced by computer, internet, and mobile phone usage; however, social networking had no significant impact on students' study habits.

In **Aswathi P (2015)** article primarily focused on the study of how socioeconomic factors influence students' access to and use of digital technology in education while also examining initiatives to bridge the digital divide among students. The study examines the differences in digital literacy, access, and involvement amongst kids from various backgrounds, pointing out major obstacles such as low digital competency, insufficient infrastructure, and budgetary limitations. The authors look at government programs, institutional assistance, and community-based interventions that are meant to close these disparities. The study concludes that an integrated strategy is required to improve student's educational opportunities and experiences by guaranteeing fair access to digital resources and promoting digital inclusion. The digital divide among students has decreased in developed countries with better ICT infrastructure. The availability of ICT infrastructure, on the other hand, does not guarantee equal access to technology.

Cruz-Jesus et.al. (2016) provided an in-depth examination of how education affects the digital divide in the European Union's 28 member states. They also emphasize that educational attainment is a crucial factor in determining an individual's digital involvement as they examine differences in digital access and usage using data from Eurostat. The findings imply that certain internal gaps still exist and must be filled, even in European nations like Finland that are surpassing their peers in terms of digital growth. There are concerns about the divisions in other nations, such as Malta, Spain, and Portugal. The study also reveals regional variations, demonstrating that narrowing the digital divide is more difficult in nations with lower average educational levels. The paper also emphasizes how crucial it is to include an evaluation of internal disparities in addition to a cross-country examination of the digital divide.

Domingo (2016) investigated the perceptions of primary school teachers regarding the use of mobile devices. The study investigates the possible advantages and difficulties of incorporating mobile devices into educational environments. Teachers reported that mobile technologies enhance student engagement, facilitate personalized learning, and improve collaboration. The study also highlights how mobile applications can make learning more interactive and adaptable to individual student needs. However, the article points out challenges, such as the need for teacher training, technological infrastructure, and managing classroom distractions caused by mobile devices. Survey data from 102 teachers at 12 different Spanish primary schools were used in this study. The survey gathered information on teachers' personal characteristics, their opinions about how mobile technology affects education, and their use of a few particular apps in the classroom. The two primary effects of mobile technology in the classroom, according to the findings, appear to be improving engagement with the material and enhancing information access.

Tayo (2016) investigated the impact of disparities in digital access on underprivileged communities in Nigeria. The authors investigate the scope of the digital divide, emphasizing how it affects social inclusion, economic opportunity, and education. The report identifies important obstacles that less fortunate people must overcome, such as expensive technological expenses, inadequate infrastructure, and low levels of digital literacy. These barriers limit internet and electronic gadgets access, impeding socioeconomic advancement and extending poverty cycles. The authors support focused initiatives that will strengthen digital education, lower expenses, and improve digital infrastructure. The report contends that by tackling these issues, closing the digital divide can be a key factor in empowering marginalized groups and promoting inclusive development in Nigeria. Thus, the digital divide is caused by inadequate infrastructure, poverty, the high cost of computers and internet usage, the absence of internet connection, and insufficient computer skills.

Dijk (2017) examined the complexity of the digital divide and highlighted its significant effect on a range of societal facets. Since 2000, research on the digital divide has been conducted in several fields, with a focus on education science, psychology, economics, sociology, and communication science. The author distinguishes three main aspects of access that contribute to unequal involvement in the digital world: material, skills, and motivational access. It also contends that inequalities in digital skills and usage have a substantial impact on social inclusion, financial prospects, and political engagement, surpassing the mere absence of physical access to technology. The paper also highlights how the digital divide exacerbates pre-existing socioeconomic injustices by disproportionately affecting underprivileged populations. The author also demands complete legislative actions to alleviate these disparities, emphasizing the advancement of digital content inclusivity, inexpensive technology access, and digital literacy.

Centeio (2017) article highlighted the persistent disparity in access to cutting-edge technologies between individuals who own them and those who do not. It also focuses on how differences in different demographic groups' access to technology lead to a widening divide in digital literacy and resource availability, particularly in the area of physical education. It explains how teachers should become aware of this difficulty prior to introducing technology into physical education and health classrooms. The author highlights persistent digital inequalities, emphasizing that the divide extends beyond device availability to include infrastructure, support, and digital skills. Low-income and rural students are particularly disadvantaged since they have less access to reliable technology and the internet, hindering their ability to benefit from digital integration in education.

Fairlie (2017) examined the fact that using the most recent data on computer and Internet access from the Census Bureau and Bureau of Labor Statistics, the digital divide has not been bridged and is still as wide as it was twenty years ago. The findings have ramifications for broadband subsidy plans for low-income families. While the digital divide has narrowed in some places due to the huge increase in smartphone ownership, the study reveals those discrepancies in the internet, particularly for high-speed connections. The report highlights the continued need for targeted measures to address these inequalities and notes that, despite advancements, gaps in digital access still exist, disproportionately harming African American and Hispanic populations.

Shokat, et al. (2018) examined how Web 2.0 technology might help Pakistan's Azad Jammu and Kashmir (AJ&K) region close the digital divide. The study looks at how different socioeconomic groups' digital access and involvement have increased due to the utilization of social media, blogs, and other interactive online platforms. The results indicate that Web 2.0 tools have benefited information exchange and social inclusion, helping to close the digital gap in the area despite obstacles including poor infrastructure and low digital literacy. The study emphasizes how Web 2.0 might promote digital equality. It thus stated that the existence of a digital divide was determined using the surveys provided. The survey's findings confirmed that web 2.0-based websites are getting more popular and enticing individuals to use the internet.

Chipeva (2018) examined that majority of the UTAUT2 hypotheses have been confirmed, with performance expectancy being the most powerful predictor. Openness is a substantial predictor of behavioural intention, whereas openness, extraversion, and agreeableness are significant personality determinants of usage behaviour. It has examined the differences between people in Eastern and Western Europe in terms of digital usage and access. The paper determines the main determinants of the digital divide by analysing variables like age, education, income, and geographic location using data from Eurostat. The results show that there are notable disparities in the two areas' levels of digital inclusion, with Eastern Europe lagging behind in terms of internet access and digital literacy. In order to eliminate these disparities and encourage fair digital engagement throughout Europe, the authors support focused legislative measures as well as educational programs.

Rai (2019) investigated the effects of unequal access to digital resources on user engagement and library services. Through an analysis of multiple study findings, the authors draw attention to the difficulties libraries encounter in addressing digital inequality and suggest ways to enhance accessibility and inclusivity. The study emphasizes how important libraries are to closing the digital disparities and guaranteeing that everyone gets equitable access to knowledge and technology.

To bridge the Digital gap, **Soomro et al. (2020)** supported institutional investments, increased access to digital technologies, and focused professional development programs. Overall, the paper presents important information about how teachers in higher education are impacted by digital disparities and suggests strategies for resolving these issues to improve student performance. The study identifies significant digital disparities among Pakistani higher education faculty regarding ICT access, skills, motivation, and usage. Using the Faculty's ICT Access (FICTA) scale with 57 items, it reveals variations according to positional and personal categories, highlighting how these disparities impact faculty's use of technology for instructional purposes.

Ramsetty (2020) emphasized that the COVID-19 epidemic has made already-existing gaps in access to digital devices known as the "digital divide"-even more declared. People's access to vital information, medical care, and educational resources is impacted by this gap. The essay explores how this gap affects disadvantaged groups and emphasizes the necessity of laws and other measures to guarantee that everyone has fair access to digital resources. The authors contend that closing the digital gap is essential to reducing the pandemic's overall socioeconomic effects and advancing health equity. The effect of the digital divide on healthcare is especially dire. The pandemic has made telemedicine and online health services indispensable, yet many people lack the required equipment and internet access, particularly those from lower socioeconomic backgrounds. In an effort to preserve social distance, educational systems have moved to online instruction. However, children who lack dependable technology or internet access are at a disadvantage, which can worsen educational disparities. The gap has an impact on parents' capacity to encourage their kids' education as well.

Aswathi P (2020) examined the connection between the student's digital divide in higher education views on information technology (IT). The study evaluates Keralan University students' attitudes, usage trends, and access to IT. The results show considerable differences in the readily available digital gadgets and access to the internet, with the socioeconomic status being a major determinant. The authors underline the effect of the digital gap on educational results in the region and stress the need for focused interventions to increase digital literacy and equal access. Findings also disclosed a relatively low rate of ownership of digital devices among the students, except in the case of smartphones.

The report by **Aissaoui (2021)** offered recommendations for further investigation in view of the COVID-19 outbreak. It also showed that the third level, the digital divide, is now only being studied in relation to the personal consequences of Internet use. Additionally, a state-of-the-art is laid out in this work, which has significant theoretical and practical implications for the success of a complete digital transition. The present research contributes to the field of digital inequality research by combining key concepts and findings from the literature on the three levels of the digital gap. In light of COVID-19, it highlights the understudied research topics on certain aspects of the digital skills disparities that led to the failure of digital transformation in many countries and makes recommendations for potential future research directions. It is suggested that additional research be done on the three levels of the digital divide in relation to developing technology.

Jaggars, et.al. (2021) analysed how the pandemic's sudden transition to online learning affected the digital divide. The study examined how differences in college students' access to technology, internet connectivity, and digital abilities affected their engagement and academic achievement. The authors list the main obstacles that students from underprivileged backgrounds must overcome and offer suggestions for how schools can resolve these disparities, highlighting the necessity of better support services and digital infrastructure to guarantee educational equity and continuity. It looks at the importance and effects of the digital divide. The results demonstrate the frequency of insufficient technology, the connection between insufficient technology and academic achievement, and the strategies used by colleges and states to assist students who lack adequate technology during the emergency transition.

García-Martín (2022) gives a thorough examination of the COVID-19-related digital gap in Latin American higher education, emphasizing the effects that teachers and students experienced due to their familiarity with and utilization of digital technologies. The author explores the difficulties brought about by the quick transition to online learning, which exacerbates already-existing differences in knowledge and access to digital tools. An online survey was distributed to 2882 university students from Latin America (49% female; M = 21.3 years). The study examines how the COVID-19 pandemic exacerbated digital disparities, particularly among men, lower socioeconomic groups, and the unemployed. It highlights the impact of digital literacy, access, and socioeconomic factors on education, emphasizing Latin American higher education. The authors advocate for enhanced digital literacy and equitable technology access to address educational inequalities.

Ben Youssef (2022) analysed how student achievement is impacted by the utilization of ICT and digital literacy and investigated the French digital divide. Face-to-face data collection was conducted with 1323 students from three French universities. Multilevel ordered logistic regression, a non-hierarchical k-means clustering approach, and principal component analysis were employed to examine the data. The findings indicate that: (1) low ICT investment lowers student performance; (2) Student performance is not much impacted by ICT training offered by universities; (3) Students do better when ICT is used creatively and collaboratively; and (4) Students who learn digital skills do better academically. Insufficient investment in ICT has an influence on students' performance; university-provided ICT training has no effect on students' performance; creative and cooperative ICT use enhances student performance; and learning digital skills enhances academic success. The findings throw light on the efficacy of French education programs since they demonstrate the persistence of the digital divide

Ceviker (2023) highlighted the challenges teachers faced during Covid-19 in adapting to online teaching, particularly in schools with inadequate technology and internet access. It also notes that it was challenging for teachers to provide high-quality instruction remotely during the pandemic due to the widening digital disparity. Better policies, infrastructure, and training are recommended in the report to close the gap and guarantee fair access to digital learning resources. The study intends to explore how instructors and students are impacted by the COVID-19 digital gap. Gaining more insight into how educators view teaching remotely and the digital gap will help prepare students for success in the classroom come pandemic time. In this mixed-method study, survey questions with open-ended responses and 36 teacher responses were gathered using a Likert scale. The findings demonstrated that first- and second-level digital disparities are the main factors impacting online learning at the time of the pandemic. Some students might not be able to benefit from online learning because of the digital divide. First-level digital divide: Students from lower socioeconomic backgrounds are disproportionately affected by the lack of use of electronics and the internet. The ICT abilities of teachers and students, known as the second-level digital divide, affected how students used technology and benefited from online education even though some students had used electronic and the internet.

Afzal et.al. (2023) explored a critical issue in contemporary education: the digital divide. The study's main objective was to look into how students' access to technology and academic performance are impacted by the digital divide. The study examines the many facets of digital inequality, focusing on how students use and have access to technology in school. The authors conduct a thorough analysis of how differences in students' access to digital resources impact their learning, especially in developing countries with inadequate infrastructure and resources. 400 students from a range of educational backgrounds made up the study's sample size, and they used a quantitative approach. Data for the study on internet access, device ownership and classroom technology use were gathered by survey questionnaires. The research indicates that internet access varies by age category, with access being higher for younger people than for elderly people. Rural and urban areas were found to differ in terms of residential internet connectivity, significantly less connectivity in rural areas. The notable disparities in personal device ownership by gender suggest that there may be gender-based digital divides.

Miras (2023) aimed to highlight the gaps in digital access, usage, and literacy, and their direct consequences on learning outcomes and educational equity. The COVID-19 epidemic has made distance learning necessary, which has worsened this imbalance. The authors pinpoint the main areas of online learning participation, educational resource access, and the digital literacy skills required for academic success where the digital divide has had the biggest impacts. The article's primary findings are that students who don't often used digital gadgets and reliable internet connections suffer significantly in comparison to their technologically proficient classmates. The following questions are intended to be addressed by the article's study of appropriate studies that have been published during the last three years: In what ways did the digital divide impact e-learning and ICT adoption during the pandemic? What techniques were employed to evaluate it? What are the recommendations to mitigate its impact? The study's findings justify the application of systematic reviews, which compile and integrate the findings of many primary investigations. These findings also hint at future study directions in our example regarding the origins, persistence, and strategies to minimize the growing digital divide in today's educational environment.

Miah (2024) examined the effects of digital inequality on education, which is a major source of concern. The article highlights that in addition to differences in internet access, the digital divide also encompasses differences in digital competence, device availability, and dependable connectivity, all of which have a substantial impact on educational performance. According to Miah, students who have little or no access to digital resources have trouble keeping up with their classmates, which causes gaps in academic achievement to become greater. Miah also covers the important roles that variables like location, socioeconomic status, and institutional support have in determining whether or not students can gain from using digital resources. A systematic literature review (SLR) methodology was used for the study. Research indicates that minority and low-income students are less likely to have access to electronic devices, which negatively affects their academic performance and educational achievements. Additionally, students without access to electronic devices are unlikely to acquire the electronic skills necessary for the 21st century.

Val (2024) provided a thorough analysis of the ways in which digital education for teachers can improve teaching methods and solve the digital divide. The writers concentrate on important elements, including digital competency development, teacher training, and the requirement that educational systems adopt technology in an inclusive manner. In the 2022-2023 academic year, 325 students with master of education and teachers who are in-service from various universities (in Cyprus, Mexico, and Spain) made up the sample for this study. They responded to a survey that included questions regarding various digital and educational topics and was partly modelled after DigComEdu. The findings indicate that there are several areas that require improvement. Teachers lack the requisite training to close the digital divide even when they have technical knowledge related to their jobs. According to the paper, teachers may be key players in promoting digital inclusion by tackling these problems. The study highlights the value of ongoing professional development for teachers that includes pedagogical strategies for incorporating technology into regular instruction in addition to technical skill development.

Prathap (2024) examined the opportunities and infrastructure-related issues brought about by the National Education Policy (NEP) 2020, focusing ICT-based education. The article outlines NEP 2020's aim to close the digital gap and increase access to education by integrating electronic tools and ICT infrastructure into the educational environment. He provides a balanced perspective of the difficulties and possibilities of NEP 2020 in realizing ICT-based education, emphasizing the need for substantial infrastructural improvements. A major focus of NEP 2020 is the creation of virtual laboratories. It is noteworthy to mention that there is also a National Educational Technology Forum (NETF) in the process of being established. A number of grave issues surfaced, including insufficient ICT infrastructure, institutional discouragement, weak policies, and, most importantly, a lack of technological, pedagogical, and integrative skills among educators at all levels. This paper covers several ICT-related provisions for teaching and learning as well as the main elements of NEP 2020. It also addresses various implementation challenges and ICT infrastructure requirements. Ultimately, a number of suggestions are offered for the best possible use of ICT.

2.1.2 Summary of reviewed literature on digital divide

The reviewed literature reveals diverse perspectives on the digital divide, emphasizing its implications across education, infrastructure, and societal equity. Researchers like Chikati (2013) and Gautam (2014) emphasize bridging gaps through public libraries and rural infrastructure. Van Dijk (2017) and Fairlie (2017), explore structural and motivational barriers. Studies by García-Martín (2022) and Ceviker (2023) examined COVID-19's role in exacerbating digital gaps. Authors like Afzal et al. (2023) and Miah (2024) highlighted the disparities in digital access, competence, and their impact on academic outcomes, while Soomro et al. (2020) and Prathap (2024) focus on ICT-based education under NEP 2020 and institutional investments. Collectively, these works underline the urgent need for targeted initiatives to address digital inequities.

2.3 INFORMATION LITERACY (IL)

ACRL (2000) outlined the essential knowledge, skills, and aptitudes needed for students to become IL experts. The standards place a strong emphasis on students' abilities to identify information needs, locate it efficiently, assess its reliability critically, and utilize it ethically in a variety of settings, including academic and research settings. Five competency standards are introduced in this document, each of which focuses on a distinct information literacy topic. These include the capacity to assess the amount of information required, acquire it efficiently and promptly, critically assess the data and its sources, utilize the data to efficiently achieve a goal, and understand the regulations and social and economic concerns that surround its use.

Dhiman (2006) study emphasized how IL goes beyond simple literacy and includes abilities like finding, locating, assessing, and efficiently utilizing information. It highlights the duty of the librarian to assist users in navigating these procedures by providing resources and training to fill in knowledge gaps. The author also emphasize that librarians are essential in the digital age because they assist consumers in navigating the massive volumes of information that are available online. They need to take the initiative to improve research abilities, promote critical thinking, and facilitate learning. Librarians now play more than just keeping books in order; they are also educators and IL advocates who support users in becoming self-sufficient learners. Libraries and information centres have gotten computer literacy training and acquired information technology. The advancements in information and communication technologies (Dhiman, 2001, 2002, 2003) require LIS experts to adapt the traditional notions of organization, user orientation, bibliographic description, and information dissemination to the new context.

UNESCO (2008) examined the significance of creating reliable metrics for assessing IL in a range of settings, especially in communication, media, and education. In a world that is becoming more complicated and information-rich, the report highlights how important it is for people to have information literacy abilities. It emphasizes that IL includes the capacity to assess, evaluate, and use information successfully for one's own, one's academic and one's professional growth. It goes beyond simply being able to access information. The report from UNESCO highlights how IL promotes critical thinking, lifelong learning, and well-informed decision-making. The paper offers a framework for developing measures to evaluate the extent and influence of IL on people and communities. Key issues that require attention are highlighted in the paper, including the inclusion of information literacy in school curricula, programs for training teachers, and public awareness initiatives.

Davis (2011) explored various models of information literacy instruction as perceived by librarians in academic settings. The study focuses on librarians' perceptions of their information literacy teaching responsibilities and the difficulties they encounter while putting together successful lesson plans. The authors collected information from a poll of academic librarians and examined how they teach information literacy, what models they employ, and how effective they believe these models to be. The findings show a significant correlation between the IL instruction model used and librarians' self-identification as instructors, their perceptions of the effectiveness of IL models, and their attitudes toward campus politics. However, the study also cites barriers to Information literacy's complete incorporation into educational programs, which consist of time constraints, teacher participation, and institutional support.

Brindha (2016) highlighted how librarians are becoming more and more important in promoting IL, especially in the digital age. The study highlights how important information literacy is for people to find, evaluate, and use information efficiently. Brindha emphasizes that in addition to being information curators, librarians are also important educators who help teach these fundamental abilities. The primary goal of this research is to provide librarians with a more thorough analytical grasp of the concept of information literacy so they can become information literate. Librarians must possess IL, so that they will have the capacity to find, acquire, assess and apply information. Information literacy is intimately tied to lifelong learning, critical thinking, and understanding educational concepts. Information literacy abilities are becoming more and more necessary for handling information because of the developments in ICT.

Badiger (2017) delves into the critical role of IL in the present-day knowledge-driven society. The authors contend that enabling individuals to find, assess, and utilize information in a range of contexts, whether academic, professional, or personal, requires IL. The paper describes how people find it difficult to differentiate between reliable and unreliable sources due to the abundance of information available in the digital era. People who are information literate are more adequately outfitted to handle this enormous volume of information. To promote critical thinking and autonomous learning, the authors stress the importance of including information literacy instruction into curricula across all levels, from elementary school to university. They also emphasize the importance of libraries and librarians in teaching these skills and making sure that users are equipped to deal with the abundance of information sources that are currently easily accessible.

Chanchinmawia and Verma (2017) investigated the information literacy skills of students in Aizawl of the Academy of Integrated Christian Studies (AICS). The study's main objective is to evaluate the students' capacity to identify their information needs, conduct effective searches, critically examine sources, and use information in an ethical manner for their academic work. A standardized questionnaire was created for data collection and given to 118 students; of the 70 total, 82 percent completed the questionnaire, which was then obtained for analysis. Overall, it was discovered that students possessed adequate skills to handle information for their basic requirements. Most students were familiar with the basic library material and were able to access it through print and electronic formats, although adjustments are needed in the way information is handled, especially when evaluating electronic sources.

Chanchinmawia (2018) provided a thorough analysis of Mizoram University's research scholars and faculty members' information literacy skills. The research focuses on understanding how well-equipped these academic groups are in locating, evaluating, and using information effectively in a digital environment, where access to vast amounts of data can either enhance or hinder academic work depending on one's information literacy proficiency. In their research, 232 research scholars were randomly given a structured questionnaire to determine their IL Skills. It was discovered that most of the scholars knew the fundamental background information about the library and could access information in both print and electronic formats. Ninety-six (54.85%) of the respondents were female, and 79 (45.14%) were male. Eleven (6.28%) respondents visited the library every day, while the largest percentage of 74 (42.8%) respondents did so once a month. 55 (31.42%) people went to the library to study, whereas 86 (49.14%) went to check out and return books.

Prasad (2018) defined IL as knowing when information is needed and knowing how to locate, evaluate, and use it effectively. The objectives include fostering critical thinking, developing research skills, and ensuring efficient access to digital and non-digital resources. The paper also emphasizes the significance of subject coordinators, who are essential in helping users navigate the abundance of information available. Subject coordinators assist in providing training, selecting pertinent materials, and making sure information literacy initiatives are in line with academic requirements. They have a vital role in promoting collaboration between educators, students, and librarians while also making sure that users have the tools necessary for effective information retrieval and use. The necessity of IL in the current electronic world cannot be emphasized. The paper presents a strong case for funding comprehensive information literacy programs at libraries and other educational institutions since these abilities are essential to tackling the problems brought on by the digital divide. The knowledge to identify, use information and to analyze the information is becoming increasingly important as technology democratizes access to it, closing the knowledge gap between groups with and without access to it.

Hebert (2018) study focussed on these students' self-assessed abilities in core field areas such as information search, appraisal, and ethical usage. Hebert employs a mixed-method approach, incorporating focus groups and surveys, to investigate students' perceptions of their preparedness for graduate-level research as well as their degree of confidence in exploring academic resources. Using Qualtrics, an online questionnaire measuring IL self-efficacy and skills was distributed. Two cohorts of prospective students were given access to the online survey instrument, which was developed using pre-existing measures (Beile, 2007; Michalak & Rysavy, 2016). The first cohort began the MLIS program in the fall of 2017, and the second cohort began in the spring of 2018. The findings show that although most students think they have sufficient information literacy abilities, there are still gaps in more advanced research methods, particularly when it comes to managing citations and differentiating between academic and non-academic sources. Some students voiced concerns about their ability to critically assess and evaluate information, especially those who have never taken formal library or information science courses. The study highlights the necessity of focused interventions to help entering students acquire more advanced research abilities. For both IL self-efficacy and skills, data differed between cohorts and survey instruments; nonetheless, bivariate analysis of the data showed that, in both the autumn 2017 and spring 2018 cohorts, there was a moderately favourable connection between shown IL skill scores and overall IL self-efficacy.

Fernandez-Otoya et al. (2024) centred on integrating digital technologies in educational environments and looked at a variety of sources to understand the present state of digital competencies in teaching. The study looks at how basic education teachers are taught digital and information literacy in order to get a current state overview of teacher training in relation to the use of teaching-related technology. The impact of new literacies and competencies on the teaching-learning processes in basic education is examined in this paper, together with the most relevant contributions. According to the results, Spain has the most research articles on the subject (29% of the total) in the Scopus database, followed by Indonesia (6%), and the United States (4%). The majority of the articles are in the social sciences and computer science. Similar to this, Spain has the most research articles on the subject (30%) in the WoS database, followed by Russia (10%) and Norway (8%); the articles mostly focus on the communication and education areas. Sixty-eight percent of the research on this topic employs a quantitative approach, 25 percent takes a qualitative approach, and seventy percent takes a mixed approach. The findings show that digital competency and IL are directly correlated.

2.3.1 Summary of Reviewed Literature on Information Literacy (IL)

The reviewed literature emphasizes the importance of IL in empowering individuals to effectively locate, evaluate, and utilize information across academic, professional, and personal contexts. UNESCO (2008) and ACRL (2000) provide global and standardized frameworks, stressing IL's necessity in today's information-rich, complex world. Other studies, including those by Brindha (2016) and Davis (2011), focus on librarians' roles in promoting IL and challenges in instructional design. Prasad (2018) and Badiger (2017) underlined IL as critical for fostering critical thinking and research skills. Chanchinmawia (2018) analyzed IL skills among Mizoram University scholars, highlighting the role of IL in navigating the digital landscape, while Fernandez-Otoya et al. (2024) explored digital competency in teacher training.

2.4 ARTIFICIAL INTELLIGENCE (AI) AND FIFTH GENERATION (5G)

The thorough manual **Freeman (2005)** explored the complexities of contemporary telecommunications systems. Telecommunications fundamentals, including transmission systems, network design, signalling, and traffic engineering, are all covered in detail in this book. Freeman's methodical methodology simplifies difficult engineering ideas, particularly for telecommunications professionals and students. In addition to giving thorough mathematical explanations and theoretical frameworks, the book also achieves a balance by offering real-world applications that are pertinent to the development and management of telecommunications networks. Freeman's experience and knowledge are clear, and he uses case studies, tables, and illustrations to help the reader understand. One of the most valuable aspects of the book is its focus on evolving telecommunication technologies, including fibre optics, satellite communications, and wireless systems. Telecommunication System Engineering, which combines technical intricacy with useful insights, continues to be a useful resource for comprehending the fundamentals of telecommunications.

Yadav (2017) paper provided an overview of the mobile communication technologies that have been established thus far and offers some insight into what the mobile world may hold in store for the future. The world now relies heavily on mobile communication for information exchange. The field of mobile technology is developing rapidly every year. The advancement of mobile devices has significantly enhanced our quality of life. The paper's comprehensive analysis of the difficulties in implementing next-generation networks, particularly with regard to infrastructure, spectrum allocation, and security issues, is one of its strongest points. Yadav talks about how the need for faster data speeds is growing, straining the capacity of current networks and requiring new technological solutions. Additionally, he draws attention to the challenges of maintaining constant connectivity and effective network management as the number of connected devices increases, especially in light of the development of the IoT. The paper provides a good summary of the progress of technology, although it could have done a better job of examining key topics, like the legal and financial obstacles to adoption.

Mahmoud (2020) provided a thorough analysis of the ways that machine learning (ML), especially with the introduction of 5G, is changing the telecom industry. The writers proficiently classify and explain the principal application scenarios in which machine learning technologies improve network performance, customer experience, and management. They highlight the ways in which machine learning (ML) techniques are being applied to optimize a number of telecommunications-related areas, such as resource allocation, defect detection, network traffic prediction, and operational task automation. This demonstrates how intelligent and adaptable networks, which are essential for managing the complexity of 5G systems, are made possible by AI and ML. A notable feature of the study is its methodical approach to examining the technological benefits machine learning offers the industry. Mahmoud and Ismail provide examples of how ML may help with predictive maintenance, reduce downtime, and enhance network dependability by finding patterns in data.

Zhai et al. (2021) provided a thorough examination of the advancement and integration of AI technology in educational settings during a ten-year period. The authors use scholarly literature from 2010 to 2020 to examine the developments, trends, and difficulties around AI's application in education. The article discusses a number of AI tools that have been applied for the improvement of the processes of learning and teaching, such as natural language processing, machine learning, and intelligent tutoring systems. Out of the 100 papers published between 2010 and 2020, 63 empirical papers (74 studies) and 37 analytical articles were chosen from the Social Sciences Citation Index database's education and educational research category. One of the main findings is that AI has made a substantial contribution to personalized learning by enabling tailored educational experiences that consider each learner's unique needs and learning preferences. Teachers can more accurately evaluate students' progress and customize treatments in real-time by utilizing AI-driven statistics. The article also discusses how AI can improve administrative efficiency by automating duties like scheduling and grading, giving teachers more time to work on more important projects. Thus, the result provides a general summary of the area of AI in the context of education, improving its conceptual foundations and creating intriguing opportunities for future collaborative research between AI engineers and educators.

Cox (2022) stated that the paper's primary objective is to use AI for knowledge discovery. Eleven possible approaches that libraries might employ for these AI uses are looked at, and their probability is evaluated. The goal is to assess the possibility that various AI implementation strategies will be used in academic libraries. The report uses concepts of jurisdiction and hybrid logic from the sociological theory of the professions as well as literature on librarians' abilities from the LIS field to guide its investigation. Thus, Cox examines how AI technologies can reshape conventional responsibilities like information retrieval, curation, and research support and how they might necessitate librarians' acquisition of new ethical and technical competencies. The essay focuses on how academic libraries must change to keep up with AI developments while upholding fundamental principles like information integrity and user privacy.

Okunlaya (2022) article stated that AI is one of the most current technological developments in digital transformation (DT), and It can be used by the university library to give its users access to additional educational materials. When it comes to sharing and retrieving information for research and education, AI can promote wise decision-making. The study examines how the application of AI promotes the development of innovative services across diverse organizations using a qualitative content analysis. Artificial Intelligence Library Services Innovative Conceptual Framework (AI-LSICF) was developed, which integrates AI features and applications into the framework's digital transformation components. Thus, the author opined that AI may boost productivity, enhance user experience, and optimize resource management in educational settings. Also, the framework highlights the need for institutions to invest in AI-driven technology in order to remain competitive and relevant in the educational sector. It also offers new roles for librarians as facilitators of digital literacy and AI-based systems.

Selwyn (2022) offered a critical analysis of the quick adoption of AI in educational environments. Selwyn argues that although AI has the potential to revolutionize education, there are also serious hazards and difficulties that should be carefully considered. Selwyn also expresses substantial concerns regarding the uncritical enthusiasm around AI. The author lists five important points that should be considered more in future discussions and decisions; these include: (1) avoiding overselling speculative AI technologies and instead focusing on issues related to "actually existing" AI; (2) highlighting AI's shortcomings regarding social context modelling and autonomy, reasoning, human intelligence, and emotion simulation; (3) pointing out the detrimental impacts of AI use on society; (4) Understanding that claims regarding AI are motivated by value; and (5) concentrating more on the long-term ecological and environmental viability of AI development and use.

In February 2023, **Chen (2023)** conducted a brief test of ChatGPT using certain library reference questions and article writing prompts and compared the results with those from ChatGPT. It also draws attention to any lessons that the library community might want to take away from earlier, paradigm-shifting technological developments like Google and Web 2.0. The study demonstrates how AI can respond to user inquiries quickly and accurately, which could speed up and enhance library service. Chen also addresses ethical issues, possible disinformation, and worries over the veracity of content produced by Artificial Intelligence. In order to guarantee quality and dependability in reference services, the paper underlines the necessity for libraries to strike a balance between the benefits of AI tools and human oversight.

Hussain (2023) mentioned that AI is a promising technology that can be applied to library services, but it is hampered by some issues, including a lack of funding, librarians' attitudes, and technical abilities. Although there is a strong relationship between AI and libraries, there are still several unanswered questions regarding AI's implementation in library services that are addressed in this paper. Thus, it draws attention to the potential benefits of AI, such as better user recommendations, improved categorization, and automation of repetitive processes like information retrieval and book circulation. AI can also support personalized services and predictive analytics. The paper also highlights issues including high installation costs, privacy risks with data, and the requirement for highly qualified staff to efficiently operate AI systems.

Verma (2023) article stated that the advent of AI-powered, data-verified digital chatbots has significantly enhanced the concepts of digital library retrieval and data sharing, which are available 24/7 and involve a variety of activities. The term "AI-based data" was also defined as A subset of human cognitive patterns, trends, views, or preferences that influence the socio-digital traces of human activity. Digital karmas in Web 3.0 avatars are expected to be represented by AI-based data, which should also be mined for big data and related concepts. The application and substance of context can be greatly enhanced by Artificial Intelligence-based data by quickly modifying sustainable goals with language convergence. Thus, Verma demonstrates how chatbots may improve customer engagement, expedite reference services, and simplify repetitive processes like book searches and cataloging. The study also addresses potential drawbacks, such as the requirement for sufficient training for library employees and doubts regarding AI's dependability in preserving information accuracy. Verma draws the conclusion that, with the right integration techniques implemented, AI chatbots might greatly enhance library administration.

Rios-Campos et al. (2024) investigated how Artificial Intelligence (AI) is changing higher education. The authors explore the ways in which teaching, research, and administrative tasks at universities are being transformed by AI technologies. The study highlights how AI has a lot of promise to help data-driven decision-making in educational management, increase the effectiveness of administrative tasks, and improve personalized learning. 42 papers, conducted between 2018 and 2024, have been chosen for this study. These include material from reputable organizations' websites, review pieces, and scientific journals. One of the main ideas that is emphasized is AI's capacity to adapt learning experiences to each student's specific requirements. AI can offer tailored information and feedback by examining students' learning habits and patterns, which will improve academic results. Additionally, the writers talk about how AI may be used to automate time-consuming administrative processes like scheduling, grading, and admissions, which can help universities save money and time. In conclusion, the author claims that because of its significant contribution, Artificial Intelligence is becoming more and more popular in higher education.

2.4.1 Summary of reviewed literature on AI and 5G

The above-reviewed literature highlighted the transformative effect of AI across education, libraries, and telecommunications. Yadav (2017) and Mahmoud (2020) focussed on AI and machine learning's role in telecommunications and highlighted their influence on network performance and future communication technologies. Selwyn (2022) critically examined AI's rapid adoption in education, balancing its potential with inherent risks. Cox (2022) and Verma (2023) discussed AI applications in libraries, such as digital chatbots and knowledge discovery, while Okunlaya (2022) and Hussain (2023) noted barriers like funding and technical expertise. Zhai et al. (2021) and Rios-Campos et al. (2024) explored AI's integration in higher education, emphasizing advancements and challenges over the past decade. Collectively, these studies showcase AI's evolving role in shaping digital transformation across various domains.

2.5 RESEARCH GAP

While existing literature addresses the digital divide, there is limited comparative research focusing specifically on North East Central Universities in India. Most literature highlights access and usage without fully exploring how these disparities affect academic performance and learning outcomes. As technology and digital access continue to evolve, the reviewed literature does not adequately address emerging trends affecting the students of Central University in North East India.

Study should be based on the ability to access ICT tools and technology for academic purposes, use pattern of the internet by the students, whether geographical restrictions contribute to the digital divide, awareness of copyright, initiative taken by selected universities to reduce the digital divide, and the area of strength and weakness of respondent in handling digital assets. Addressing this gap could provide updated insights into how current digital access and skills gaps shape university students. Thus, studies tend to analyze the digital divide among top 5 Central Universities NIRF ranking 2021.

2.6 CONCLUSION

Chapter 2 deals with the literature review, which was compiled from several sources and split into three sections. Digital divide has 47 articles, Information Literacy (IL) has 11 articles, and 5G and Artificial Intelligence (AI) has 11 articles. Of the 69 reviewed publications, 57 were international publications, and the remaining 7 were Indian publications. The majority of reviews were journal articles, followed by conference proceedings. 4 conference papers, 1 PhD theses. The review sought to offer a thorough comprehension of the digital divide and its related aspects, covering diverse sources to guarantee a thorough perspective. Despite the substantial number of international publications, there is a notable scarcity of studies specifically dealing with the digital divide within the Indian context, especially in North-eastern Central Universities. Despite the substantial number of international publications, there is a notable scarcity of studies specifically addressing the digital divide within the Indian context, especially in North-eastern Central Universities.

References:

Afzal, A., Khan, S., Daud, S., Ahmad, Z., & Butt, A. (2023). Addressing the Digital Divide: Access and Use of Technology in Education. *Journal of Social Sciences Review*, 3(2), 883-895. https://doi.org/10.54183/jssr.v3i2.326. Accessed on 20th March 2024

Ahn, J. (2011). Digital Divides and Social Network Sites: Which Students Participate in Social Media? *Journal of Educational Computing Research*, *45*(2), 147-163. https://doi.org/10.2190/EC.45.2.b. Accessed on 25th August 2022

Aissaoui, Najeh. (February, 2021). The Digital Divide: A Literature Review and Some Directions for Future Research in Light Of COVID-19. *Global Knowledge Memory and Communication*. https://www.researchgate.net/publication/349291437_The_digital_divide_a_literature_review_and_some_directions_for_future_research_in_light_of_COVID-19. Accessed on 20th March 2023.

Association of College and Research Libraries (ACRL). (2000). Information Literacy Competency Standards for Higher Education. https://alair.ala.org/server/api/core/bitstreams/ce62c38e-971a-4a98-a424-7c0d1fe94d34/content. Accessed on 20th March 2023.

Aswathi P, & Haneefa K, Mohamed. (May 2015) Bridging the Digital Divide among Students. *Journal of Knowledge & Communication Management*. 5(1). 42-52. DOI:10.5958/2277-7946.2015.00004.2. Accessed on 25th September 2022

Aswathi P., & Haneefa K, Mohamed. (2020). Attitude Towards Information Technology and Digital Divide: A Study Among Students in Universities in Kerala, India. *Library Philosophy and Practice (e-journal)*. 4437. https://digitalcommons.unl.edu/libphilprac/4437. Accessed on 25th September 2022

Badiger, Mallikarjuna., Choudhary, Pallavi., & Badiger, Kalikadevi G. (2017). Information literacy: Need and Importance. *International Journal of Applied Research*. 3(7). 173-175. https://www.allresearchjournal.com/archives/2017/vol3issue7/PartC/3-6-267-177.pdf. Accessed on 20th March 2024

Bansode, S.Y., & Patil, S.K. (January, 2011). Bridging Digital Divide in India: Some Initiatives. Asia Pacific Journal of Library and Information Science, 1 (1), 58-68. https://www.researchgate.net/publication/236141535_Bridging_Digital_Divide_in_India_Some_Initiatives. Accessed on 26th March 2023

Ben Youssef, A., Dahmani, M., & Ragni, L (March, 2022). ICT Use, Digital Skills and Students' Academic Performance: Exploring the Digital Divide. *Information*. 13 (129). https://doi.org/10.3390/info13030129. Accessed on 20th March 2023.

Bo Kinney (2010). The Internet, Public Libraries, and the Digital Divide. *Public Library Quarterly*, 29:2, 104 161. https://www.tandfonline.com/doi/full/10.1080/01616841003779718. Accessed on 20th February 2023.

Brindha, T. (2016). Information Literacy and Librarians. *Shanlax International Journal of Arts, Science & Humanities*, 85-87. https://www.shanlaxjournals.in/pdf/ASH/V3N4/Ash_V3_N4_013.pdf. Accessed on 18th April 2024.

Centeio, E. E. (2017). The Have and Have Nots: An Ever-Present Digital Divide. *Journal of Physical Education, Recreation & Dance*, 88(6), 11-12. https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1067&context=coe_khs. Accessed on 18th April 2024.

Ceviker, Elife., & Gezer, Tuba (2023). Examining the Digital Divide in Education During COVID-19 From Teachers' Perspectives. *Mid-Western Educational Researcher*. 35 (2), Article 2. DOI: https://doi.org/10.25035/mwer.35.02.02.

Chanchinmawia, F. (2018). Information Literacy Competency Among Faculty Members and Research Scholars of Mizoram University in Digital Environment. (Ph.D. thesis, Mizoram University). http://hdl.handle.net/10603/219513. Accessed on 20th February 2024

Chanchinmawia, F., & Verma, M. K. (2017). Assessment Of Information Literacy Skills Among Students of Academy of Integrated Christian Studies, Aizawl: A Survey. *International Research: Journal of Library & Information Science*, 7(3), 449- 465.

Chen, Xiaotian. (2023). ChatGPT and Its Possible Impact on Library Reference Services. *Internet Reference Services Quarterly*. 27(2). 121-129. https://doi.org/10.1080/10875301.2023.2181262

Chikati, R. (2013). An Assessment of the Impact of High School Digital Divide to Students Performance at Tertiary Education In Botswana. *International Journal of Scientific & TechnologyResearch*, *2*(9), 68-72. https://typeset.io/pdf/an-assessment-of-the-impact-of-high-school-digital-divide-to-2axvs9kmcc.pdf. Accessed on 20th February 2024

Chipeva, P., Cruz-Jesus, F., Oliveira, T., & Irani, Z. (2018). Digital Divide at Individual Level: Evidence for Eastern and Western European Countries. *Government Information Quarterly*, 35(3), 460-479. DOI: 10.1016/j.giq.2018.06.003

Chou, Jyh-Rong., & Shieh, Chich-Jen (April 2011). The Digital Divide in Taiwanese Unemployed Adult Population. *Scientific Research and Essays*, 6 (7). 1514-1521.https://www.researchgate.net/publication/260518364_The_digital_divide_in_Taiwanese_unemployed_adult_population. Accessed on 21st September 2023

Cooper, J. (2006). The Digital Divide: The Special Case of Gender. *Journal of Computer Assisted Learning*, *22*(5), 320–334. https://doi.org/10.1111/j.1365-2729.2006.00185.x . Accessed on 21st September 2023

Cox, Andrew. (2022). How Artificial Intelligence Might Change Academic Library Work: Applying the Competencies Literature and the Theory of the Professions. *Journal of the Association for Information Science and Technology*. 72(3). 367-380. https://asistdl.onlinelibrary.wiley.com/doi/full/10.1002/asi.24635. Accessed on 20th February 2024

Cruz-Jesus, F., Vicente, M. R., Bacao, F., & Oliveira, T. (2016). The Education-Related Digital Divide: An Analysis for the EU-28. *Computers in Human Behavior*, *56*, 72–82. https://doi.org/10.1016/j.chb.2015.11.027.Accessed on 21st September 2023.

Davis, E. L., Lundstrom, K., & Martin, P. N. (2011). Librarian Perceptions and Information Literacy Instruction Models. *Library Faculty & Staff Publications*, 1–24. https://digitalcommons.usu.edu/lib_pubs/106. Accessed on 21st September 2022.

Dhiman, A. K. (2006). Information Literacy and The Role of Librarian. *4th International Convention CALIBER-2006, Gulbarga*. 390-398. https://ir.inflibnet.ac.in:8443/ir/bitstream/1944/1207/1/42.pdf. Accessed on 21st September 2022.

Dijk, Jan A. G. M. Van. (March 2017). Digital Divide: Impact of Access.https://www.researchgate.net/publication/314732108_Digital_Divide_Impact_of_Access. Accessed on 21st September 2022.

DiMaggio, P., &Hargittai, E. (2001). From the 'Digital Divide' to 'Digital Inequality':Studying Internet Use as Penetration Increases. *Working paper series 15*. Princeton,NJ: Princeton University Center for Arts and Cultural Policy Studies. https://digitalinclusion.typepad.com/digital_inclusion/documentos/digitalinequality.pdf. Accessed on 21st September 2022.

Domingo, M. G., &Garganté, A. B. (2016). Exploring The Use of Educational Technology in Primary Education: Teachers' Perception of Mobile Technology Learning Impacts and Applications' Use in The Classroom. *Computers in Human Behavior*, *56*, 21-28. https://doi.org/10.1016/j.chb.2015.11.023.Accessed on 16th September 2022.

Eastin, M. S., & LaRose, R. (2006). Internet Self-Efficacy and The Psychology of The Digital Divide. *Journal of Computer-Mediated Communication*, *6*(1), 0-0. https://doi.org/10.1111/j.1083-6101.2000.tb00110.x

Fairlie, R. (2017). Have We Finally Bridged the Digital Divide? Smart Phone and Internet Use Patterns by Race and Ethnicity. *UC Santa Cruz. Report:9.* https://escholarship.org/uc/item/2591v2w7. Accessed on 16th September 2022.

Fernandez-Otoya, F., Cabero-Almenara, J., Perez-Postigo, G., Bravo, J., Alcazar-Holguin, M. A., & Vilca-Rodriguez, M. (2024). Digital and Information Literacy in Basic-Education Teachers: A Systematic Literature Review. *Education Sciences*, *14*(2), 127. https://doi.org/10.3390/educsci14020127. Accessed on 18th April 2023.

Freeman, R. L. (2005). *Telecommunication System Engineering*. John Wiley & Sons. https://www.academia.edu/28190761/Telecommunication_System_Engineering. Accessed on 18th April 2023.

Garcia-Martin, J, & Garcia-Sanchez, J.N. (2022). The Digital Divide of Know-How and Use of Digital Technologies in Higher Education: The Case of a College in Latin America in the COVID-19 Era. *International Journal of Environmental Research and Public Health*.19 (6): 3358. https://doi.org/10.3390/ijerph19063358. Accessed on 07th May 2023.

Garuba, Abdul Rahman. (2013). The Prospects of Bridging the Digital Divide in Africa. *Library Philosophy and Practice (e-journal).* 882. https://digitalcommons.unl.edu/libphilprac/882.Accessed on 18th April 2023.

Gautam, Devendra Kumar. (December 2014). Impact of Digital Divide and Public Libraries. *IOSR Journal Of Humanities And Social Science*. 19 (12). http://www.iosrjournals.org/iosr-jhss/papers/Vol19-issue12/Version-4/J0191245963.pdf.Accessed on 07th May 2023.

Goldfarb, Avi., & Prince, Jeffrey. (2007). Internet Adoption and Usage Patterns Are Different: Implications for the Digital Divide. *SSRN Electronic Journal*, vol. 20, no. 1, 2007, pp. 2-15. DOI:10.1016/j.infoecopol.2007.05.001. Accessed on 06th May 2023.

Hargittai, E. (2002). Second-Level Digital Divide: Differences in People's Online Skills. *First Monday*, *7*(4). https://doi.org/10.5210/fm.v7i4.942. Accessed on 16th September 2022.

Hebert, Andrea. (2018). Information Literacy Skills of First-Year Library and Information Science Graduate Students: An Exploratory Study. *Evidence Based Library and Information Practice.*13(3). 32-52. DOI: 10.18438/eblip29404

Hoffman, Donna L., Novak, Thomas P. (February, 1998). Bridging the Digital Divide: The Impact of Race on Computer Access and Internet Use. https://eric.ed.gov/?id=ED421563.Accessed on 18th April 2023.

Hussain, A. (2023). Use Of Artificial Intelligence in The Library Services: Prospects and Challenges. *Library Hi Tech News*. 40(2), 15-17. https://doi.org/10.1108/LHTN-11-2022-0125Accessed on 21st September 2024.

Jaggars, S. S., Motz, B. A., Rivera, M. D., Heckler, A., Quick, J.D., Hance, E. A., &Karwischa, C. (2021). The Digital Divide Among College Students: Lessons Learned From the COVID-19 Emergency Transition. Midwestern Higher Education Compact. https://eric.ed.gov/?id=ED611284#:~:text=Policy%20Report%2C%20Midwestern%20Higher%20Education%20Compact%2C%202021%2DJan&text=This%20report%20examines%20the%20meaning,emergency%20shift%20to%20remote%20learning.Accessed on 21st September 2024.

Krubu, Dorcas., Osawaru, Kingsley. (2010). The Impact of Information and Communication Technology (ICT) In Nigerian University Libraries. *Library Philosophy and Practice (ejournal).* 515. https://digitalcommons.unl.edu/libphilprac/515.Accessed on 21st August 2023.

Mahmoud, H. H. H., & Ismail, T. (2020). A Review of Machine learning Use-Cases in Telecommunication Industry in the 5G Era. *2020 16th International Computer Engineering Conference (ICENCO)*, Cairo, Egypt, 159-163. doi: 10.1109/ICENCO49778.2020.9357376.

Marrall, Rebecca M. (2014). Teaching the Digital Divide: Connecting Students to Community, Knowledge, and Service Learning. *Library Philosophy and Practice (e-journal).*1126. http://digitalcommons.unl.edu/libphilprac/1126. Accessed on 19th September 2024.

Miah, Muhammed. (March, 2024). Digital Inequality: The Digital Divide and Educational Outcomes.https://www.researchgate.net/publication/379258768_Digital_Inequality_The_Digital_Divide_and_Educational_Outcomes. Accessed on 21st November 2024.

Miras, S., Ruiz-Bañuls, M., Gómez-Trigueros, I.M., & Mateo-Guillen, C. (2023). Implications of The Digital Divide: A Systematic Review of Its Impact in The Educational Field. *Journal of Technology and Science Education*, 13(3), 936-950. https://doi.org/10.3926/jotse.2249. Accessed on 29stSeptember 2024.

Mitchell, M. (2002). Exploring The Future of The Digital Divide Through Ethnographic Futures Research. *First Monday*. https://doi.org/10.5210/fm.v7i11.1004. Accessed on 02st September 2023.

Naidoo, Segarani., Raju, Jaya. (November 2012). Impact of The Digital Divide on Information Literacy Training in a Higher Education Context. *South African Journal of Libraries and Information Science. 78 (1).* https://sajlis.journals.ac.za/pub/article/view/46#:~:text=The%20findingsof%20the%20study%20revealed,lessons%20while%20advantaged%20students%20already.Accessed on 02st September 2023.

Nkanu, W. O., Okon, Henry Itohowo. (2010). Digital Divide: Bridging the Gap Through ICT in Nigerian Libraries. *Library Philosophy and Practice (e-journal)*. 492. http://digitalcommons.unl.edu/libphilprac/492.Accessed on 07th September 2022.

Norris, P. (2001). Digital Divide: Civic Engagement, Information Poverty, and The Internet Worldwide. New York, NY: Cambridge University Press.

Ntui, Aniebiet Inyang. (2014). Information and Communication Technology (ICT) Usage and Undergraduate Students Study Habits in Universities in Cross River State, Nigeria. *Library Philosophy and Practice (e-journal)*. 1187. http://digitalcommons.unl.edu/libphilprac/1187. Accessed on 02st September 2023.

Okunlaya, R.O., Syed Abdullah, N. & Alias, R.A. (2022). Artificial intelligence (AI) Library Services Innovative Conceptual Framework for The Digital Transformation of University Education. *Library Hi Tech*. 40(6), 869-1892. https://doi.org/10.1108/LHT-07-2021-0242. Accessed on 07th May 2023.

Prasad, H.N. (2018). Information Literacy: Definition, Objectives and Subject Coordinator Importance. *Library Use and User Studies*. (n.d.). https://ebooks.inflibnet.ac.in/lisp15/chapter/information-literacy-definition-objectives-and-subject-coordinator-importance/. Accessed on 06th May 2023.

Prathap, S. (2024). NEP 2020 and the Infrastructure for ICT-based Teaching Learning. *International Journal for Multidisciplinary Research (IJFMR).* 6 (1). https://www.ijfmr.com/papers/2024/1/11597.pdf. Accessed on 06th December 2024.

Rai, Alka., & Sharma, Arvind. (January 2019). Digital Divide and Libraries: A Systematic Literature Review. *Library Herald*. 57(3): 402. DOI:10.5958/0976-2469.2019.00026.5. Accessed on 06th May 2023.

Ramsetty, Anita., & Adams, Cristin. (April 2020). Impact of The Digital Divide in The Age Of COVID-19. *Journal of the American Medical Informatics Association*, 27(7), 1147-1148. https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC7197532&blobtype=pdf. Accessed on 21st November 2024.

Rios-Campos, C., Zambrano, E. O. G., Cantos, M. F. M., Anchundia-Gómez, O., León, M. E. C., Moya, G. E. M., García, E. a. M., Batalla, E. a. P., De La Oliva, N. a. R., & Zelada, O. S. (2024). Universities And Artificial Intelligence. *South Florida Journal of Development*, *5*(6), e4016. https://doi.org/10.46932/sfjdv5n6-010Accessed on 18st November 2024.

Selwyn, N. (2022). The Future of AI and Education: Some Cautionary Notes. *European Journal of Education*. *57*(4), 620-631. https://doi.org/10.1111/ejed.12532. Accessed on 21st November 2024.

Shokat, S., Riaz, R., Rizvi, S. S., Riaz, F., Aziz, S., Hussain, R. S., & Shabir, S. (2018). Impact of Web 2.0 on Digital Divide in AJ & K Pakistan. *International Journal of Advanced Computer Science and Applications*, *9*(2), 221–228. https://doi.org/10.14569/IJACSA.2018.090231Accessed on 07th May 2023.

Singh, Kirti. (September,2012). Digital Divide Factors in Indian Management Libraries Introduction. *International Journal of Advanced Research in IT and Engineer*. 1(3), 34-43. https://www.academia.edu/5379938/DIGITAL_DIVIDE_FACTORS_IN_INDIAN_MANAGEMENT_LIBRARIES_INTRODUCTION. Accessed on 07th May 2023

Soomro, K.A., Kale, U., Curtis, R. et. al.(2020). Digital Divide Among Higher Education Faculty. *Int J Educ Technol High Educ* 17, 21. https://doi.org/10.1186/s41239-020-00191-5. Accessed on 06th May 2023.

Sun, Jerry Chih-Yuan., & Metros, Susan E. (2011). The Digital Divide and Its Impact on Academic Performance. *US-China Education Review A 2*. 153-161. https://files.eric.ed.gov/fulltext/ED524846.pdf. Accessed on 20th May 2023

Tayo, Omolaro., Thompson, Randall., & Thompson, Elizabeth. (2016). Impact of the Digital Divide on Computer Use and Internet Access on the Poor in Nigeria.

Journal of Education and Learning. 5(1). https://files.eric.ed.gov/fulltext/EJ1085410.pdf.Accessed on 20th May 2023

UNESCO. (2008). Towards Information Literacy Indicators: Conceptual Framework Paper. *United Nations Educational, Scientific and Cultural Organization*. https://unesdoc.unesco.org/ark:/48223/pf0000158723. Accessed on 28th May 2024.

Val, S., & Lopez-Bueno, H. (2024). Analysis of Digital Teacher Education: Key Aspects for Bridging the Digital Divide and Improving the Teaching–Learning Process. *Educ. Sci.*, *14,* 321. https://doi.org/10.3390/educsci14030321. Accessed on 21st November 2024

Van Deursen, A. J., & van Dijk, J. A. (2014). The Digital Divide Shifts to Differences in Usage. *New Media & Society*, 16(3), 507-526. https://doi.org/10.1177/1461444813487959. Accessed on 06th May 2023.

Van Dijk J. A. G. M. (2006). Digital Divide: Research, Achievements and Shortcomings. *Poetics,*34, 221-235. https://www.researchgate.net/publication/241880596_Digital_Divide_Research_Achievements_and_ShortcomingsAccessed on 21st November 2024.

Verma, Manish. (2023). Novel Study on AI-Based Chatbot (ChatGPT) Impacts on the Traditional Library Management. *International Journal of Trend in Scientific Research and Development*. 7(1), 961-964. https://www.ijtsrd.com/papers/ijtsrd52767.pdf. Accessed on 08th November 2024.

Yadav, Rajesh. (2017). Challenges and Evolution of Next generation Wireless Communication. *Proceedings of the International Multi Conference of Engineers and Computer Scientists*. https://www.iaeng.org/publication/IMECS2017/IMECS2017_pp619-623.pdf. Accessed on 08th November 2024.

Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J., Yuan, J., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity*. 1-18. https://doi.org/10.1155/2021/8812542. Accessed on 08th November 2024.

CHAPTER-3

GOVERNMENT INITIATIVES IN BRIDGING THE DIGITAL DIVIDE, ARTIFICIAL INTELLIGENCE (AI)

3.1 INTRODUCTION

To bridge the digital divide, the Indian government has launched a number of programs, focusing on expanding internet access, enhancing digital literacy, and promoting technology in rural areas. Initiatives have been taken in various sector such as agriculture sector, educational sector and online infrastructure and government services.

3.2 INDIAN GOVERNMENT INITIATIVES IN BRIDGING THE DIGITAL DIVIDE

The initiatives are as follows:

3.2.1 Kisan Call Centre: According to the Ministry of Agriculture. Government of India (2024). On 21 January 2004, the Ministry of Agriculture & Farmers Welfare introduced "Kisan Call Centres" (KCCs) program in an effort to maximize the potential of ICTs in agriculture. The program’s primary goal is to provide farmers with phone support in their native tongue when they have questions. These call centres operate throughout all 21 states and union territories of the nation. For Kisan Call Centre, a standard eleven-digit Toll Free Number 1800-180-1551 was assigned nationwide. This number can be reached by landlines, smartphones, and all telecom networks, including those operated by commercial service providers. There are 22 local languages used in the responses to the farmers' inquiries. These call centers' goal is to provide prompt, local language responses to farmers' concerns. Call centres are located in each state and are meant to handle inquiries from all across the country. These call centres answer questions pertaining to agriculture and related subjects. Kisan Call Centre services are available at all KCC sites daily from 6:00 AM till 10:00 PM. Farm Tele Advisors (FTAs) are Kisan Call Centre agents who have proven fluency in their native language and have a degree in agriculture or a related field (farming, fisheries, beekeeping, agricultural engineering, sericulture, poultry, aquaculture, animal husbandry, agricultural marketing, biotechnology, etc.). Higher-level experts receive inquiries that FTAs are unable to address. These specialists are State Departments of Agriculture (SDAs), KVKs, ICAR Institutes, and State Agricultural Universities (SAUs) Subject Matter Specialists (SMSs).

KCCs provide location-specific, real-time guidance with the goal of bridging the information gap between farmers and agricultural specialists. However, the digital divide in India has affected this program's efficacy. Especially in rural and isolated places, farmers with limited access to digital literacy, telecommunication equipment, or smartphones frequently find it difficult to fully utilize KCC services. Although the program increases agricultural output for farmers who have access to ICT, it can unintentionally create a divide for underprivileged farmers who do not have access to technology. In order to ensure that the KCCs program reaches all Indian farmers and promotes inclusivity and equal access to information, it is essential that this digital barrier be addressed.

3.2.2 Life Line India: OneWorld Foundation India (2024), which is a recognized Indian organization, the OneWorld Foundation India seeks to promote ICT-based social and sustainable development. OneWorld started operating in India in 2000 as the South Asian Center of the OneWorld International Foundation, even though it was officially registered under Section 25 in 2008 as a non-profit organization. OneWorld is a leader in the field of knowledge enablement. With its network of portals and channels, it generates, distributes, compiles and maintains knowledge and information on a variety of topics related to development to a variety of audiences.

OneWorld thinks that empowerment and progress may be facilitated by information. In order to provide grassroots communities with development advantages, OneWorld collaborates with partners to develop innovations supported by ICT and suitable e-tools for knowledge management. OneWorld creates solutions to include linguistic, cultural, geographical, and contextual elements in knowledge management during this process. In addition, OneWorld is focusing on social networking for positive change communication and mobile telephony-led voice and text-based communication to promote content, connectivity, capacity building, convergence, and coordination.

The idea behind the LifeLines India service was to develop a digital inclusion initiative that would give people in rural India access to information and technology, thereby bridging the digital gap and enhancing their quality of life. With the founding cooperation of British Telecom, Cisco Systems, and OneWorld Foundation

India, LifeLines India was introduced in September 2006, bringing this digital ambition to life as a unique ICT-led helpline. Strategic goals for the program at the outset were:

- By providing rural communities with access to important, crucial information, livelihood and sources of income will increase.
- As information is shared through the service, a contextual knowledge base is developed in parallel to provide a sustainable delivery strategy.

In order to deliver vital and demand-based guidance and direction to remote and rural populations in India via voice, in the local language, and within 24 hours, LifeLines India combines telephone and internet technology.

3.2.3 Bhoomi Project: The Karnataka State Government initiated and developed the 'Bhoomi' project. The reason for doing this was to computerize all of Karnataka's land records. On the other hand, the initiative was funded by the Indian Ministry of Rural Development, which works with the Karnataka State Government. There are some intriguing aspects of the Bhoomi project to consider- Software for printing land records at any time (i.e. anytime the records were to be printed) was produced, update record certificates online for farmers, Bio-Login metrics system (Compaq): fingerprint-based user authentication to prevent impersonation and database system hacking, utilizing the program to generate reports on soil, quantity of land holdings, kinds of crops farmed, and many other topics (to make educated policy decision).

Farmers can easily obtain their land records at kiosks; these records serve as evidence of land ownership or lease and also protect them from harassment or extortion. Easy techniques for obtaining farm credit, Easy when it comes to legal issues. Additionally, the administrator benefits from ease of upkeep and updating of land data, rapid and simple access to the documents for examination, and monitoring of government lands is simple. The Bhoomi Project includes 6.7 million farmers and contains millions of land ownership data. Many people and foreign financial bodies have expressed their support for the project. The project has reduced the time required to interact with the bureaucratic hierarchy of the state revenue department. These kiosks offer a touch screen for reviewing any land record, and the project can serve as a databank for a variety of public and private sector organizations' projects.

3.2.4 Gyandoot Project: Bhatnagar (2003) gives a report that On January 1st, 2000, Gyandoot was launched by setting up an affordable network to link a server at the district office connected 20 government-owned information kiosks spread across five blocks of the district. 17 independently owned kiosks were subsequently added. In the Madhya Pradesh state's Dhar district, the government has set up Gyandoot, an intranet-based service portal. Of the 1.7 million people living in the state, 60% are considered to be below the poverty line, and 54% are considered to be members of "scheduled tribes." Establishing locally owned, cutting-edge, and environmentally friendly information kiosks in this impoverished, predominantly tribal region of Madhya Pradesh was the aim of the Gyandoot initiative. The initiative was conceived in November 1999 by Amit Aggarwal, CEO of the district panchayat (local government), and Rajesh Rajoura, Collector (head of administration) of Dhar.

A computer, a modem, a printer, an uninterruptible power supply (UPS) system with a backup battery in case of an electrical outage, furniture, and stationery are the standard components of an information kiosk, also known as a soochanalaya. These kiosks can be found in government buildings, at conspicuous places like marketplaces, or beside main roads. Hindi, the native tongue, is used on the portal to provide information. Each kiosk serves 10-to-15-gram panchayats, or village councils, that oversee 20 to 30 villages with 20,000–30,000 residents each.

A few of the services provided are a public grievance system, an online portal for village auctions, agricultural crop price data, and registration on online applications for land record copies. One year into the project's execution, application for driving license and secondary and higher secondary board examination results access were included. Photocopying, telephone booths, horoscope services, and computer training are among the other services offered by privately held kiosks.

Three nominees nominated by the local community are chosen to become the proprietor of the kiosk, called a soochak. The district council provide training to these nominees. Upon completion of the program, the top trainee is designated as the soochak. Most soochaks are educated, youthful, and more of an entrepreneur than an employee. In addition to being forced to pay for phones and stationery, soochaks are not entitled to a salary. The fee that they charge for the various services that are offered to the public at the kiosks ranges from Rs 10 to Rs 15. Ten percent of the kiosk's earnings must be given to the district councils. Through the kiosks, locals can submit online applications for various government services and register grievances by sending emails in Hindi to the district office. Applications and complaints sent to the district headquarters official via email are sent "by hand" to the relevant departments. Since most departments that must respond to applications and complaints are not electronic, these transactions are completed by hand. A nonprofit organization has been established to oversee the project. In terms of software creation and system maintenance, the National Informatics Center offers technical assistance and direction. The Gyandoot network is funded by a variety of sources. The kiosks were set up with the help of loans from state organizations in addition to money from the private sector. All construction of the networking infrastructure was funded by government grants.

3.2.5 Technology Development for Indian Languages (TDIL): The Ministry of Electronics and Information Technology is currently working on an ambitious program called TDIL. To produce, access, and integrate multilingual information resources to create cutting-edge user goods and services TDIL was created, TDIL also aims to create information processing techniques and technologies that facilitate interaction between humans and machines across linguistic boundaries. The program's primary objectives are to develop and promote software tools and applications for each of India's 22 officially recognized languages, offer solutions and standardization at all levels, and facilitate collaborative research and development of cutting-edge technologies that produce innovative goods and services.

The primary goal of every initiative in a multilingual country like India is to give as many people as possible access to information and services in their native tongue. Human language technology (HLT) advancements enable human-machine interaction throughout the current technological revolution, which is AI and ICT. It is very challenging to offer tools, applications, and content that are both reasonably priced and user-friendly while facilitating ICT infrastructure available in multiple Indian languages, especially considering the potential for multilingual web content in India to increase quickly. There are numerous potential advantages to developments in Indian language technology. Low-literate patients might be able to communicate with a doctor in their native dialect, while an illiterate land worker might be able to obtain important land records for his little plot of land in the local language.

3.2.6 National Language Translation Mission (NLTM): According toBhashini (2024), the Mission Bhashini aims to enhance the amount of information accessible in Indian languages and the ease with which all Indians can use digital services and the internet in their mother tongues. The Honorable Finance Minister also announced the NLTM, better known as "Bhashini," in the budget for 2021. In March 2022, it began as a three-year initiative with the goal of employing natural language technology to develop a diverse ecosystem of members, partners, and contributors in order to remove linguistic barriers and provide digital inclusion and empowerment in an Aatma Nirbhar Bharat. The mission is to create a digital platform that is open to the public and combines NLP and AI to offer a responsive and easy-to-use ecosystem for translating between various Indian languages and English. Among the major initiatives currently in progress is the development of basic language technologies, including automatic speech recognition (ASR), machine-assisted translation (MAT), optical character recognition (OCR), speech-to-speech (S2S), text-to-speech (TTS) and addition of Indian languages to IT tools and solutions.

3.2.7 Digital India: The Ministry of Electronic and Information Technology passed Digital India, the Government of India's flagship initiative, in 2024 with the intention of making India a society and knowledge economy empowered by digital technology. Among other things, the government's major ICT projects included some extensive programs that focused mostly on building information systems, such as computerizing land records and railroads. Many states then started large-scale e-governance pilot projects with the intention of providing citizens with electronic services.

Digital India, a comprehensive initiative to reduce the country's digital gap by providing high-quality, affordable, and widely accessible digital infrastructure, was introduced on July 1 2015, by Prime Minister Narendra Modi. Its three main objectives are to increase digital connectivity, provide services online, and give individuals more control through digital literacy. The goal of Digital India is to advance growth that is inclusive and equal opportunities by increasing internet access and incorporating technology into governance, education, healthcare, and agriculture. Building an efficient digital infrastructure is one of Digital India's main goals. Projects like BharatNet, the largest rural broadband program in the world, aim to give 250,000 Gram Panchayats, or village councils, access to high-speed internet. By bridging the connectivity gap between rural and urban communities, the project, which is an internet service, gives access to rural areas. Expanding 4G/5G networks and public Wi-Fi hotspots will increase internet penetration even in remote areas. Aadhaar, India's distinctive biometric identity system, is a vital enabler for digital services in addition to broadband connectivity. With more than 1.2 billion Aadhaar IDs being given, it lowers physical barriers and administrative inefficiencies while facilitating access to different kinds of services, including banking, subsidies, and government benefits.

There were 130 crore (1.3 billion) people living in India as of December 31, 2018, with 100.6 crore (446 million) smartphones,150 crore (1.5 billion) mobile phones, 130 crore Aadhaar digital biometric identity cards, 130 crore (1.3 billion) internet users-up from 481 million (80% of the country's total population) in December 2017-and a 71% increase in e-commerce (Wikipedia, 2024). Digital India also encourages Digital Payments, which furthers a cashless economy. The Unified Payments Interface (UPI) has revolutionized digital commerce by enabling instantaneous money transfers using mobile devices. Financial inclusion is ensured by programs like the Jan Dhan Yojana and Direct Benefit Transfers (DBT), which cut out intermediaries and minimize corruption by delivering government benefits and subsidies straight into consumers' bank accounts.

The e-government initiative includes the creation of websites and mobile applications that allow individuals to access essential services, including utilities, healthcare, education, and finance. With the UMANG app (Unified Mobile Application for New-age Governance), users can access government services, make payments, and get updates from their mobile devices. The software unifies over 1,200 functions on a single platform. The Common Service Centers (CSC), which act as digital hubs in rural and isolated locations and give citizens a range of services that the government provides, such as digital payments and other crucial information, are other important services.

3.2.8 National e-Governance Plan (NeGP): The National e-Governance Plan (NeGP), launched in May 18, 2006 by the government of India, aimed to implement 31 Mission Mode Projects (MMPs) across diverse sectors like agriculture, health, education, and land records. Of these, 24 MMPs are operational, delivering partial or full services. Challenges such as limited process re-engineering, lack of integration among government systems, and underutilization of advanced technologies prompted the government to introduce the e-Kranti initiative, which is focused on transforming e-governance.

e-Kranti emphasizes principles like "Transformation, not Translation," "Integrated Services," mandatory Government Process Reengineering (GPR), "Cloud by Default," "Mobile First," and "Security and Data Preservation." It also mandates standards, language localization, and fast-tracking approvals. Expanding the MMP portfolio from 31 to 44, e-Kranti incorporates projects targeting the social sector, including Women and Child Development, Financial Inclusion, Urban Governance, and Social Benefits, ensuring a modern, efficient, and inclusive e-governance framework.

3.3 DIGITAL INDIA: EMPOWERING CITIZENS THROUGH DIGITAL LITERACY

3.3.1 Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA): Ministry of Electronic and Information Technology (2024) states that, in 2017, the Indian government introduced the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) as a component of the expanded Digital India plan. The program's goal is to empower rural inhabitants by giving them the digital skills they need to engage in the digital sector and improve their employment prospects. The objective is for every rural home to have at least one technologically literate member. The principal aim of PMGDISHA is to impart digital literacy skills to about 60 million rural families in India, enabling them to operate digital devices like smartphones, computers, and tablets. In order to ensure a more inclusive approach to digital empowerment, the program targets residents between the ages of 14 and 60, encompassing underprivileged populations such as minorities, Scheduled Tribes, and Scheduled Castes.

Essential skills, including using digital devices, sending emails, visiting websites, and making digital payments, are covered in the program. It improves people's capacity to engage in online activities like e-commerce and e-learning and assists them in understanding how to use government e-services. PMGDISHA was created especially for rural India, where there has traditionally been less internet usage and a lower level of digital literacy. The program aimed to close the gap between urban and rural communities in terms of access to digital. In remote areas, the project has established multiple training centres. Beneficiaries can receive free digital literacy instruction from these centres. Education is delivered by accredited training partners, and certification is obtained upon successful course completion. PMGDISHA significantly contributes to improving chances for employment, entrepreneurship, and information access by acquainting rural populations with digital tools.

3.3.2 Digital Infrastructure for Knowledge Sharing (DIKSHA): Ministry of Education (2024) states that **DIKSHA** has been formally launched by the Hon'ble Vice President of India on 5th September 2017. The Government of India created the national educational platform DIKSHA to provide educators and students with digital learning tools. As part of the Digital India project, it offers a range of educational resources, instructional aids, and professional development tools for the upgradation of education. With the use of digital content that can be adapted to the curriculum and the needs of students in various states and boards, the platform is intended to provide educators with more authority.

DIKSHA provides free access to interactive learning content in various formats, such as videos, worksheets, and assessments, which are available in multiple languages. Teachers and students can interact with the content in a flexible way because the platform is available through web portals and mobile apps. In addition, it facilitates collaborative learning by enabling educators to upload, choose, and distribute educational resources. Through ICT integration into education, DIKSHA hopes to lower inequalities, increase inclusive learning, and increase accessibility to high-quality education throughout India, particularly in underprivileged and rural areas.

3.3.3 SWAYAM: Ministry of Education (2024) states that the Ministry of Education created a government project called SWAYAM, or Study Webs of Active Learning for Young Aspiring Minds. Its goal is to bridge the digital gap and provide education to everyone, irrespective of geography or financial status, through the use of online courses. Since its 2017 launch, SWAYAM has provided courses in a variety of subjects, starting from school-level to post-graduate and professional growth. Students, instructors, and professionals looking to advance their knowledge and abilities outside of typical classroom settings will find it very helpful.

Through Massive Open Online Courses (MOOCs), SWAYAM offers access to courses created by some of India's best colleges, including IITs and IIMs. These multilingual courses offer instruction in a number of topics, including engineering, the humanities, and law. To guarantee comprehensive learning, every course consists of video lectures, reading materials, tests, and assignments. In addition, learners can improve their employability by paying a small amount to receive certifications upon completion of the courses. The platform is essential to the democratization of education because it makes sure that even the most underprivileged and isolated communities can profit from high-quality education.

3.3.4 INTERNET SAATHI: Tata Trusts (2024) states that, typically, rural women establish community networks and plan events for the organizations. Launched in 2015 in partnership with Google, the Tata Trusts' Internet Saathi programme empowers these women to act as change agents by taking the lead in rural areas in advancing digital literacy. To put it briefly, the program builds a network of trainers who teach digital literacy to rural populations by assisting in the development of a group of women in rural communities who are proficient in digital literacy and who then train other women. In 200,000 villages, the Trusts have established an effective network of roughly 60,000 saathis, who have trained more than 20 million women in computer literacy. Along with sharing vital information with their fellow villagers, the saathis also relay weather reports and relief efforts for natural catastrophes like cyclones and floods. These women are essential in supplying the Trusts with information about internet usage patterns in the communities they operate in, as well as acting as a bridge between the rural community and the Trusts. They accomplish portfolio goals that are connected to the Trusts' digital intervention initiatives. For instance, the Aspirational Districts initiative uses field-level data collected via the Internet Saathis.

The Trusts have created a Foundation for Rural Entrepreneurship Development (FREND) to help rural communities implement the Internet Saathi and livelihoods program. The Internet Saathi program is entering its second phase through FREND, and the Trusts are making the platform available for other partners to join. By giving these women saathis transformative job, this would not only empower them but also give them a means of subsistence that would enable them to maintain their network. Additionally, the saathis are helping to raise awareness about menstrual hygiene and good practices through a WASH initiative in Gujarat. The Trusts feel that it's necessary to create a digital center of well-chosen employment prospects with enablement and support features so that rural women may utilize it to launch social enterprises with a localized but global emphasis. Through the "FREND Application," which will empower and support women in rural India who are driven to pursue their entrepreneurial goals at every stage of their journey, the Trusts want to put this into practice.

The center aims to empower women at every stage of their entrepreneurial journey, from start-up to established, by offering options for revenue generation as well as essential support services that can make a big difference in an enterprise's ability to succeed and grow. By 2022, FREND aims to have one lakh digital entrepreneurs with annual income opportunities of one lakh rupees. The Internet Saathi initiative has allowed hidden entrepreneurial aspirations to grow into reality, with over 53% of women trained by Internet Saathis using the internet to upskill themselves. According to a recent IPSOS research on the Internet Saathi impact, 45% of women feel that gaining new skills has raised their income, and 57% of women feel that they have improved their money management skills. In village-level meetings, women were twice as likely to speak up and 3.5 times as likely to get involved in other aspects of society.

The findings of TNS's 2018 Internet Saathi Impact Study are as follows:

- Through the Internet Saathi program, 70% of women made their first internet-related purchase.
- One third of the mothers think that the Saathi program has improved their own lives and their kids' educational experiences.
- Thirty percent of individuals with better access to healthcare report feeling better about their health.
- The increase in upskilling is 53%.
- Ten per cent of women go on to launch their own companies, bringing in an average of more over Rs 4,000 a month.

3.4 DISTINCTION BETWEEN THE NATIONAL AND GLOBAL DIGITAL DIVIDE

The difference in the use and access of digital technology within a single nation is known as the "national digital divide," and it is frequently caused by variables like socioeconomic level, geography, education, age, gender, or ethnicity. The global digital divide, on the other hand, means that the difference in access to technology, as well as the internet, and the necessary digital skills between developed and developing countries**.**

3.4.1 National digital divide

Digital inequality within countries is generally driven by a combination of urban-rural contrasts, economic disparities, and educational achievement, especially in developing or even developed nations. While residents in affluent urban areas have access to high-speed internet, those living in rural or isolated locations may suffer from inadequate or non-existent internet infrastructure. Educational disparities also come into play; those with more education typically have better digital literacy and more access to digital tools. For example, low-income households, the elderly, and rural populations are severely affected by the digital divide in nations such as the United States.

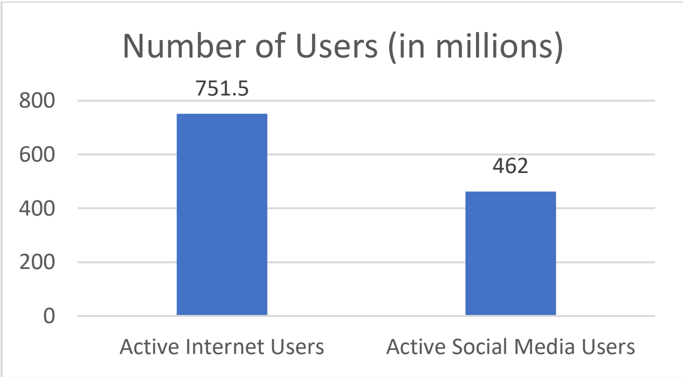
3.4.2 Focusing on India scenario

India faces a serious problem with the national digital divide, which is defined by differences in digital literacy, internet access, and device availability, especially between urban and rural areas. India has made progress in building out its digital infrastructure, but there are still challenges in rural areas, such as worse internet access and lower levels of digital literacy. In India's rural areas, internet penetration was only 37% as of 2023, whereas it was 69% in metropolitan areas. Socioeconomic issues also play a role; marginalized communities have fewer chances of having access to computers and smartphones, which results in gaps in digital engagement. The gap is further widened by gender inequality since access to digital technologies is less common among women than among men. Programs like Digital India seek to close this divide, but obstacles still exist, particularly when it comes to giving rural and underprivileged communities access to inexpensive, high-quality infrastructure. Addressing these concerns is vital for attaining equal digital inclusion across the country.

Statista (2024) states that due to the government's Digital India program and the country's increasing internet penetration in recent years, as of January 2024, over 751 million people in the country were actively using digital gadgets. Mobile internet users presently make up the vast majority of traffic in the second-largest internet market in the world. When Reliance Jio services first launched in 2007, all citizens of the nation could take advantage of appealing programs and incentives, regardless of their socioeconomic status or income level. With Jio services accounting for more than 60% of mobile data traffic in less than ten years after its introduction, the impact was seen almost immediately. Over time, both rural and urban areas have seen a growth in the number of internet users. Previous trends suggested that the introduction of Gigafiber, the Jio fixed-line broadband service, might contribute to the nation's already rising internet penetration. In combination with the demonetization that occurred in late 2016, the nation saw a startling rate of digitization, nearly 50% by 2019 take hold.

Table No.3.1: Digital population across India as of January 2024

Category	Number of Users (in millions)
Active Internet Users	751.5
Active Social Media Users	462



(Source: Statista -2024)

Figure-3.1: Digital population across India as of January 2024

3.4.3 Global digital divide

Global differences in digital literacy are reflected in the global digital gap. Particularly in North America, Europe, and some parts of Asia, developed nations typically have vast technological infrastructure, widespread use of the internet and great proficiency with digital. Meanwhile, many developing nations, particularly those in Africa and some parts of South Asia, struggle with low proficiency in digital technology, poor infrastructure, and limited access to the internet. The causes for this include economic limits, lack of investment in technology, and educational obstacles. The global digital divide has serious ramifications since it restricts chances for economic growth, international market access, and involvement in the information economy. Statista (2024) states that the modern information society is largely dependent on the internet, which connects billions of people worldwide. In 2023, Northern Europe was declared as the highest percentage of internet users in the world.

In Saudi Arabia, UAE and Norway, 99 per cent of individuals had an internet connection as of April 2023. Meanwhile, North Korea, which came in last in the world rankings, has virtually no internet usage among its citizens. With around 2.93

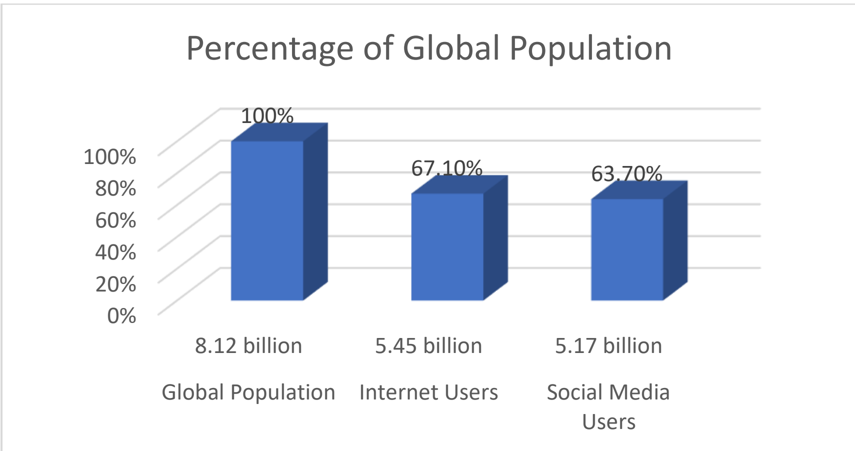
billion internet users as of the latest estimate, compared to other parts of the world, Asia has the highest number of internet users. Europe ranked second with more than 750 million internet users. The United States, China and India are the countries with the highest internet usage rates.

3.4.4 Number of internet and social media users worldwide as of July 2024

Statista (2024) has mentioned that 67.1 % of the global population, or 5.45 billion individuals worldwide, were internet users as of July 2024. At the same time, social media was used by 5.17 billion individuals worldwide or 63.7 % of the global population.

Table No.3.2: Number of internet and social media users worldwide as of July 2024

Category	Number of Users (billion)	Percentage of Global Population
Global Population	8.12 billion	100%
Internet Users	5.45 billion	67.10%
Social Media Users	5.17 billion	63.70%



(Source: Statista-2024)

Figure-3.2: Number of internet and social media users worldwide as of July 2024

The everyday lives of people around the world are greatly impacted by their daily use of the internet. Film, television, music, and phone calls have all been transformed by the internet, which has also altered how people communicate with each other. With the introduction of new digital technology and websites, human interaction via social networking, instant messaging, and online forums has become more common. Since the emergence of social media, internet communications and the differentiation between private and public online spaces have changed. Digital video, music, user-generated content, and digital media transactions have become commonplace online, and this has had a significant effect on how people consume traditional media. Retail has also been permanently impacted by the internet. In addition to requiring traditional stores to adjust to new digital sales channels, e-commerce's growth has made it possible for independent small business owners to expand their operations across geographical boundaries.

3.5 DIGITAL DIVIDE'S IMPACT ON EDUCATION

Due to unequal access to technology, the digital divide has a major adverse effect on education by limiting student’s possibilities to learn in underprivileged areas. Because education is becoming more and more dependent on digital resources, students will find it difficult to stay up with other students if they don't have regular access to electronics, the internet, or digital literacy. This gap became increasingly obvious at the time of COVID-19 pandemic when schools shifted to online learning, leaving many students in rural or low-income areas at a disadvantage. The digital divide has an effect on teachers' capacity to deliver high-quality instruction in addition to access. Teachers in underfunded schools might not have the resources or expertise necessary to successfully incorporate technology into their lessons, which would increase the academic disparity between students from different socioeconomic backgrounds and geographical areas.

3.6 INITIATIVE OF NEP 2020 ON THE DIGITAL DIVIDE

Given the growing integration of technology into education, the National Education Policy (NEP) 2020 acknowledges the pressing need to overcome India's digital divide. The policy acknowledges that unequal access to the internet and digital technology limits equitable learning opportunities for students from disadvantaged and isolated areas. NEP 2020 emphasizes the need to improve digital infrastructure in order to make sure that all students, whether they are from different locations or socioeconomic backgrounds, have fair access to high-quality digital education. One of the primary objectives of NEP 2020 is to promote the integration of technology into teaching and learning.

The approach attempts to bridge the gap by providing internet connectivity and equipment to schools and students, especially those in impoverished areas, and encouraging the production of high-quality digital content to support teachers in utilizing technology in the classroom. Baturay & Demiray (2018) stated that because of the increasing quantity of technology being utilized, children must master digital citizenship skills, including digital security and ethical online behaviour. However, these abilities may not be available to students without access to technology or the internet.

The National Education Policy (NEP) 2020's implementation in Indian schools is a momentous and revolutionary step toward changing the nation's educational landscape. The policy, which was adopted by the Union Cabinet in July 2020, presents a vision for education going forward that place a strong emphasis on adaptability, holistic development, and a student-centred methodology.

NEP 2020 also emphasizes how critical digital literacy is for educators as well as students. The suggestion suggests establishing a nationwide digital education hub that can provide adaptable experiences in online learning for all students, especially those residing in isolated areas. NEP 2020 emphasizes bridging the digital divide, professional development in digital skills for teachers, and fostering a reading culture through expanded public, school, and digital libraries. High-quality, inclusive books in multiple languages will be widely accessible, supported by a national book promotion policy to ensure equitable access and broad readership.

3.6.1 Bridging the digital divide, NEP 2020 support for gifted students/students with special talents

NEP (2020) stated that after all homes and/or schools have internet-connected smartphones or tablets, online apps that include tests, virtual communities for common interests, enrichment materials, assessments, and competitions will be created. These applications will boost all of the listed programs by giving students access to group activities that are appropriately supervised by instructors and parents. Smart classrooms will be progressively established in schools to employ digital pedagogy.

3.6.2 For Recruitment and deployment NEP 2020 suggest that:

States will use technology to forecast subject-wise teacher shortages over the next 20 years through comprehensive planning. Recruitment and deployment efforts will be enhanced to address these shortages, offering incentives for retention and career growth. Emphasis will be placed on filling vacancies with skilled, including local, teachers. Teacher education programs will align with projected needs, ensuring a steady supply of qualified educators to meet future demands effectively.

3.6.3 For equitable and inclusive education: learning for all NEP 2020 implies that:

To help children with disabilities engage with peers and teachers more easily, linguistically relevant instructional resources (textbooks in accessible formats like Braille and large print) will be available, along with suitable technology-based tools and assistive devices. This category will include all school-related activities, such as sports, the arts, as well as vocational training. NIOS will provide excellent modules to teach Indian sign language and other core disciplines. The safety and protection of children with impairments shall receive sufficient attention.

3.6.4 For higher education- quality universities and colleges: a new and forward-looking vision for India's higher education system in bridging the digital divide, NEP 2020 stated that:

To address these issues and provide high-quality, inclusive, and equitable higher education, this strategy requires a comprehensive reform and revitalization of the system. The ICT-based vision of the policy advocates for increased equity, inclusion, and access using several methods, including expanding access to high-quality public education, providing scholarships to disadvantaged students attending private or philanthropic universities, enabling online learning and Open Distance Learning

(ODL), and ensuring that all educational resources and infrastructure are accessible to students with disabilities.

3.6.5 Online and digital education: ensuring equitable use of technology

India. MHRD (2020) states the following Instruction-

- Initiatives must adapt to new realities and situations. Since pandemics and epidemics have become more common in recent years, we must be prepared in case traditional, Instruction which is face-to-face is not feasible with alternate, high-quality educational options. In this regard, NEP 2020 recognizes the value of harnessing technology's advantages while simultaneously being cognizant of its potential risks and perils. To find out how to maximize the advantages of digital and online learning while addressing or reducing the drawbacks requires properly planned and suitably scaled pilot trials. The continuing ICT-based educational projects and current digital platforms need to be expanded and optimized in the meantime to meet the challenges of giving everyone access to high-quality education, both now and in the future.
- However, unless the digital divide is closed by coordinated initiatives like the Digital India and the availability of reasonably priced technology, the advantages of virtual education cannot be aware. Fairness concerns must be adequately taken into consideration while utilizing technology for digital and online learning.
- To succeed as an online teacher, teachers need the right kind of training and growth. It is not a given that a teacher who does well in a traditional classroom will also excel in an online one. Online tests necessitate a different strategy in addition to pedagogical adjustments. Large-scale online exams provide several challenges, including limiting the types of inquiries that can be asked online, controlling network and power disruptions, and refraining from unethical activities. Innovative approaches can help overcome the restrictions of some course/subject categories, such scientific practical's and performing arts classes, in the online/digital education realm. Furthermore, without experience and activity-based learning, online learning is likely to

transition into a screen-based curriculum with less focus on the social, affective, and psychomotor components of learning.

3.7 NEP 2020 INSTRUCTIONS TO BRIDGE THE DIGITAL DIVIDE

In order to bridge the digital gap in education, NEP 2020 provides a number of crucial guidelines. It strongly emphasizes enhancing digital infrastructure through device provision and dependable internet connectivity, particularly in underprivileged and rural areas. The strategy encourages the production of excellent digital content in a variety of languages to improve learning for students from varied backgrounds. In order to provide teachers and students with the necessary ICT skills, it also promotes digital literacy programs. NEP 2020 also promotes the creation of a national digital education platform that will guarantee inclusivity and fair access to education by providing flexible online learning possibilities for everyone. Prathap (2024) highlights some key provisions of NEP 2020 as follows:

- NEP 2020 promotes the usage of digital platforms like DIKSHA and SWAYAM for online teacher training in order to standardize training programs that may be delivered to several instructors in a short amount of time.
- Advances in technology facilitate professional growth and teacher preparation, increase educational access, and improve administrative procedures, including admissions, attendance, evaluations, and others.
- NEP 2020 states that teachers as well as students across all levels, including Divyang students and those attending distant schools, will have access to educational software. The educational e-content created by NCERT, CIET, CBSE, NIOS, and every state in their own regional languages would be stored on the DIKSHA platform.
- NEP 2020 states that it is necessary for teachers to effectively integrate e-content into their lesson plans, educational institutions must provide them with the appropriate ICT resources.
- NEP 2020 gave special attention to the professional development and training that teachers need to be great virtual teachers. It could be challenging for a teacher who does well in a traditional classroom to adapt to an online

environment. NEP 2020 outlines that the Ministry will focus on growing capability, creating digital material, and establishing digital infrastructure to meet the demands of e-education in both higher and classroom settings. Given the speed at which technology is changing, we require experience to provide high-quality online education.

3.8 CONSTRUCTION OF TOP-NOTCH DIGITAL INFRASTRUCTURE, CAPACITY, AND EDUCATIONAL DIGITAL CONTENT.NEP 2020 STATED THE FOLLOWING:

In order to accomplish policy goals, it will be necessary to coordinate the different ecosystem stakeholders because rather than being a destination, technology in education is a journey. The Ministry will establish a specialized unit to manage the e-education requirements of both higher education and schools by planning the development of capacity building, infrastructure and digital content. A thriving ecosystem must be promoted in order to develop solutions that not only address India's issues of diversity and equity but Also adapt to the rapidly changing technological landscape, whose half-life is getting shorter every year. This is because technology is changing quickly and requires experts to provide the best online education. As a result, the centre will be composed of experts in e-governance, digital pedagogy and assessment, educational technology, administration, and education.

3.9 INFORMATION LITERACY AND DIGITAL DIVIDE RELATION

The digital divide and IL are related because differences in technology and information availability worsen inequalities in digital capability. Unequal access to digital resources, such as the internet and gadgets, typically arises from social, geographic, or educational issues. This phenomenon is known as the "digital divide." People without access to these resources are less likely to acquire information literacy abilities, which makes it more difficult for them to find, assess, and use information efficiently. Conversely, information literacy helps close the digital divide by empowering people to navigate the digital world efficiently. However, learning and using these skills is more challenging when access to technology is limited. Lack of information literacy can make it difficult for even those with access to digital resources to deal with misinformation, privacy concerns, and the ethical use of information. As a result, eliminating digital inequality and guaranteeing that everyone can engage in the information society depend heavily on the promotion of information literacy.

Information literacy is essential in today's digital environment to bridge the digital divide. The ability to find, assess, and use information online successfully is more crucial than ever as technology becomes more and more necessary for daily living, employment, and education. With information literacy, people may confidently use digital platforms while guarding against exploitation, false information, and privacy threats. Fostering these abilities contributes to closing the digital divide by ensuring that everyone can participate effectively in the digital world, regardless of access to technology. This promotes equity in civic engagement, employment opportunities, and educational opportunities.

3.10. INFORMATION LITERACY SKILLS

Information literacy skills are the capacity to locate, assess, and make use of information in a morally and practically sound way. These abilities are necessary for research, academic performance, and making wise decisions in daily life. They make it possible for users to assess the accuracy and applicability of the vast amount of information that is easily accessible in the current digital world. Information literacy skills include the skills to identify, access, and utilize information in a range of forms and to choose the most effective communication channel. It also includes mental states and learning related to ethical, legal, and societal challenges using information and IT. Information literacy is knowing where to look for information, when and why to utilize it, and how to evaluate, use, and convey it ethically (CILIP, 2004). Before fully putting the criteria into practice, an institution should evaluate its mission and educational goals to see how information literacy could enhance learning and boost the organization's efficacy. Professional development is crucial for workers and teachers to embrace the concept (ACRL, 2000).

3.11 FIFTH GENERATION (5G) AND ARTIFICIAL INTELLIGENCE (AI)

3.11.1 INTRODUCTION ON 5G

The world now relies heavily on mobile communication for information exchange. The field of mobile technology is developing rapidly every year. The advancement of mobile devices has significantly enhanced our quality of life. We see these gadgets being used for a variety of purposes everywhere, which makes everyone's life much easier and more engaging. The availability of mobile devices is fast growing worldwide, offering a wide range of features and technology that significantly improve our quality of life. We can only contact individuals we need to reach for either personal or professional reasons through this method of communication. We can quickly and efficiently transmit crucial files to any location in the world, meeting business requirements in the process. Additionally, we can receive immediate permission to make important choices that will improve our lives. It is enabling people who reside in remote areas of the world to communicate. No matter where they live in the world, loved ones who were once quite far away have become closer. It's quite incredible how mobile communication has brought people together throughout the globe. Yadav (2017).

3.11.2 What is 5G in telecommunication all about?

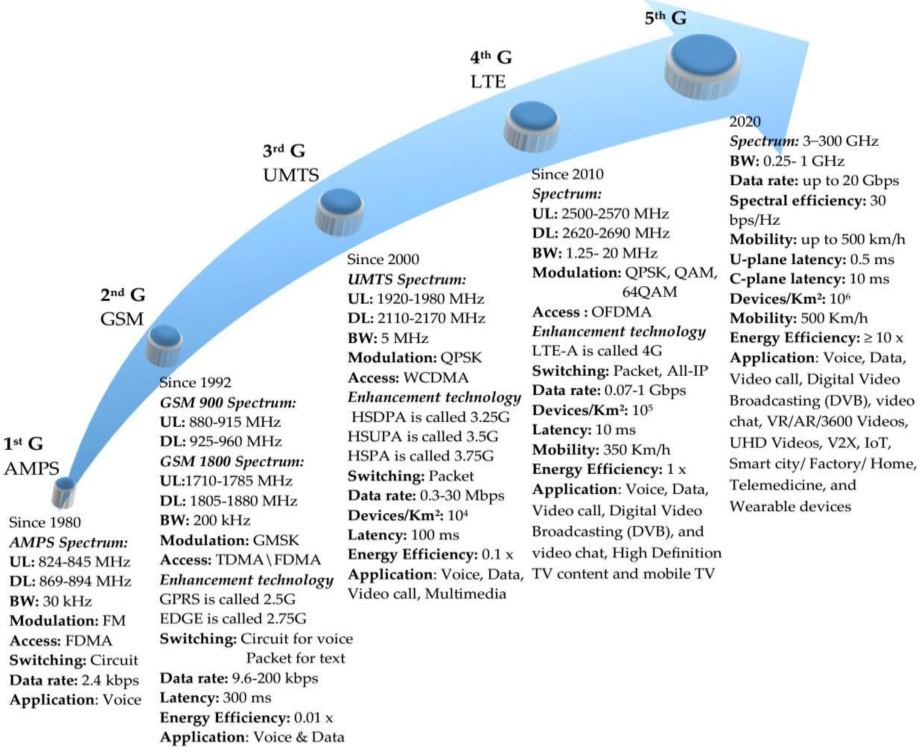
Freeman (2005) said that the electrical transmission of data over long distances is referred to as telecommunication. This covers the transfer of data, voice, and video. Transmitters, receivers, and communication routes like cables, fiber optics, satellites, and radio waves make up a telecommunication system. From straightforward analog voice conversations (1G) to intricate high-speed data transfers (5G), telecommunication technology has advanced throughout time to serve a wide range of services, including broadcasting, mobile phones, internet connectivity, and the Internet of Things (IoT). The sector plays a vital role in facilitating digital services and international communication across several industries.

3.11.3 Evolution of different generation in telecom sector:

The telecom industry has developed across several generations (G), with each generation signifying a breakthrough in terms of user experience and technology. According to Solyman (2022):

- **First-generation 1G:** 1G mobile communications were made public in the 1970s. The main users include the advanced mobile phone system (AMPS) in North America, the Nordic mobile telephone (NMT) in Scandinavia, the total access communications system (TACS) in the United Kingdom, and the total access communications system (JTACS) in Japan. With data rates of up to 2.4 kbps, 1G technology is a simple analog system which is best suited for voice calls. It employs frequency division multiple access (FDMA) and frequency modulation (FM) communication technologies with a bandwidth of 30 kHz (BW).
- **Second-generation (2G):** First adopted in the 1990s, the second-generation technology was called global mobile communications, or GSM. Time division multiple access (TDMA) transmission technology, with a bandwidth of 200 kHz for voice communications, and Gaussian minimum frequency shift keying (GMSK) modulation are the key components of the simple GSM digital cellular system. Developing a single international mobile communication standard and encouraging the growth of worldwide mobile communication technology are the attributes of this generation.
- **Third-generation (3G):** The 3G system uses high-speed packet access (HSPA) and wideband code division multiple access (WCDMA) technologies to provide much better video and audio transmission capabilities along with rapid internet access. In order to boost and improve the performance of 3G mobile telephony networks employing the WCDMA protocol, HSPA combines two mobile phone protocols: high-speed downlink packet access (HSDPA) and high-speed uplink packet access (HSUPA). The enhanced third-generation partnership project (3GPP) standard, developed HSPA (sometimes referred to as HSPA+), was introduced at the end of 2008 and went global in 2010. However, the qualities of 3.9G long-term evolution (LTE) surpass those of standard 3G mobile communications.

- **Fourth generation (4G):** Based on orthogonal frequency division multiplexing (OFDM), LTE is a wireless access technology that offers expandable transmission bandwidths of up to 20 MHz in along with sophisticated multi-antenna transmission. Higher data rates and multi-stream transmission are made possible by MIMO, a crucial system technology that also enhances connection quality, produces more spectrum efficiency, and modifies radiation patterns for signal gain and mitigation. The interference array is generated by the antenna's adaptive beamforming technology. Mobile data speeds can reach 100 megabits per second (Mbps) thanks to LTE technology. With the need for mobile broadband communication increasing dramatically, the wireless technology roadmap has been expanded to include LTE advanced (LTEA), which has the potential to achieve a peak throughput rate of over 1 gigabit per second.
- **Fifth-generation (5G):** After 4G networks, this technology is unquestionably the next critical step in mobile technology. Because it is a completely wireless communication system without limits, it might be referred to as the "real wireless world."5G is anticipated to be a clever innovation technology that will connect everyone on the planet without boundaries. Although 5G isn't a name that is officially used yet, subsequent iterations will improve system speed and offer new capabilities with new application areas **(**Yadav, 2017). The new networks offer faster download speeds, up to 10 gigabits per second (Gbit/s) when a single user is connected. Because 5G can connect more devices and has more bandwidth than 4G, it can offer quicker speeds and better internet services in crowded places. 5G technology supports about 65,000 connections and offers massive gigabit data streaming.



Source: (Solyman-2022)

Figure-3.3: 1st G-5th G components

The transition of the telecom industry from 1G to 5G has drastically changed communication, altering user experiences as well as technological possibilities. From 1G's basic voice services to 5G's high-speed, ultra-reliable networks, which support new technologies like the Internet of Things (IOT), autonomous systems, and smart cities, each generation delivered significant breakthroughs. This invention has accelerated the growth of mobile internet, video streaming, and real-time interactions by improving network efficiency, increasing capacity, and revolutionizing services. The digital economy has advanced as a result of the combined effects of these developments, which have also improved information access, opened up new business opportunities, and speed up social and economic development on a worldwide scale. The telecom infrastructure's improvements continue to transcend digital gaps and pave the way for future developments as the world depends more and more on continuous communication.

3.12 ARTIFICIAL INTELLIGENCE (AI) INTRODUCTION:

Many of our everyday computing activities are already impacted by Artificial Intelligence. The majority of modern computer systems and smartphones have AI capabilities, and undoubtedly, we have utilized them without recognizing that they were highly advanced gadgets. Speech recognition, natural language processing, self-driving or autonomous cars, machine learning, deep learning, and robotics are examples of Artificial Intelligence in computers (Omame, 2020).

One of the newest technological advances in the digital age is Artificial Intelligence (AI), which the library can use to bring patrons more educational possibilities. AI can facilitate intelligent information-sharing and retrieval decisions for use in research and education (Okunlaya, 2022). Digital transformation is a revolution in the widespread use of digital technology to generate value. In order to create a more responsive and sustainable solution, the idea of digital transformation entails putting a variety of cutting-edge information and communication technologies into practice (Agrawal et al., 2019).

Artificial Intelligence (AI) aims to create machines that can think, learn, make decisions, and act in a certain way to achieve goals. By integrating algorithms, mathematical models, and vast amounts of data, Artificial Intelligence (AI) systems imitate human cognitive abilities, such as speech recognition, picture processing, natural language understanding, and problem-solving.

3.12.1 Artificial Intelligence (AI)

Artificial intelligence (AI) refers to the advancement of computer systems that can perform tasks that generally require human intelligence. Over the last two decades, AI has advanced quickly thanks to improvements in processing power, data accessibility, and algorithmic developments. AI is currently changing a wide range of sectors and areas of our lives, from healthcare and banking to transportation and entertainment.

The ability of technology, particularly computer systems, to imitate human intelligence functions is known as Artificial Intelligence. Machine learning, speech recognition, natural language processing, expert systems, and vision are certain specific areas where Artificial Intelligence is being used.

3.12.2 Modern library and Artificial Intelligence (AI)

Libraries are essential for adapting to the technological advances that result from Artificial Intelligence (AI). While AI can enhance many library services, it's critical to strike a balance between adopting new technologies and maintaining the fundamental values of traditional libraries. Traditional libraries can leverage AI to streamline administrative tasks, improve search and retrieval systems, enhance cataloguing and metadata management, and facilitate user interactions. AI methods such as natural language processing and machine learning can be used to analyse a lot of data, automate repetitive processes, and deliver personalized suggestions to library users.

However, the fundamental values of conventional libraries, privacy protection, fair access to knowledge, and community building, must be maintained. Modern libraries should make sure that the application of AI complies with these standards, taking into account user consent, transparency, and ethical considerations. Modern libraries can also play an important role in addressing the challenges and implications of AI. They can serve as spaces for critical discussions, education, and awareness about AI's impact on society, including its ethical, social, and cultural implications. Modern libraries can provide resources and support to help individuals understand and navigate the complexities of AI technology.

3.12.3 Common AI trends

The field of AI was experiencing several notable trends. Notice that things are always changing in the field of AI, and that since then, new paths might have appeared. The following list includes some important AI trends until 2021:

- **Continued growth of deep learning**: Deep learning is a field of Artificial Intelligence that was rapidly expanding because to its success in many applications, such as computer vision, speech recognition, and natural language processing. As neural networks with several layers multiplied, AI systems could perform at the cutting edge in challenging tasks.
- **AI in healthcare**: AI has significantly changed the healthcare sector by helping with patient data management, drug research, adapted therapy, and

medical image analysis. AI-driven diagnostics and decision-support systems were beneficial for healthcare professionals and patients.

- **Ethical AI and responsible AI development**: As AI became more pervasive, concerns about ethical implications, algorithm bias, and data privacy grew. The main emphasis now is on making sure AI systems are created ethically, with accountability, transparency, and accountability as the main objectives.
- **AI in Natural Language Processing (NLP)**: NLP technologies were advancing rapidly, leading to more accurate language understanding, sentiment analysis, language translation, and conversational AI agents. The use of voice assistants, such as Siri, Google Assistant and Alexa is increasing.
- **AI for autonomous vehicles**: The automotive industry was actively exploring AI for self-driving cars and autonomous vehicles. AI technologies, particularly computer vision and reinforcement learning, enabled vehicles to safely perceive and navigate their environments.
- **AI in finance**: By improving fraud detection, credit risk assessment, algorithmic trading, and customer service, Artificial Intelligence (AI) reshaped the financial industry. Robo-advisors were becoming more common, offering personalized investment advice based on AI-driven analysis.
- **AI and Internet of Things (IoT)**: The combination of AI and IoT enabled intelligent and connected devices to gather and process data intelligently. AI algorithms were used to make sense of huge volumes of data produced by Internet of Things devices, leading to improved automation and decision-making.
- **AI for cyber security**: AI bolsters cyber security measures, detecting and preventing cyber threats in real-time. Machine learning-based security solutions were becoming essential in combating increasingly sophisticated cyber-attacks.
- **AI in education**: Through personalized learning platforms, sophisticated tutoring systems, and flexible learning settings, AI revolutionized education.

These AI-driven solutions cater to individual student needs, offering more effective and engaging learning experiences.

- **AI in entertainment and creativity**: AI made its mark in the entertainment industry with applications like AI-generated art, music, and video content. Creative AI tools assisted artists and content creators generate novel and compelling content.

It's essential to remember that the field of AI is quite dynamic, with new developments and developments will likely emerge beyond 2021. AI's influence on a number of sectors and facets of our lives will continue to evolve, and responsible adoption and ethical considerations will remain crucial in shaping AI's future.

3.12.4 AI for modern library

AI technology can revolutionize libraries and significantly enhance how information is managed, accessed, and utilized. Here are several ways AI can be applied in libraries:

- **Automated cataloging**: AI algorithms can assist in automating the process of cataloguing and classifying library materials. AI can make suggestions for relevant metadata, keywords, and categorization codes by analyzing the content of books, papers, and other resources. This helps librarians organize and retrieve material more quickly and effectively.
- **Intelligent search and recommendation systems:** Search results' relevancy and accuracy can be increased by search engines with AI. AI algorithms can understand the context and intent behind the search, leading to more accurate results. Additionally, based on a user's preferences and browsing history, recommendation systems can make relevant recommendations to them, facilitating the discovery of new resources.
- **Chatbots and virtual assistants:** Libraries can employ AI chat to assist patrons instantly stand assistance to patrons. These AI-powered systems can answer common questions, provide information about library services, help with research queries, and guide users in navigating library resources.

Chatbots can operate via library websites, social media platforms, or popular messaging applications.

- **Content curation and personalization:** AI behavior is capable of providing individualized content recommendations by examining user behavior, interests, and previous interactions. Libraries can leverage AI to curate customized reading lists, suggest relevant articles, or create tailored learning paths for individual users. This approach enhances engagement and encourages the exploration of diverse resources.
- **Data analysis and predictive analytics:** Libraries generate vast amounts of data, including borrowing patterns, resource usage, and user feedback AI systems are able to process this data and derive insightful information, such as identifying popular topics or predicting future demands for specific materials. Libraries can use this information to influence decisions about resource allocation, collection development, and service enhancements.
- **Preservation and digitization:** AI can be crucial in preserving and digitizing library collections. Machine learning algorithms can automate the process of digitizing physical materials, such as books or manuscripts, by recognizing and converting text and images into digital formats. It facilitates broader access to rare or fragile materials and enables preservation efforts by reducing physical handling.
- **Language translation and transcription:** AI-powered language translation services can break down language barriers by instant translations of library resources or communications with non-native speakers. Additionally, AI algorithms can assist in transcribing audio or video recordings, making multimedia content more accessible and searchable.

While AI offers significant potential benefits to libraries, addressing concerns such as data privacy and bias and ensuring equitable access to AI-powered services is essential. Libraries should carefully implement and oversee AI technologies, considering ethical guidelines and ensuring transparency and fairness in their operations.

Libraries can use AI to improve user experiences, expedite procedures, and open up fresh possibilities for information sharing. This will promote lifelong learning and help libraries meet the changing requirements of their customers in the digital era.

3.12.5 AI trends for modern library

AI began to make its way into libraries, offering various possibilities for enhancing library services and user experiences. Followings are some of the AI trends for libraries, while more may have emerged since then:

- **AI-powered search and discovery**: AI-driven search engines and recommendation systems were developed to help users discover relevant resources more efficiently. Natural Language Processing (NLP) techniques enabled more sophisticated and accurate search queries, while recommendation algorithms suggested personalized reading lists and materials based on user preferences. NLP allows search engines to understand the meaning behind user queries rather than relying solely on keyword matching. This enables more intuitive interactions, as users can phrase their questions in a natural, conversational language without needing to use exact terms. NLP techniques like semantic search and query expansion help these systems to comprehend complex or ambiguous queries, resulting in more accurate and relevant results. AI-driven search tools can go beyond simple word-based searches to interpret user intent and context. With the rise of voice assistants and visual search technologies, AI-powered systems now offer even more dynamic ways for users to discover information. Voice search, driven by NLP, allows users to speak queries naturally, while visual search lets users find information based on images.
- **Automated cataloguing and metadata management**: AI was explored to automate cataloguing processes and manage metadata. Machine learning algorithms could analyze content and suggest appropriate keywords, classifications, and tags, making information retrieval and organization simpler for librarians. AI-powered automated cataloguing and metadata management have revolutionized the way information systems and libraries

handle massive amounts of data. Historically, managing metadata and cataloguing have been labour-intensive processes requiring close attention to detail. This is simplified by AI, especially machine learning (ML), which reduces human error, saves time, and automates the process. AI can also handle large datasets more efficiently, processing vast amounts of information at speeds unattainable by manual efforts. For instance, natural language processing (NLP) models can understand and categorize complex documents, assign appropriate descriptors, and enable precise information retrieval. This automation helps ensure consistency in cataloguing, which is crucial for large digital collections or institutional repositories.

- **AI-powered virtual assistants**: Libraries were considering the implementation of AI chatbots or virtual assistants to provide instant support to users. These virtual assistants could assist with general inquiries, guide users in navigating library resources, and offer real-time assistance, enhancing the overall user experience. From assisting customers with complicated library systems to providing general inquiries, these AI-powered chatbots and virtual assistants are capable of performing a wide variety of jobs. Virtual assistants have the potential to significantly enhance user experience by responding instantly to frequently asked questions about things like library hours, book availability, and digital resource access, round the clock.
- **Content curation and personalization**: AI-curated personalized content recommendations for library patrons. By analyzing user behavior and preferences, AI algorithms could offer tailored reading lists, relevant articles, and other materials that matched individual interests. Libraries may improve the user experience by providing patrons with highly customized recommendations through AI-powered content curation and personalization. Artificial intelligence (AI) algorithms are able to create customized reading lists and suggest books, articles, and multimedia materials that correspond with individual interests by examining user behaviour, preferences, and previous interactions. Customers find new material that they might not have otherwise found thanks to this customized approach, making their experience

more effective and interesting. By improving the relevance and timeliness of information retrieval and encouraging a more in-depth interaction with the Library's vast array of resources, AI-driven content curation also increases user happiness.

- **AI for library analytics**: Tools for AI-driven data analysis were used to uncover patterns in resource utilization, user behavior, and collection trends. With this data, libraries could make informed choices about the expansion of their collections, the distribution of their resources, and the enhancement of their services. AI for Library Analytics uses data analysis to find patterns in user behavior, resource usage, and trends in collection growth. Libraries can improve services, allocate resources more efficiently, and grow collections by using this data to inform their decisions. AI technologies give libraries useful information that they may utilize to predict demand, find popular materials, and better understand the requirements of their patrons. This makes it possible for libraries to organize their offers strategically, which guarantees more effective, data-driven management and higher levels of customer satisfaction.
- **Digitization and preservation**: AI technologies were leveraged to automate library digitization and preservation of physical materials. Image recognition and text extraction algorithms helped convert rare and fragile materials into digital formats, making them more accessible to a broader audience.
- **Language translation and multilingual services**: AI-powered language translation services were explored to overcome language barriers in libraries. By providing instant translations of library materials and communications, libraries could cater to diverse user populations.
- **AI for library security**: AI-enhanced library security and prevent theft and vandalism. In order to provide a safer environment for users and resources, AI-powered surveillance systems could identify suspicious activity and notify personnel in real-time.

- **AI-enhanced user support**: AI chatbots and virtual assistants could offer 24/7 support to library users, providing quick responses to frequently asked questions and common inquiries, even outside of regular library hours.
- **AI and user behavior analysis**: AI systems could examine user interactions with library resources, preferences, and behavior to learn more about what the users want and need. Services and resources could be better tailored using this information to better match user needs.

These AI trends for libraries aim to enhance user experiences, improve resource management, and optimize library operations. To guarantee responsible and equitable implementation, libraries must take into account the ethical implications of adopting AI, including concerns about privacy and data security. As AI technology advances, libraries can leverage these innovations to serve their communities better and remain relevant in the digital age.

3.12.6 Chat GPT: trending AI features for modern library

GPT-3.5 is the foundation for ChatGPT, an AI language model created by OpenAI. It can produce human-like responses and carry on discussions with people because it has been educated on a variety of online content. It is designed to understand and develop text in a conversational context, making it ideal for interactive and dynamic interactions. The model can understand natural language prompts, inquiries, and requests and can respond to them. It can provide information, offer suggestions, assist with problem-solving, engage in creative writing, and much more. With the help of ChatGPT, users may create responses that are both understandable and suitable for the context of the conversation. It is significant to note that ChatGPT uses patterns and data from its training set to generate responses. Though it makes an effort to deliver accurate and helpful responses, it occasionally generates inaccurate or nonsensical results. Therefore, using critical thinking and verifying information from any AI model is always a good idea.

OpenAI continually works to improve ChatGPT's capabilities, but it's important to remember that it has limitations. It may need help with ambiguous queries, complex reasoning, or providing real-time information beyond its knowledge cutoff (September 2021 for this particular model). ChatGPT aims to provide an interactive and informative conversational experience, assisting users with questions and engaging in discussions on various topics. In recent years, AI-based chatbots have become increasingly widespread, with chatbots used in various applications, including customer service, virtual assistants, and digital libraries (Verma, 2023).

3.12.7 Chat GPT usage and its advantage for modern Library

Verma (2023) give some potential impacts for traditional Library, which are as follows:

- **Improved user experience**: ChatGPT can read and respond to queries and requests in natural language, which can significantly enhance the user experience in a traditional library. By getting timely answers to basic inquiries and being directed to resources with more comprehensive information when needed, users can save time and increase their productivity.
- **Enhanced reference assistance:** In addition to offering information on general library policies, services, and resources, ChatGPT can help library users with reference inquiries. As a result, library workers may be able to assist customers more quickly and effectively while concentrating on work that is more sophisticated.
- **Personalized recommendations:** ChatGPT can analyze a user's reading interests and search history to provide specific suggestions for books, articles, and other materials. As a result, users could discover fresh and relevant content that inspires further exploration of the Library's collection.
- **Navigation assistance:** ChatGPT helps users navigate the Library's website and locate the information they need. This makes the Library's information retrieval systems more effective and less frustrating.
- **User engagement:** ChatGPT has the power to draw people in and encourage them to take part in library activities. In addition to enrolling in classes and scheduling conference rooms, users can also obtain information about forthcoming events and activities.

3.13 CONCLUSION

AI seeks to imitate human intelligence in machines. AI is reshaping industries and impacting our daily lives with its broad range of applications and transformative potential. As advancements continue, understanding AI and its implications will be crucial for individuals and societies to navigate the future effectively. The way information is maintained, accessed, and used can completely change with the introduction of AI technologies into modern libraries. These developments enhance user experiences while also streamlining operations in libraries, allocating resources optimally, and guaranteeing the preservation and accessibility of valuable library materials for future generations. By enabling an effective and automated method to respond to user inquiries and expedite repetitive processes, ChatGPT integration in libraries is a strong option to mitigate workforce shortages. Future libraries can significantly improve user experiences by implementing ChatGPT, which offers quick and individualized information retrieval.

Traditional libraries have the opportunity to harness the potential of AI while maintaining their fundamental values. By embracing AI thoughtfully and ethically, libraries can enhance their services, empower users, and contribute to AI's responsible and inclusive adoption in society.

References:

Abrol, A., & Jha, R.K. (2016). Power Optimization in 5G Networks: A Step Towards GrEEn Communication. *IEEE Access, 4,* 1355-1374.

Association of College and Research Libraries (ACRL). (2000). Information Literacy Competency Standards for Higher Education. https://alair.ala.org/server/api/core/bitstreams/ce62c38e-971a-4a98-a424-7c0d1fe94d34/content. Accessed on 20th November 2023.

Association of College and Research Libraries (ACRL). (2000). Information Literacy Competency Standards for Higher Education. https://alair.ala.org/server/api/core/bitstreams/ce62c38e-971a-4a98-a424-7c0d1fe94d34/content. Accessed on 20th November 2023.

Baturay, M. H., & Demiray, U. (2018). The Digital Divide and Its Effects on Education. *Journal of Education and Practice*. 9(7), 1-8.

Bengaluru Urban District. Government of Karnataka (2024). Bhoomi Project. https://bengaluruurban.nic.in/en/bhoomi/. Accessed on 08th November 2024.

Bhashini (2024). National Language Translation Mission (NLTM). https://bhashini.gov.in/. Accessed on 08th November 2024.

Bhatnagar, Subhash., Dewan, Ankita., Moreno Torres, Magui., & Kanungo, Parameeta. (2003). Gyandoot Project : ICT initiative in the district of Dhar, Madhya Pradesh (English). Empowerment Case Studies Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/621851468267614396/Gyandoot-Project-ICT-initiative-in-the-district-of-Dhar-Madhya-Pradesh. Accessed on 18th November 2023.

Brindha, T. (2016). Information Literacy and Librarians. *Shanlax International Journal of Arts, Science & Humanities*, 85-87. https://www.shanlaxjournals.in/pdf/ASH/V3N4/Ash_V3_N4_013.pdf. Accessed on 18th April 2024.

Chanchinmawia, F., & Verma, M. K. (2017). Assessment of Information Literacy Skills Among Students of Academy of Integrated Christian Studies, Aizawl: A

Survey. International Research: *Journal of Library & Information Science,* 7(3), 449- 465.

Chanchinmawia, F., & Verma. M. K. (2018). Assessment of Information Literacy Skills Among Research Scholars of Mizoram University : A study. International Research: Journal of Library and Information Science, 8(1), 387–399

Charted Institute of Library and Information Professionals. (2004). Information literacy: Definition. London: CILIP.http://www.cilip.org.uk/professional guidance/ informationliteracy/definition/. Accessed on 18th April 2024.

Chaudhuri, S., & Roy, S. (2021). Digital Divide and Education During COVID-19 Pandemic: A Global Perspective. Interactive Learning Environments, 1-14. doi: 10.1080/10494820.2021.1915387

Chinn, M. D., & Fairlie, R. W. (2010). The Determinants of The Global Digital Divide: A Cross-Country Analysis of Computer and Internet Penetration. *Oxford Economic Papers*. 62(3), 561-582.

Dhiman, A. K. (2006). Information Literacy and The Role of Librarian. *4th International Convention CALIBER-2006, Gulbarga*. 390-398. https://ir.inflibnet.ac.in:8443/ir/bitstream/1944/1207/1/42.pdf. Accessed on 21st September 2022.

DiMaggio, P., &Hargittai, E. (2023). From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases. https://doi.org/10.31235/osf.io/rhqmum.Accessed on 18th April 2024.

Doyle, C.S. (1992). Outcome Measures for Information Literacy within the Nation Education Goals of 1990. Final Report to National Forum on Information Literacy Summary of Findings. ERIC Digest No. 351033. https://eric.ed.gov/?id=ED351033. Accessed on 21st September 2022.

Freeman, R. L. (2005). *Telecommunication System Engineering*. John Wiley & Sons. https://www.academia.edu/28190761/Telecommunication_System_Engineering. Accessed on 08th October 2022.

Fuchs, C., & Seo, J. (2021). The COVID-19 Pandemic and the Digital Divide: Exploring the Relationship between COVID-19 and Internet Access. *Journal of Information, Communication and Ethics in Society*. doi: 10.1108/JICES-05-2020-0099

Giuliano, R. (2024). From 5G-Advanced to 6G in 2030: New Services, 3GPP Advances, and Enabling Technologies, *IEEE Access*. 12, 63238-63270. doi: 10.1109/ACCESS.2024.3396361.

Greenberg, R., & Zhu, E. (2021). Digital Divide in Education in the Time of COVID-19. *Handbook of Research on Online Discussion-Based Teaching Methods*, 222-237. doi: 10.4018/978-1-7998-8620-9.ch013

Hrastinski, S. (2020). Digitalisation of Higher Education in the COVID-19 Pandemic. *Nordic Journal of Digital Literacy*, 15(4), 193-198. doi: 10.18261/issn.1891-943x-2020-04-03

India. MHRD (2020), National Education Policy-2020, Ministry of Human Resource Development, New Delhi.

Jayaprakash, A. and Gupta, V.U. 2005. Information Literacy: Need to Promote the Use of Digital Information Services in Digital Era. In R. Chandra edited ‘Libraries, Information Literacy and Lifelong Learning. Indian Library Association, Delhi. 292-301.

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook and Academic Performance. Computers in Human Behavior, 26(6), 1237-1245.

Mahmoud, H. H. H., & Ismail, T. (2020). A Review of Machine learning Use-Cases in Telecommunication Industry in the 5G Era. *2020 16th International Computer Engineering Conference (ICENCO)*, Cairo, Egypt, 159-163. doi: 10.1109/ICENCO49778.2020.9357376.

Miah, Muhammed. (March, 2024). Digital Inequality: The Digital Divide and Educational Outcomes. https://www.researchgate.net/publication/379258768_Digital_Inequality_The_Digital_Divide_and_Educational_Outcomes. Accessed on 21st November 2024.

Ministry of Agriculture. Government of India (2024). Kisan Call Center. https://dackkms.gov.in/account/login.aspx. Accessed on 21st November 2024.

Ministry of Education (2024). DIKSHA (Digital Infrastructure for Knowledge Sharing).https://pmevidya.education.gov.in/diksha.html. Accessed on 22nd November 2024.

Ministry of Education (2024). SWAYAM. https://swayam.gov.in/. Accessed on 21st November 2024.

Ministry of Electronic and Information Technology (2024). Digital India. https://www.digitalindia.gov.in/. Accessed on 22nd November 2024.

Ministry of Electronic and Information Technology (2024). National Language Translation Mission (NLTM). https://www.meity.gov.in/archive-nltm. Accessed on 19th August 2024.

Ministry of Electronic and Information Technology (2024). National e-Governance Plan (NeGP). https://www.meity.gov.in/divisions/national-e-governance-plan. Accessed on 22nd November 2024.

Ministry of Electronic and Information Technology (2024). Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA).https://www.pmgdisha.in/about-pmgdisha/. Accessed on 12th November 2024.

Ministry of Electronic and Information Technology (2024). Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA).https://www.pmgdisha.in/about-pmgdisha/. Accessed on 18th November 2024.

Morgan, H. (2017). The effect of the digital divide on student achievement. The Elon Journal of Undergraduate Research in Communications, 8(1), 46-55.

Okunlaya, R.O., Syed Abdullah, N. & Alias, R.A. (2022). Artificial intelligence (AI) Library Services Innovative Conceptual Framework for The Digital Transformation of University Education. *Library Hi Tech*. 40(6). 1869-1892. https://doi.org/10.1108/LHT-07-2021-0242. Accessed on 13th November 2024.

Omame, Isaiah Michael., Alex-Nmecha, Juliet C. (2020). Artificial Intelligence in Libraries. *Managing And Adapting Library Information Services For Future Users: IGI Global*. 120 – 144.

https://www.researchgate.net/publication/338337072_Artificial_Intelligence_in_Libraries. Accessed on 17th November 2023.

OneWorld Foundation India (2024). Life Line. https://oneworld.net.in/Accessed on 12th November 2024.

Prathap, S. (2024). NEP 2020 and the Infrastructure for ICT-based Teaching Learning. *International Journal for Multidisciplinary Research (IJFMR).* 6 (1). https://www.ijfmr.com/papers/2024/1/11597.pdf. Accessed on 06th December 2024

SCONUL. (2011). The SCONUL Seven Pillars of Information Literacy: Core Model for Higher Education. https://www.researchgate.net/publication/259341007_The_SCONUL_Seven_Pillars_of_Information_Literacy_Core_model#:~:text=3-,The%20SCONUL%20Seven%20Pillars%20of%20Information%20Literacy%3A%20Core%20Model,data%20curation%20and%20data. Accessed on 25th November 2024.

Shukla, Ravi. (2020). Information Literacy Skills Among PG Students of Social Sciences of Mizoram University and Tezpur University: A Comparative Study. [Doctoral Theses, Mizoram University]. INFLIBNET. https://mzuir.inflibnet.ac.in/bitstream/123456789/1057/1/RAVI%20SHUKLA%20PhD%20Thesis%202020.pdf. Accessed on 25th June 2024.

Solyman, Ahmed Amin Ahmed., & Yahya, Khalid. (August 2022). Evolution of Wireless Communication Networks: From 1G to 6G and Future Perspective. *International Journal of Electrical and Computer Engineering (IJECE*). 12 (4). DOI: 10.11591/ijece.v12i4.pp3943-3950

Statista (2024). Worldwide Digital Population 2024**.** https://www.statista.com/statistics/617136/digital-population-worldwide/. Accessed on 28th August 2024.

Sufyan, A., Khan, K.B., Khashan, O.A., Mir, T., & Mir, U. (2023) From 5G to beyond 5G: A Comprehensive Survey of Wireless Network Evolution, Challenges, and Promising Technologies. *Electronics*. 12, 2200. https://doi.org/10.3390/electronics12102200. Accessed on 28th November 2024.

Taba, P. (2023). Challenges and Prospects of Higher Education in Northeast India: A Comprehensive Analysis. In *International Journal of Novel Research and Development*.8 (9). https://www.ijnrd.org/papers/IJNRD2309340.pdf. Accessed on 08th August 2024.

Tata Trusts (2024). Internet Saathi. https://www.tatatrusts.org/our-work/digital-transformation/digital-literacy/internet-saathi. Accessed on 02nd November 2024.

UNESCO. (2005). Towards Information Literacy Indicators. https://unesdoc.unesco.org/ark:/48223/pf0000158723. Accessed on 24th August 2024.

Verma, Manish. (2023), "Novel Study on AI-Based Chatbot (ChatGPT) Impacts on the Traditional Library Management", *International Journal of Trend in Scientific Research and Development*. 7(1). 961-964. https://www.ijtsrd.com/papers/ijtsrd52767.pdf. Accessed on 24th August 2024.

Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital Divide*. Cambridge, MA: MIT Press. https://direct.mit.edu/books/oa-monograph/1817/Technology-and-Social-InclusionRethinking-the. Accessed on 24th August 2024.

Warschauer, M., &Matuchniak, T. (2010). New Technology and Digital Worlds: Analyzing Evidence of Equity in Access, Use, And Outcomes. *Review of Research in Education*, 34(1), 179-225.

Warschauer, M., Knobel, M., & Stone, L. (2004). Technology and Equity in Schooling: Deconstructing the Digital Divide. *Educational Policy*, 18(4), 562-588.

Wikipedia (2024). Global Digital Divide. https://en.wikipedia.org/wiki/Global_digital_divide. Accessed on 16th November 2024.

Wikipedia (2024). Telecommunication. https://en.wikipedia.org/wiki/Telecommunications. Accessed on 16th November 2024.

Yadav, Anubhuti. (2018). Media and Information Literacy. *INFLIBNET Center*. https://ebooks.inflibnet.ac.in/lisp20/. Accessed on 18th November 2023.

Yadav, Rajesh. (2017). Challenges and Evolution of Next generation Wireless Communication. *Proceedings of the International Multi Conference of Engineers and Computer Scientists*. https://www.iaeng.org/publication/IMECS2017/IMECS2017_pp619-623.pdf. Accessed on 16th November 2024.

Zurkowski, P.G. (1974). The Information Service Environment Relationships and Priorities. Washington DC: National Commission on Libraries and Information Sciences. https://eric.ed.gov/?id=ED100391. Accessed on 20th November 2022.

CHAPTER-4

OVERVIEW OF CENTRAL UNIVERSITY IN NE INDIA

4.1 INTRODUCTION

India has one of the world's largest and most diverse higher education systems, with institutions ranging from deemed, private, state, and central universities to institutions of national importance like IITs, IIMs, and NITs. In response to the growing need for professional skills and advanced education, this sector has grown quickly during the last few decades. Despite this expansion, there are still many problems with India's higher education system, such as those related to equity, access ibility, and quality.

Institutions of higher learning serve three essential roles: disseminating information, conducting thorough research and analysis, and supporting outreach initiatives. With its many facets, these goals highlight how important higher education is to solving complicated social, economic, cultural, moral, and spiritual issues. It is impossible to overestimate the importance of higher education in the national context because it transfers specialized knowledge and skills to its citizens, thereby significantly contributing to the country's progress and development. (India. MHRD, 2020). Additionally, policies and programs that increase access to high-quality education, encourage research and innovation, and build international collaborations all highlight the nation's commitment to higher education (Ahuja & Yadav, 2020; India. MHRD, 2020).

In India, central universities are public institutions created by an Act of Parliament and fall under the jurisdiction of the Ministry of Education's Department of Higher Education, with the exception of nine universities that fall under the jurisdiction of other ministries. The University Grants Commission (UGC) generally recognizes Indian universities and derives its authority from the University Grants Commission Act, 1956. Furthermore, there are 15 Professional Councils that oversee different aspects of coordination and accreditation. The Central Universities Act of 2009 also governs central universities, establishing 12 new institutions and regulating their governance, powers, and other aspects. As of June 2023, the list of central universities published by the UGC includes 56 central universities. (Wikipedia, 2024).

Table No.4.1: List of Central Universities of North East India

University	State	Location	Established
Rajiv Gandhi University	Arunachal Pradesh	Rono Hills, P.O. Doimukh, Itanagar, Arunachal Pradesh - 791 112	1985, Central w.e.f. 2007
Assam University	Assam	PO: Assam University, Silchar	1994
Tezpur University	Assam	Distt. Sonitpur, P.B. No. 72, Napaam, Tezpur	1994
Central Agricultural University	Manipur	Imphal	1993
Manipur University	Manipur	Canchipur, Imphal	1980, Central w.e.f. 2005
North Eastern Hill University (NEHU)	Meghalaya	NEHU Campus, Shillong	1973
Mizoram University	Mizoram	Post Box No. 910, Aizawl	2000
Nagaland University	Nagaland	Campus Kohima, Headquarter Lumami	1994
Tripura University	Tripura	Suryamaninagar, Agartala	1987
Sikkim University	Sikkim	6th Mile, Samdur, P.O. Tadong, Gangtok	2007

(Source: Taba, 2023)

India, a country known for its "unity in diversity," has an impressive array of languages, customs, and civilizations. The northeastern part of this enormous subcontinent is a significant physical and cultural region. The northeastern area, which is made up of eight different states (Assam, Arunachal Pradesh, Nagaland, Mizoram, Manipur, Meghalaya, Tripura, and Sikkim), represents a unique combination of languages, ethnic groups, and landscapes that add to its complex identity. (Taba, 2023).

Since the scope of the study is to analyse the digital divide among the PG students of top five Central University by NIRF Ranking 2021 within North East Region. The Researcher will highlight only some of the details of Tezpur University, North Eastern Hill University, Assam University, Manipur University and Mizoram University.

4.2. TEZPUR UNIVERSITY: OVERVIEW

Tezpur University is a Central University situated in Tezpur, Assam, that was founded in 1994. It was established by an Act of Parliament with the intention of advancing research and higher education in northeastern India. With a wide range of academic programs and a thriving research environment, Tezpur University has become a well-known hub for academic quality, innovation, and cultural integration over time. As stated in the statutes, the Central University's goals are to provide interdisciplinary and employment-oriented courses to satisfy the state of Assam's development needs as well as local and regional aspirations. It also aims to provide courses and encourage research in fields that are particularly and directly relevant to the region, as well as in cutting-edge fields of science and technology.

Tezpur University is located at Napaam, a couple 15 kilometres from the town of Tezpur, on a vast campus spanning over 262 acres. The school is renowned for its gorgeous surrounds, which include tranquil lakes, an abundance of vegetation, and a calm atmosphere that is ideal for academic endeavours. (Source: https://www.tezu.ernet.in/)

4.2.1. Academic programs and schools

Tezpur University offers a wide array of undergraduate, postgraduate, and doctoral programs across various disciplines. The academic structure is organized into several schools, each focusing on specific areas of study:

- **School of Humanities and Social Sciences**: This school includes departments such as Assamese, English, Foreign Languages, Linguistics and Language Technology, Mass Communication and Journalism, Sociology, Hindi, Social Work, Education and Law.
- **School of Science**: Comprising departments like Chemical Science, Environmental Science, Mathematical Sciences, Physics, Molecular Biology and Biotechnology, this school emphasizes scientific research and innovation.
- **School of Engineering**: This school offers programs in Computer Science and Engineering, Applied Sciences, Design, Electronics and Communication Engineering, Civil Engineering, Food Engineering and Technology, Electrical Engineering, Mechanical Engineering, and Energy.
- **School of Management Sciences**: Focused on business education and research, this school provides programs in Business Administration, Commerce, and Centre for Disaster Management.(Source: https://www.tezu.ernet.in/)

(Source: https://www.eastmojo.com/news/2024/03/18/tezpur-university-to-launch-seven-new-courses-see-details-here/)

Figure- 4.1: Tezpur University

4.2.2. Central Library of Tezpur University

Tezpur University's Central Library is an essential resource centre for academics, staff, and researchers. A wide range of academic subjects are served by the library's vast collection of books, periodicals, theses, and digital resources. It supports the academic and research endeavours of the university community by providing access to a number of electronic databases, e-journals, and e-books. Reading rooms, computer laboratories, and digital access points are just a few of the contemporary amenities the library offers. It offers a variety of services, including digital archiving, interlibrary lending, and reference aid. In order to facilitate users' efficient use of the resources at their disposal, the library also hosts user education classes and orientation programs.

Since 1994, the Central Library has been operational. Since then, it has served as the hub for the whole Tezpur University user community. Over 1,19,121 print books, 8,000+ e-journals, 1,255 e-books (subscribed + open-access), 48 print journals (2023), 5 databases, and 10,845 back volumes of journals are now held by the library. The Central Library is an automated, RFID-enabled library that is connected to the open-source Koha ILMS to offer computerized services to the entire academic community of Tezpur University. Features like the Self-Service KIOSK, Self-Book Drop Unit, Anti-Theft Detection System, and Flap Barrier are made possible by the RFID-based automation system.

In addition, the library has 1,455 government publications, 3,040 CDs and DVDs, 241 Braille volumes, and more than 3,120 theses and dissertations. From any terminal on the university campus, library patrons can access all online resources, including WEB-OPAC, e-journals, e-books, Knowledge Repository, ETDs Repository, etc. (Source: https://www.tezu.ernet.in/Library/)

(Source: https://www.tezu.ernet.in/Library/index.php/about-us/about-library)

Figure-4.2: Tezpur University Central Library

4.3 NORTHEASTERN HILL UNIVERSITY (NEHU): OVERVIEW

One of the top universities in India, Northeastern Hill University (NEHU) is renowned for its dedication to research, academic quality, and regional development. NEHU, which was founded in 1973 by an Act of Parliament, is a significant centre for education and culture in Northeastern India. The institution, which is located in the charming city of Shillong, Meghalaya, has been instrumental in the academic, social, and cultural development of the area. The University's objectives are to spread knowledge and improve the welfare of people living in the hill areas of the northeastern part of the country by offering facilities for instruction and research in any field of study it deems appropriate. It also places a high priority on the cultural, intellectual, and academic development of the local population.

The states of Meghalaya and Nagaland, together with the former Union Territories of Arunachal Pradesh and Mizoram, were initially included under the University's jurisdiction. NEHU's authority in Nagaland ended on September 6, 1994, with the establishment of Nagaland University. Similarly, with the establishment of Mizoram University in June 2001, NEHU's authority over Mizoram came to an end. Additionally, Arunachal Pradesh has a university of its own. NEHU is associated with the Northeastern Regional Institute of Science and Technology, which is situated in Arunachal Pradesh.

The city of Meghalaya, Shillong, is home to NEHU's main campus. Because of its picturesque surroundings and pleasant weather, Shillong is frequently referred to as the "Scotland of the East". The campus, which occupies 1225 acres and is surrounded by lush hills, offers a stimulating setting for study and research. To serve the academic needs of the Garo Hills region, the University also maintains a minor campus in Tura, another town in Meghalaya. NEHU has a well-developed infrastructure with cutting-edge facilities for both instructors and students. Both students and research scholars can benefit greatly from the University's central library's extensive collection of books, periodicals, and digital materials. The site has auditoriums, health clinics, sports facilities, hostels, and faculty housing in addition to academic buildings. Additionally, the University emphasizes technology heavily, providing internet access and well-equipped computer labs around the campus. (Source: https://nehu.ac.in/About-NEHU)

4.3.1 Academic programs and research

NEHU provides a broad range of graduate, undergraduate, and doctorate degrees in a number of fields, including engineering, law, science, business, and the arts. From traditional disciplines like political science, history, and literature to more contemporary fields like biotechnology, environmental science, and information technology, the University offers a wide range of schools and departments to meet the interests of students with a variety of academic backgrounds. NEHU's emphasis on research is one of its main advantages. With a number of programs supported by both domestic and foreign organizations, the University has made a name for itself as one of the top research institutions in the Northeast. At NEHU, research scholars and faculty members are actively involved in cutting-edge studies that expand our understanding of a variety of subjects. (Source: https://nehu.ac.in)

4.3.2 Regional development and community engagement

NEHU is more than just a university; it has a strong commitment to the advancement of Northeastern India. The institution has a long history of engaging the community, collaborating closely with neighbourhood groups to solve issues related to sustainability of the environment, health, and education. The local community, especially those living in rural and undeveloped areas, is the target audience for NEHU's outreach and extension programs. (Source: https://nehu.ac.in/About-NEHU)

(Source: https://www.flickr.com/photos/chinavine/215720587)

Figure-4.3: NEHU

4.3.3 Central Library of NEHU

North-Eastern Hill University's (NEHU) Central Library is an essential part of the university, acting as a major resource for researchers, professors, and students. The Central Library was founded in 1973 in association with the university and, since then, has become among the most important academic libraries in North-Eastern India. It provides a broad array of resources and services to meet the demands of the university community in terms of research and academics.

There are currently 53 undergraduate colleges associated with the university, eight of which are professional colleges. Nearly 200,000 books, 38,000 bound periodicals, and subscriptions to 316 international and 366 Indian current journals are all held by the University Central Library, which has access by university and college instructors, honours students pursuing postgraduate and undergraduate degrees, and non-teaching staff members.

The digital materials available at the library are quite impressive. It offers access to an extensive database of electronic books, journals, and databases covering topics in the social sciences, humanities, sciences, and more. The Central Library provides access to a multitude of academic resources that are critical for advanced research through consortia, such as INFLIBNET and DELNET. (Source: https://www.nehu.ac.in/library/index.html)

(Source: https://themeghalayanexpress.com/education-ministry-sends-team-to-resolve-crisis-at-north-eastern-hill-university-in-meghalaya/)

Figure-4.4: NEHU Central Library

4.4 ASSAM UNIVERSITY: OVERVIEW

The Assam (Central) University Act of 1989 gave rise to the establishment of Assam University in 1994. The university is currently working towards becoming an academic institution of difference. Its main campus is located in Dargakona, approximately 20 km from Silchar. Surrounded by gently rolling mountains and a typical northeastern landscape, the 600 acres of the campus offer an ideal setting for scholars, students, and anyone interested in academic excellence. Its second, which is the other campus is situated in Diphu, Assam's Karbi Anglong district. The following five Assamese districts are under the university's territorial jurisdiction: Cachar, Karimganj, Hailakandi, Dima Hasao (previously North Cachar Hills), and Karbi Anglong. (Source: http://www.aus.ac.in/)

4.4.1 Academic programs and departments

In many different fields, Assam University provides a large selection of undergraduate, postgraduate, and doctoral degrees. The academic structure is organized into 16 schools, each comprising several departments that cover subjects in humanities, science, social sciences, law, technology, management, and more. Some of the key schools include:

- **School of Social Sciences:** Includes departments like Sociology, Political Science, History, and Social Work.
- **School of Humanities:** Comprises departments such as English, Bengali, Hindi, and Philosophy.
- **School of Environmental Sciences:** Focuses on environmental studies, earth sciences, and related fields.
- **School of Life Sciences:** Includes Biotechnology, Microbiology, and Botany departments.
- **School of Physical Sciences:** Includes Physics, Chemistry, and Mathematics.
- **School of Technology:** Provides engineering and technology-related courses.

The university is known for its strong emphasis on interdisciplinary studies, allowing students to engage in comprehensive academic experiences that cut across traditional disciplinary boundaries. (Source: http://www.aus.ac.in/)

(Source:
https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DhQvNnzL_pEk&psig=AOvVaw0dlIjERQU5NR8AqW8omBKH&ust=1736329114896000&source=images&cd=vfe&opi=89978449&ved=0CBgQ3YkBahcKEwiY3JyZqOOKAxUAAAAAHQAAAAAQBA)

Figure-4.5: Assam University

4.4.2 Central Library (RABINDRA LIBRARY) of Assam University

When the University was founded in 1994, the library was established as a focal resource to serve the academic community's information needs. In January 2006, Assam University's Central Library moved to a new, permanent location in the Central Library-cum-Computer Centre building, where it was renamed as RABINDRA LIBRARY. The Rabindra Library, the central library of Assam University, is a crucial resource for students, faculty, and researchers. There is a vast collection of books, journals, theses, and digital resources at the library. It provides access to various electronic databases, e-journals, and e-books, supporting the academic and research activities of the university community. The library also offers services like interlibrary loan, reference assistance, and digital archiving, ensuring that users have comprehensive access to both current and archival information.In 2021, Rabindra Library, one of Northeast India's first university libraries, received an ISO-9001:2015 accreditation of excellence for its excellent infrastructure and services, including an RFID and Wi-Fi enabled integrated library management system based on KOHA. (Source: http://www.aus.ac.in/library/about-the-library/)

(Source: http://www.aus.ac.in/library_old/)

Figure-4.6: Assam University Rabindra Library

4.5 MANIPUR UNIVERSITY: OVERVIEW

Under the Manipur University Act. 1980 (Manipur Act 8 of 1980), Manipur University was founded on June 5, 1980, as a teaching-cum-affiliated university in Imphal with territorial jurisdiction over the entire state of Manipur. On October 13, 2005, it was changed into a Central University. The Manipur University Act No. 54 of 2005 received the President's assent on December 28, 2005. One of the university's constituent colleges is the Manipur Institute of Technology (MIT). The university currently has 116 affiliated colleges, including two medical colleges. Situated on a vast 287-acre campus, Manipur University is located in Canchipur, approximately 7 kilometres away from Imphal. The campus is surrounded by breathtaking hills and an abundance of vegetation, which creates a calm and supportive atmosphere for study and research. The academic buildings, labs, libraries, residence halls, and recreational spaces of the institution are all state-of-the-art. (Source: https://www.manipuruniv.ac.in/)

4.5.1 Academic programs and departments

Numerous undergraduate, graduate, and doctorate programs in a range of subjects are available at Manipur University. The various schools and departments that make up the academic framework encompass a variety of subjects, including education, engineering, social sciences, science, and the humanities. Different departments of Manipur Universities are:

- **Arts:** Includes departments such as English, History, Political Science, Philosophy, and Manipuri.
- **Science:** Comprises departments like Physics, Chemistry, Mathematics, Life Sciences, and Earth Sciences.
- **Social Sciences:** Offers programs in Sociology, Economics, Anthropology, and Social Work.
- **Engineering:** Manipur Institute of Technology (MIT) operates under this faculty, offering courses in engineering and technology.
- **Management Studies:** Provides programs in management, finance, and business administration. (Source: https://www.manipuruniv.ac.in/)

(Source: https://icetpess2022.manipuruniv.ac.in/venue.html)

Figure- 4.7: Manipur University

4.5.2. Central Library of Manipur University

Manipur University's Central Library is an essential resource that helps the campus community's academic and research needs. The library provides access to a vast array of scholarly fields with its collection of books, periodicals, theses, and digital resources. In order to help teachers and students stay current with advancements in their professions, it also gives them access to a number of electronic databases, e-books, and e-journals. Lending, reference support, interlibrary loans, and digital archiving are just a few of the services the library provides. Additionally, it holds user education sessions and orientation programs to assist researchers and students in making the most use of the resources available. With EM-RFID for the security system, self-issue/return, automated inventory control, and ILMS KOHA for library automation, the library is completely automated. (Source: http://mulibrary.manipuruniv.ac.in/)

(Source:http://mulibrary.manipuruniv.ac.in/)

Figure- 4.8: Manipur University Central Library

4.6 MIZORAM UNIVERSITY (MZU): OVERVIEW

An Act of Parliament (No. 8 of 2000) established MZU, and on July 2, 2001, it went into function. The University is situated on 978.1988 acres in an area on the outskirts of Aizawl, the capital city of Mizoram. The NEHU, with its main office in Shillong, had a campus in Mizoram before the MZU was founded. Under the leadership of a

Pro-Vice Chancellor, the NEHU campus in Mizoram at the time had seven postgraduate departments: public administration, psychology, education, forestry, economics, and English. In the last 17 years of its existence, MZU has advanced significantly in terms of its academic programs, facilities, workforce, and support services. MZU received an "A" accreditation grade from NAAC in 2019. According to the NIRF rankings conducted by MHRD in 2016, 2017, and 2018, the University was rated among the top 100 universities in India. The University has 33 functioning academic departments offering UG, PG, M.Phil. and Ph.D. programmes under 8 Schools of Study. The University has 35 affiliated colleges and one constituent college.

The University has granted 277 Ph.D. degrees in various fields throughout the past five years. Approximately the past five years, the faculty has published approximately 900 books, book chapters in edited volumes, conference proceedings, and 1385 papers in reputable journalsA total of 7434 citations were found, with an average h-index of 26 (SCOPUS and WoS), in accordance with the SCOPUS, WoS, and Indian Citation Index databases. 20 patents were submitted by university professors based on the findings of their separate studies. (Source: https://mzu.edu.in/about-the-university/)

Figure-4.9: Mizoram University

4.6.1 Mizoram University Central Library

The Central Library at MZU occupies 4,496.62 square meters and contains 1,12,719 volumes in addition to other reading materials. These are complemented by e-resources that are obtained from INFLIBNET.The tree-surrounded library building has ramps and is barrier-free for people with disabilities. Since 2008, the whole library's collection has been available in a machine-readable catalogue. Additionally, users can search the computerized bibliographic information of the library's holdings via WebOPAC on the campus's Local Area Network (intranet). Additionally, the Central Library offers orientation programs for recently admitted students as well as lending and retyping services. By including an SMS and email alert system, the library improved its current library management software. (Source: https://lib.mzu.edu.in/)

Figure-4.10: Mizoram University Central Library

4.7 NIRF RANKING OF TOP 5 CENTRAL UNIVERSITIES (2020-2024)

The institutions' performances in terms of teaching, learning, and resources; research and professional practices; graduation outcomes; outreach and inclusivity; and perception are all reflected in the rankings of the following universities

Table No.4.2: NIRF ranking university category (2020-2024)

Name of Institution	City	State	Year	Score	Rank
Tezpur University	Tezpur	Assam	2020	48.77	39
			2021	47.27	46
			2022	47.48	56
			2023	46.70	69
			2024	49.01	69
North-Eastern Hill University (NEHU)	Shillong	Meghalaya	2020	46.88	49
			2021	44.24	59
			2022	45.44	66
			2023	44.95	80
			2024	N/A	101-150
Mizoram University	Aizawl	Mizoram	2020	43.49	67
			2021	N/A	101-150
			2022	43.24	78
			2023	45.18	76
			2024	48.03	77
Assam University	Silchar	Assam	2020	N/A	101-150
			2021	39.21	93
			2022	N/A	101-150
			2023	N/A	101-150
			2024	N/A	101-150
Manipur University	Imphal	Manipur	2020	N/A	101-150
			2021	N/A	101-150
			2022	N/A	101-150
			2023	N/A	101-150
			2024	N/A	101-150

(Source: NIRF-2024)

4.8 CONCLUSION

Thus, the overview of the top five Central Universities in Northeast India, as per the 2021 NIRF ranking, highlights the region's growing prominence in the Indian higher education landscape. These institutions, including North-Eastern Hill University (NEHU), Tezpur University, Assam University, Mizoram University, and Manipur University, have demonstrated their commitment to academic excellence, research output, and infrastructure development. Tezpur University’s consistent ranking reflects its strength in research and innovation, while NEHU stands out for its diverse academic programs and community engagement. Mizoram University, Assam University, and Manipur University also give steady progress, focusing on regional development and catering to the unique socio-cultural and economic needs of Northeast India.

References:

Ahuja, R., & Yadav, S. (2020). Indian Higher Education: Challenges and Opportunities. Journal of Educational Planning and Administration, 34(4), 5-18.

Assam University (2024). http://www.aus.ac.in/

http://mulibrary.manipuruniv.ac.in/Accessed on 11thNovember 2024.

http://www.aus.ac.in/library_old/. Accessed on 11thNovember 2024.

https://icetpess2022.manipuruniv.ac.in/venue.html. Accessed on 11thNovember 2024.

https://lib.mzu.edu.in/. Accessed on 11thNovember 2024.

https://mzu.edu.in/about-the-university/. Accessed on 11thNovember 2024.

https://nehu.ac.in/About-NEHU. Accessed on 11thNovember 2024.

https://themeghalayanexpress.com/education-ministry-sends-team-to-resolve-crisis-at-north-eastern-hill-university-in-meghalaya/. Accessed on 11thNovember 2024.

https://www.eastmojo.com/news/2024/03/18/tezpur-university-to-launch-seven-new-courses-see-details-here/. Accessed on 11thNovember 2024.

https://www.flickr.com/photos/chinavine/215720587. Accessed on 11thNovember 2024.

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DhQvNnzL_pEk&psig=AOvVaw0dlIjERQU5NR8AqW8omBKH&ust=1736329114896000&source=images&cd=vfe&opi=89978449&ved=0CBgQ3YkBahcKEwiY3JyZqOOKAxUAAAAAHQAAAAAQBA. Accessed on 11thNovember 2024.

https://www.nehu.ac.in/library/index.html. Accessed on 11thNovember 2024.

https://www.tezu.ernet.in/Library/. Accessed on 11thNovember 2024.

https://www.tezu.ernet.in/Library/index.php/about-us/about-library. Accessed on 11thNovember 2024.

India. MHRD (2020). National Education Policy 2020, Ministry of Human Resource Development, New Delhi. https://www.education.gov.in/nep/about-nep#:~:text=In%20school%20education%2C%20the%20National,solving%20

%E2%80%93%20but%20also%2C%20social%20and. Accessed on 05th November 2024.

Manipur University (2024). https://www.manipuruniv.ac.in/. Accessed on 05th November 2024.

Ministry of Human Resource Development (2017). NIRF India Ranking 2017. https://www.nirfindia.org/Docs/Ranking_Methodology_And_Metrics_2017.pdf. Accessed on 05th November 2024.

MZU. (2024). https://mzu.edu.in/. Accessed on 06th November 2024.

NEHU. (2024). https://www.nehu.ac.in/Accessed on 17th November 2024.

NIRF. (2024). About NIRF. https://www.nirfindia.org/Home/About/Accessed on 14th November 2024.

NIRF. (2024). Ranking. https://www.nirfindia.org/#. Accessed on 20th November 2024.

Taba, P. (2023). Challenges and Prospects of Higher Education in Northeast India: A Comprehensive Analysis. *International Journal of Novel Research and Development*. 8(9). 278- 287. https://www.ijnrd.org/papers/IJNRD2309340.pdf. Accessed on 08th August 2024.

Tezpur University (2024).https://www.tezu.ernet.in/. 21st November 2024.

Wikipedia. (2024). Central University (India). https://en.wikipedia.org/wiki/Central_university_(India)#:~:text=Central%20universities%20in%20India%20are,the%20purview%20of%20other%20ministries. 08th November 2024.

CHAPTER-5

DATA ANALYSIS AND INTERPRETATION

5.1 INTRODUCTION

This chapter analyses the questionnaire responses from the top 5 Central Universities in North East India based on the 2021 NIRF Ranking. To learn more about the prevalence of a digital divide among students, the data collected were evaluated. Here, the researcher has examined data by examining several elements included in the questionnaire concerning variations in the ability to access ICT tools and technology for academic purposes, use pattern of the internet, the impact of geographical restriction, awareness of copyright, and the effort to lessen the digital divide that selected University has taken. After the students completed the questionnaires, the data were coded and put into a spreadsheet, and then SPSS and Microsoft Excel were used to analyse the results. Several statistical techniques are applied in the investigation.

5.2 QUESTIONNAIRE DISTRIBUTED AND RECEIVED BY THE RESPONDENTS:

The present study adopted a survey method for assessing the digital divide among PG students. The study analyses the digital divide among the PG students of the top five Central Universities by NIRF University Ranking 2021 within the North East Region. The data that has been collected is limited only to PG students from five selected Central Universities. From all the selected Central Universities, the study sample size is 500. Among the selected Central University, 100 structured questionnaires were distributed to each University randomly, and the target response was 100 questionnaires from each University. As a result, the researcher has received 100% response from each University. A single approach, which is a quantitative research methodology, is part of the research methodology. This method works effectively for investigating a number of aspects of the digital divide, including ICT proficiency, device availability, internet access, and computer usage.

In order to collect primary data from respondents, the following methods were adapted as data collection tools. A structured questionnaire was framed with six parts i.e. (a) Personal Information, (b) To know the ability to access ICT tools and technology for academic purposes. (c) To analyse the use pattern of the internet by the respondents. (d) To find out whether geographical restrictions contribute to the digital divide among the respondents. (f) To know the initiative taken by selected Universities to reduce the digital divide among the respondents. (g) To find out the areas of strength and weakness of respondent in handling digital assets and give suggestions for enhancement. (e) To identify the awareness of copyright among the respondents. The gathered data were compiled and put into a spreadsheet and further analysed using statistical tools like SPSS and Microsoft Excel. The table below gives a detail of the questionnaire distributed;

Table-5.1: Name of the university, questionnaire distributed and questionnaire received

Sl.No.	Name of university	Questionnaire Distributed	Questionnaire Received (%)
1	Tezpur University	100 (Random)	100 (100)
2	North Eastern Hill University	100 (Random)	100 (100)
3	Assam University	100 (Random)	100 (100)
4	Manipur University	100 (Random)	100 (100)
5	Mizoram University	100 (Random)	100 (100)

Since the target response is 100 from each university which comes the total of 500. As a result, the researcher has received 100% response from each University.

5.3 TO KNOW THE ABILITY TO ACCESS ICT TOOLS AND TECHNOLOGY FOR ACADEMIC PURPOSES.

In today's educational environment, knowing how to use ICT (Information and Communication Technology) tools and technology for educational purposes is essential. Students' access to ICT resources, such as computers, tablets, and internet connectivity, is crucial to their academic progress as education becomes more and more reliant on digital platforms.

More than just having the right gadgets, access to ICT tools also requires knowing how to use them to enhance education. This includes abilities like utilizing educational software, managing online resources, taking part in virtual classrooms, and cooperating via digital platforms. Students who do not have access to these resources or do not possess the requisite abilities to use them are extremely disadvantaged, and this can result in differences in opportunity and academic achievement. Chikati (2013) mentioned that access to ICTs from home and schools is essential for satisfying the digital needs of students and to improve their capacity to use various ICT devices and programs. In addition to improving learning outcomes, it gets students ready for the challenges that lie ahead in a world driven by technology. Promoting equity and diversity in education requires addressing these issues. The analysis is presented in tabular form along with diagram.

5.3.1 Know how to access the internet and having a device to access the internet

Knowing how to access the internet involves understanding how to connect to networks (such as Wi-Fi or mobile data) and use browsers or apps to find information, communicate, or use online services. Having a device to access the internet means owning or having reliable access to tools like smartphones, tablets, or computers that can connect to the internet for various digital tasks. The data are presented in the following Table-5.2 and Figure-5.1.

Table-5.2: Know how to access the internet and having a device to access the internet

University	Know how to access internet		Have device to access internet	
	Yes	No	Yes	No
Tezpur University	100	0	100	0
NEHU	98	2	94	6
Assam University	100	0	99	1
Manipur University	99	1	98	2
Mizoram University	100	0	99	1
Total	**497 (99.4%)**	**3 (0.6%)**	**490 (98%)**	**10 (2%)**

N=500

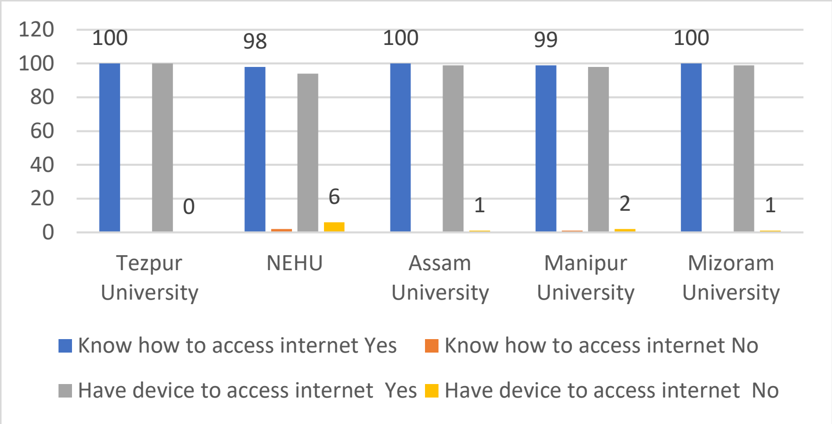


Figure-5.1: Know how to access the internet and having a device to access the internet

The above table shows data on two dimensions of the digital divide: knowing how to access the internet and owning a gadget to do so, which draws from five Central Universities.

Know how to access the internet: The following three Central Universities, Tezpur University, Assam University, and Mizoram University, all respondents which are 100% know how to access the internet. 99% of respondents from Manipur University are proficient at using the internet, whereas 1% are not. At the same time, 98% of respondents from NEHU know how to access the internet, while 2% do not. Overall total of 500 respondents, 497, which is 99.4%, are proficient at using the internet, whereas only 3, which is 0.6%, are not. Almost all respondents are aware of how to use the internet, indicating a high level of familiarity with it across all universities. The percentage of students who lack knowledge to access the internet is minimal (0.6%), indicating that lack of knowledge is not a significant barrier in these universities.

Having a device to access the internet: All respondents, which is 100% from Tezpur University, have a device which they use to access the internet. According to data from Assam University and Mizoram University, 99% of respondents own a gadget, and 1% do not. At Manipur University, 98% of respondents own a gadget, while 2% do not. 94% of respondents from NEHU have their own gadgets, while merely 6% of the population lack a device. Of the overall total of 500 respondents, 490, which is 98%, have a device to access the internet, while 10 respondents, which is 2%, do not. The majority of respondents across all universities have a device to connect to the internet, with 98% reporting device ownership. The data suggests that device availability is a slightly more significant issue than knowledge of internet access, with 2% of respondents lacking a device. Financial constraints may be the issue in terms of device ownership.

The data shows an overwhelming majority with 99.4% of respondents know how to access the Internet, highlighting a strong internet literacy rate among students across these Central Universities. While internet access knowledge is nearly universal, 2% of respondents still lack access to devices, which may hinder their ability to fully engage with online resources.

5.3.2 Familiarity with the use of computer

Familiarity with the use of computers has been studied how long the individual has been familiar with the use of computers in terms of years. Where an individual's ability is to perform basic operations of a computer and understand computer system functions. Table-5.3 and Figure-5.2 present data on the respondents' familiarity with the use of computers.

Table-5.3: Familiarity with the use of computer

University	**Less than 1 year**	**1-5 Years**	**6-10 Years**	**More than 10 years**	**Total**
Tezpur University	5	20	29	46	100
NEHU	26	33	26	15	100
Assam University	15	24	28	33	100
Manipur University	19	28	21	32	100
Mizoram University	10	25	23	42	100
Frequency (%)	**75 (15%)**	**130 (26%)**	**127 (25.4)**	**168 (33.6)**	**500**

N=500

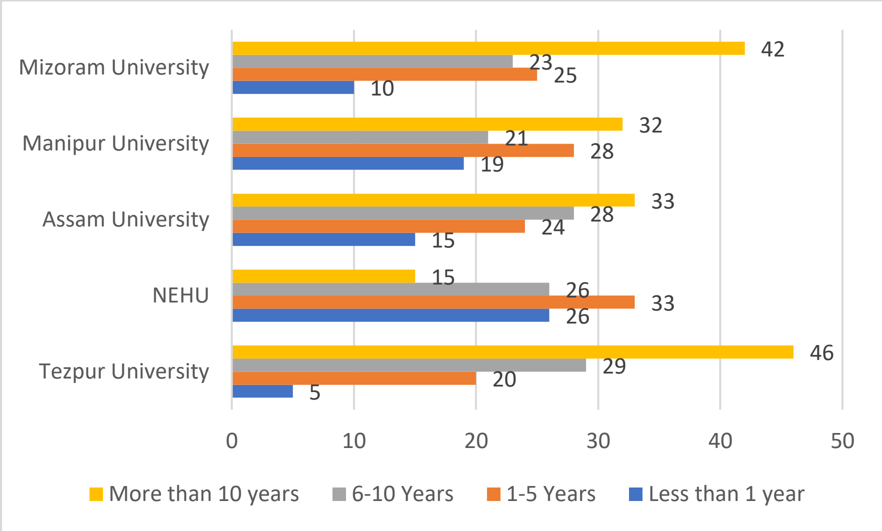


Figure-5.2: Familiarity with the use of computer

The statistics on students' knowledge of computers across five main universities are shown in the above table and chart, which is divided into categories based on how long the students have had the experience. A large part of the student population exhibits high levels of familiarity and competency with computers, as seen by the fact that 33.6% of students have been using computers for over ten years. The majority of students, 26% and 25.4%, respectively, have 1-5 years and 6-10 years of computer experience. This suggests that most students have a reasonable level of familiarity with computers, likely developed during their high school or early college years. 15% of students have been using a computer for less than 1 year, indicating that a small but significant portion of the student body is relatively new to computer use.

Tezpur University has 46% of students who have been using a computer for more than 10 years, which is the highest percentage in this category among the universities. 29% have 6-10 years of experience. 20% have been using a computer for 1-5 years. It also shows that 5% of students have been acquainted with using a computer for less than 1 year. NEHU has 33% of people who have been using a computer for 1-5 years, which is also the highest percentage in this category. 26% of students have been acquainted with using a computer for less than 1 year, which is also the highest percentage in this category. 26% have 6-10 years of experience. 15% have been using a computer for more than 10 years; this is the lowest percentage in this category. Assam University has 33% who have been using a computer for more than 10 years. 28% have 6-10 years of experience. 24% have been using a computer for 1-5 years. 15% of students who have been acquainted with using a computer for less than 1 year. Manipur University has 32% who have more than 10 years of computer experience. 28% have 1-5 years of computer experience. 21% have 6-10 years of experience. Only 19% of students have been acquainted with using a computer for less than 1 year. Lastly, Mizoram University has 42% who have been using a computer for more than 10 years. 25% have 1-5 years of computer experience. 23% have 6-10 years of experience. 10% of students who have been acquainted with using a computer for less than 1 year.

5.3.3 Source of learning ICT skills

The sources of learning ICT skills are categorized and measured with self-learning, attending courses, friends, and teachers, each reflecting different pathways through which individuals acquire digital competencies. The following Table-5.4 and Figure-5.3 show the students' sources of learning ICT skills.

Table-5.4: Source of learning ICT skills

University	**Self-Learning**	**Attending Course**	**Friends**	**Teachers**	**Total**
Tezpur University	66	4	0	30	100
NEHU	63	4	3	30	100
Assam University	56	8	0	36	100
Manipur University	69	14	4	13	100
Mizoram University	75	10	8	7	100
Total	**329 (65.8)**	**40 (8%)**	**15 (3%)**	**116 (23.2%)**	**500**

N=500

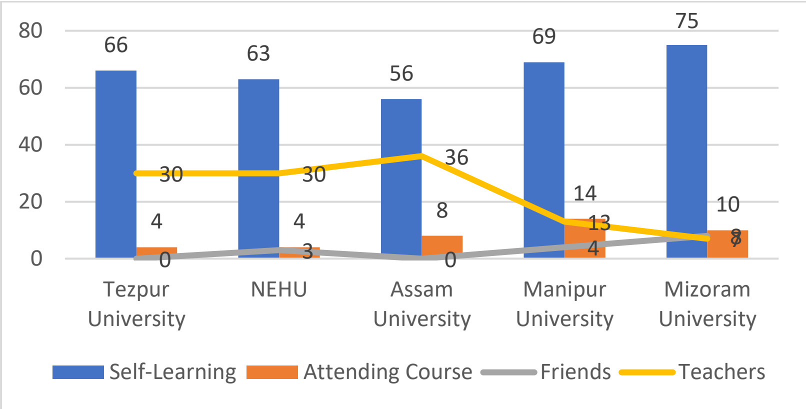


Figure-5.3: Source of learning ICT skills

Based on the above table and chart, it is evident that a significant majority, 65.8% of students across the universities, learned ICT skills through self-learning. This implies that students are largely relying on their own initiative, possibly due to the accessibility of online resources or a lack of formal training opportunities. Teachers are the second most common source, with 23.2% of students reporting they learned ICT skills through teacher instruction. This indicates that while self-learning is predominant, teachers still play a vital role in imparting ICT skills. Formal courses account for only 8% of ICT learning, suggesting that structured educational programs are not the primary method for students to acquire these skills and formal education in ICT skills is not as prevalent. Only 3% of students reported learning ICT skills from friends, indicating that peer influence is relatively low in this context.

Mizoram University has the highest percentage, with 75% of students who learned ICT skills through self-learning, indicating a strong reliance on independent study. Assam University has the highest percentage, with 36% of students who learned ICT skills from teachers, suggesting that the university's faculty plays a more active role in this area. Manipur University stands out with the highest percentage with 14% of students who learned ICT skills by attending courses, Mizoram University with 10%, Assam University with 8%, and Tezpur University and NEHU has the same percentage with 4% of students who learned ICT skills by attending courses, which could imply better access to or awareness of formal ICT training programs. NEHU, with 63%, and Tezpur University, with 66%, have similar patterns, with self-learning being the most common method, followed by significant contributions from teachers.

5.3.4 Awareness of using online library database

Awareness of using online library databases or repositories refers to an individual's knowledge of and ability to access, navigate, and utilize digital platforms that provide scholarly resources, academic journals, e-books, and institutional archives. Information related to awareness of using online library databases are presented in the following Table-5.5 and Figure 5.4.

Table-5.5: Awareness of using online library database

University	Yes	No	Not Sure	Total
Tezpur University	73	5	22	100
NEHU	27(27.6%)	16(16.3%)	55(56.1%)	98
Assam University	64(66.7%)	7(7.3%)	25(26%)	96
Manipur University	60(61.2%)	9(9.2%)	29(29.6%)	98
Mizoram University	62	10	28	100
Frequency (%)	**286(58.1)**	**47(9.6)**	**159(32.3)**	**492**

N=492

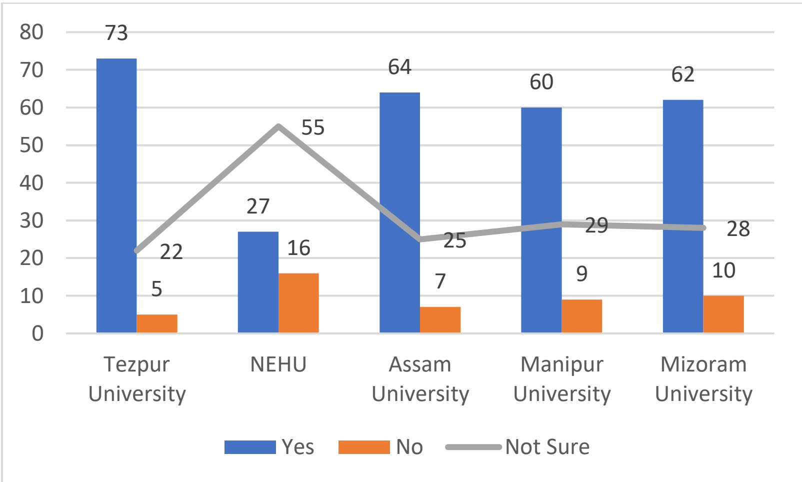


Figure-5.4: Awareness of using online library database

The statistics regarding students' awareness of using online library databases or repositories from five Central Universities are displayed in the above table and chart. Based on all responses, the majority of 286 students, which is 58.1%, know how to access online library databases or repositories. 47 students, which is 9.6%, do not know how to access them. 159 students, which is 32.3%, are not sure about how to access these resources. According to data from Tezpur University, 73% of respondents are familiar with using online library databases and repositories. 5% do not know. 22% are not sure. 66.7% of students from Assam University have the knowledge to access online databases. 7.3% do not know. 26% are not sure. 62% of students from Mizoram University have the knowledge to access online databases. 10% do not know. 28% are not sure. 61.2% of students from Manipur University know how to access online databases. 9.2% do not know. 29.6% are not sure. According to NEHU's response, only 27.6% of students have knowledge of accessing online databases, which is the lowest among the universities. 16.3% do not know. 56.1% are not sure which is the highest in this category.

A little over half of the respondents 58.1% know how to access online library databases or repositories. This indicates a moderate level of awareness and competence among students regarding these academic resources. A notable proportion of students 32.3% are not sure about how to access these resources, which suggests that many students may lack confidence or are unaware of the tools and processes needed to utilize online databases effectively. Only 9.6% of students outright lack the knowledge to access these databases. This is relatively low but still highlights the need for targeted interventions.

Tezpur University has the highest percentage which is 73% of students who know how to access online databases, indicating strong awareness and likely effective library services and training. NEHU has the lowest percentage with 27.6% of students who know how to access these resources, coupled with the highest percentage with 56.1% of students who are not sure. This suggests a significant gap in either communication, training, or resource accessibility at NEHU.

5.3.5 Used of Artificial Intelligence for academic purpose

The use of AI for academic purposes is assessed based on the extent of its application, measured through a scale such as "To a great extent", "Somewhat", "Very Little," and "Not at all," indicating varying levels of engagement with AI tools in an educational context. Table-5.6 and Figure-5.5 illustrate the extent to which respondents utilize AI.

Table-5.6: Used of Artificial Intelligence (AI) for academic purpose

University	To a great extent	Somewhat	Very Little	Not at all	Total
Tezpur University	37	47	16	0	100
NEHU	31	38	16	15	100
Assam University	39(39.8%)	32(32.6%)	24(24.5)	3(3.1%)	98
Manipur University	26	43	31	0	100
Mizoram University	34	43	19	4	100
Total	**167(33.5%)**	**203(40.8%)**	**106(21.3%)**	**22(4.4%)**	**498**

N=498

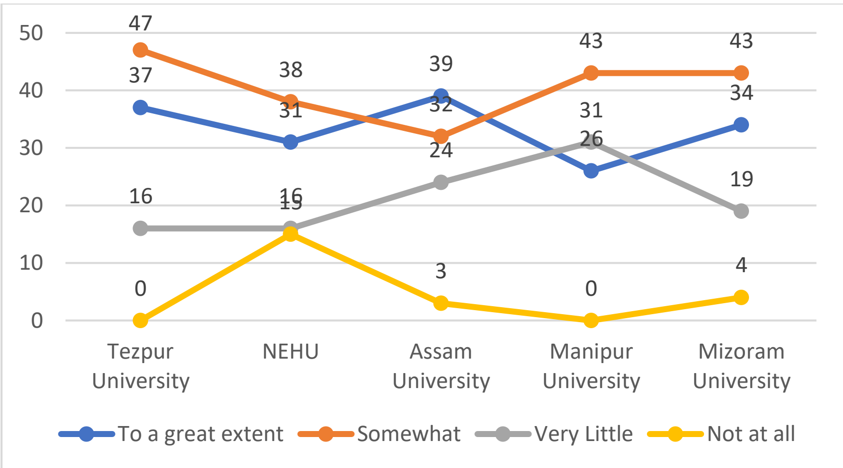


Figure-5.5: Used of Artificial Intelligence (AI) for academic purpose

The above table and chart give information on how much Artificial Intelligence (AI) has been employed by students at five Central Universities of North East India for academic purposes. The overall usage from the above table is that 203 students which is 40.8% used AI somewhat, 167 students which is 33.5% used AI to a great extent. 106 students which is 21.3% used AI very little. Only 22 students which is 4.4% did not use AI at all.

Tezpur University has the following data of responses- 47% used AI somewhat, 37% of respondents used AI to a great extent, and 16% used AI very little. 0% reported not using AI at all. NEHU has 38% of respondents used AI somewhat, 31% used AI to a great extent, 16% used AI very little, and 15% did not use AI at all. Assam University has 39.8% of its students using AI to a great extent, which is the highest percentage among the universities. 32.6% used AI somewhat. 24.5% used AI very little. 3.1% did not use AI at all. Manipur University also has 43% used AI somewhat. 31% used AI very little, which holds the highest in this category; 26% used AI to a great extent, which highlights the lowest percentage among the universities of the category. 0% did not use AI at all. Mizoram University has 43% used AI somewhat, 34% used AI to a great extent, 19% used AI very little, and 4% did not use AI at all.

A significant portion of students, which is 203 (40.8%), used AI somewhat, indicating a moderate level of integration of AI tools in academic work. Combining those who used AI to a great extent and somewhat (33.5+40.8=74.3), 74.3% of students have integrated AI into their academic activities, demonstrating widespread adoption across these universities. Only 4.4%, which is 22 students of the total respondents, reported not using AI at all, suggesting that AI tools have become a nearly predominant part of the academic experience. Assam University has the highest percentage, with 39.8% of students using AI to a great extent, indicating a stronger inclination or access to AI resources. Manipur University has a relatively higher percentage, with 31% of students using AI very little, suggesting potential barriers to full utilization. NEHU has the highest percentage of students, with 15% not using AI at all, indicating possible challenges in AI adoption.

The data suggests that AI is well-integrated into academic work for the majority of students. However, there are variations in the extent of usage, which might be impacted by different aspects such as access to resources, training, and the nature of academic programs. Universities with higher percentages of low or non-use of AI, such as NEHU and Manipur University, may benefit from targeted support in terms of AI training programs and resources to ensure more consistent usage across the board.

5.3.6 Frequency of device usage to access the internet for academic purposes

The sentence refers to an analysis of how frequently different devices are used by students to access the internet for academic purposes. The devices in question are laptops, smartphones, tablets, desktops, and smart TVs, and the frequency of their usage is categorized into four parameters: always, sometimes, rarely, and never.

The laptop is a portable computer often used by students for a wide range of academic activities, such as research, writing papers, and accessing online learning platforms. The smartphone is a mobile device that is widely accessible and commonly used for quick internet access, checking emails, participating in online discussions, and accessing educational apps. The tablet is a portable touch-screen device that offers similar functionality to a laptop but is often more convenient for reading and note-taking. A desktop is a stationary computer typically found in homes or computer labs, often used for more intensive tasks such as programming, graphic design, or any task that benefits from a larger screen and more powerful processing capabilities. Smart TV is a television with internet capabilities, which can be used to access online content such as educational videos, streaming lectures, or other multimedia resources for learning.

5.3.6.1 Use of Laptop to access internet for academic purpose

The use of a laptop to access the internet for academic purposes refers to utilizing the device to conduct research, complete assignments, access online learning platforms, and engage with digital academic resources. The analysis of response data is given in the following Table-5.7 and Figure-5.6.

Table- 5.7: Use of Laptop to access internet for academic purpose

University	Always	Sometimes	Rarely	Never	Total
Tezpur University	65	33	2	0	100
NEHU	10	48	24	18	100
Assam University	46	46	7	1	100
Manipur	25	53	9	13	100

University					
Mizoram University	36	55	5	4	100
Frequency (%)	**182(36.4)**	**235(47)**	**47(9.4)**	**36(7.2)**	**500**

N=500

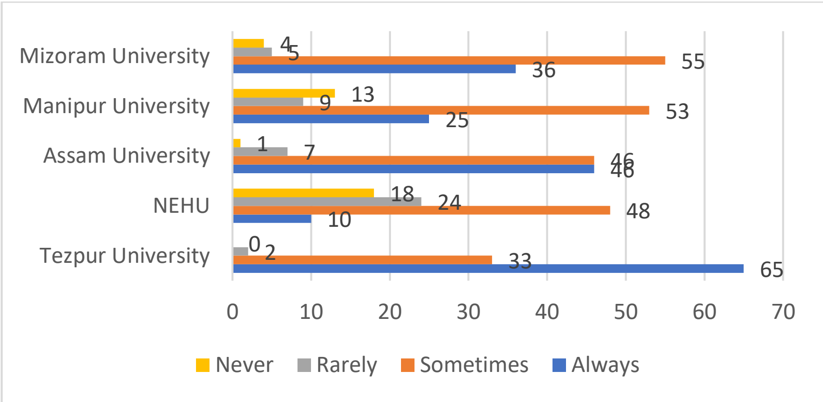


Figure-5.6: Use of Laptop to access internet for academic purpose

The table presents data on the frequency of laptop usage among students across five Central Universities for academic purposes. The data reveals distinct patterns in how students rely on laptops for their academic work. Overall, in the always category, 36.4% (182 students) of the total student population always use laptops, indicating that laptops are a primary tool for a significant portion of students. At Tezpur University, the majority of 65% of its students always use laptops, suggesting a strong dependency on this device for academic activities. In contrast, NEHU shows a different trend, with only 10% of students always using laptops; this is the lowest number in this category. Assam University has 46%, Mizoram University has 36%, and Manipur University has 25%.

Sometimes category, which accounts for 47% (235 students) of the total, which is almost half of the total respondents, suggests that laptops are often used but not exclusively relied upon. Mizoram University has the highest percentage, with 55% of students sometimes using laptops, followed closely by Manipur University with 53%. Followed by NEHU with 48%, Assam University with 46% and lastly Tezpur University with 33%. This could indicate that while laptops are an important academic tool, students may also be using other devices, like smartphones or desktops, depending on the task.

The rarely and never categories, comprising 9.4% (47 students) and 7.2% (36 students) of the total, respectively, highlight a minority of students who do not frequently or at all use laptops for academic purposes. NEHU has the highest percentage of students with 24% in the rarely category, followed by Manipur University at 9%, Assam University at 7%, Mizoram University at 5%, and lastly, Tezpur University at 2%. In the never category, NEHU has the highest with 18%, followed by Manipur University with 13%, Mizoram University with 4%, Assam University with 1%, and lastly, Tezpur University does not have any students who do not use laptops for academic purpose. Overall, the data illustrates varied laptop usage patterns across universities, with some institutions showing high reliance on laptops and others indicating more diverse device usage for academic purposes.

5.3.6.2 Use of Smartphone to access internet for academic purpose

The use of smartphones to access the internet for academic purposes involves utilizing mobile devices to browse educational content, participate in online classes, conduct research, and access academic resources. The analysis of the response data related to this usage is presented in Table-5.8 and Figure-5.7.

Table-5.8: Use of Smartphone to access internet for academic purpose

University	Always	Sometimes	Rarely	Never	Total
Tezpur University	95	4	1	0	100
NEHU	94	3	3	0	100
Assam University	94	0	6	0	100
Manipur University	94	1	1	4	100
Mizoram University	96	4	0	0	100
Total	**473(94.6)**	**12(2.4)**	**11(2.2)**	**4(0.8)**	**500**

N=500

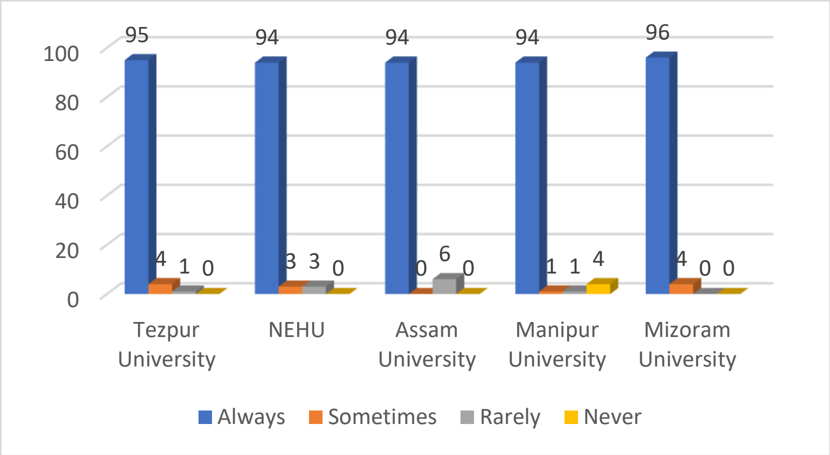


Figure-5.7: Use of Smartphone to access internet for academic purpose

The table illustrates the frequency of smartphone usage among students from five Central Universities for academic purposes. The data reveals a strikingly high reliance on smartphones across all universities; almost all student population, which is 94.6% (473 students), always use smartphones for their academic activities. This overwhelming majority highlights smartphones as the primary device for accessing the internet for academic work. Mizoram University leads slightly with 96% of students always using, closely followed by Tezpur University with 95%, and then NEHU, Assam, and Manipur Universities, each with 94% in this category. This consistency across universities suggests that smartphones are indispensable tools for students, likely due to their portability, ease of access, and multifunctionality.

The sometimes, rarely, and never categories together account for a minimal percentage of the total, indicating that very few students use smartphones infrequently. In the sometimes category, Tezpur University and Mizoram University have the same amount of response with 4%. This was followed by NEHU with 3%, Manipur University with 1%, and no students who gave a response from Assam University in the sometimes category. In the rarely category, Assam University has the highest with 6%, followed by NEHU with 3%, Tezpur University and Manipur University have 1% each, and Mizoram University does not have any response in this category. In the never category. Manipur University has the highest percentage, with 4%, while all other universities have a 0% response. However, these numbers are still quite low. These universities use smartphones almost exclusively, which highlights the significance of mobile-friendly learning platforms and materials.

Furthermore, the statement implies that students are becoming more reliant on their cell phones for academic purposes. This could have an impact on how Universities create and distribute digital information, making it mobile-friendly and accessible.

5.3.6.3 Use of Tablet to access internet for academic purpose

The use of tablets to access the internet for academic purposes refers to employing these portable devices for tasks such as reading e-books, attending online classes, conducting research, and accessing educational materials. The corresponding response data is analysed and presented in Table-5.9 and Figure-5.8

Table-5.9: Use of Tablet to access internet for academic purpose

University	Always	Sometimes	Rarely	Never	Total
Tezpur University	4	14	34	48	100
NEHU	2	22	30	46	100
Assam University	7	22	34	37	100
Manipur University	10	16	32	42	100
Mizoram University	4	16	19	61	100
Total	**27(5.4)**	**90(18)**	**149(29.8)**	**234(46.8)**	**500**

N=500

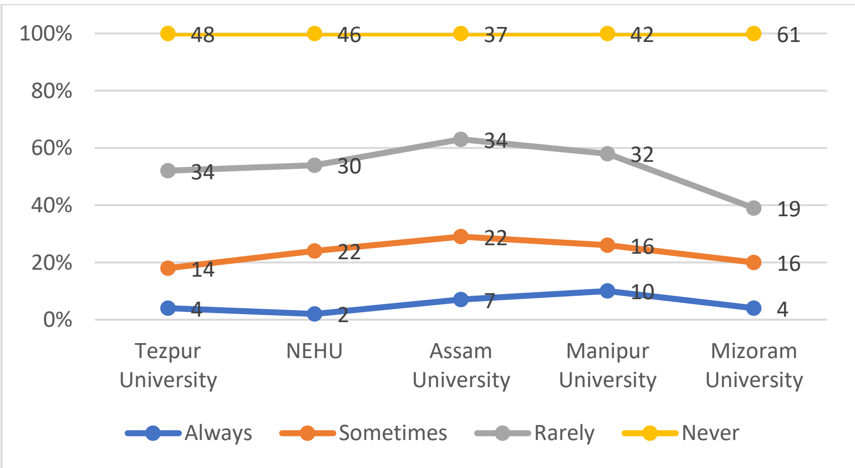


Figure-5.8: Use of Tablet to access internet for academic purpose

The table and chart present data on the frequency of tablet usage among students from five Central Universities for academic purposes. Given that 46.8% (234 students) said they never use tablets for academic purposes, the data suggests that most students do not utilize tablets as their primary devices. The largest percentage of non-users is seen in Mizoram University at 61%, followed by Tezpur at 48% and NEHU at 46%, Manipur University at 42%, and Assam University at 37%. This shows that, when it comes to academic activities in these universities, tablets are either less desirable or less accessible than other devices like laptops or smartphones.

In contrast, a small percentage of students always use tablets, with only 5.4% (27 students) falling into this category across all universities. Manipur University has the highest percentage of students who always use tablets at 10%, followed by Assam University with 7%, Tezpur University and Mizoram University with 4% each, NEHU has the lowest percentage with 2% in this category, though this is still a minority. The sometimes and rarely categories account for a significant portion of students, with 18% and 29.8%, respectively. This suggests that although tablets are not the preferred device for the majority of students, they are occasionally utilized, possibly for certain activities like note-taking or reading. The overall low frequency of tablet use indicates that other devices, possibly because of their higher functionality or convenience, are preferred more for academic purposes. Given that most students only use tablets occasionally, this trend suggests that educational institutions should concentrate more on making computers and smartphones as efficient as possible.

5.3.6.4 Use of Desktop to access internet for academic purpose

The use of a desktop computer to access the internet for academic purposes involves utilizing the device for activities such as online research, completing assignments, accessing digital libraries, and participating in virtual learning environments. The related response data has been analysed and is presented in Table 5.10 and Figure 5.9

Table-5.10: Use of Desktop to access internet for academic purpose

University	Always	Sometimes	Rarely	Never	Total
Tezpur University	6	21	53	20	100
NEHU	7	35	33	25	100
Assam University	10	39	43	8	100
Manipur University	11	20	39	30	100
Mizoram University	1	34	31	34	100
Total	**35(7)**	**149(29.8)**	**199(39.8)**	**117(23.4)**	**500**

N=500

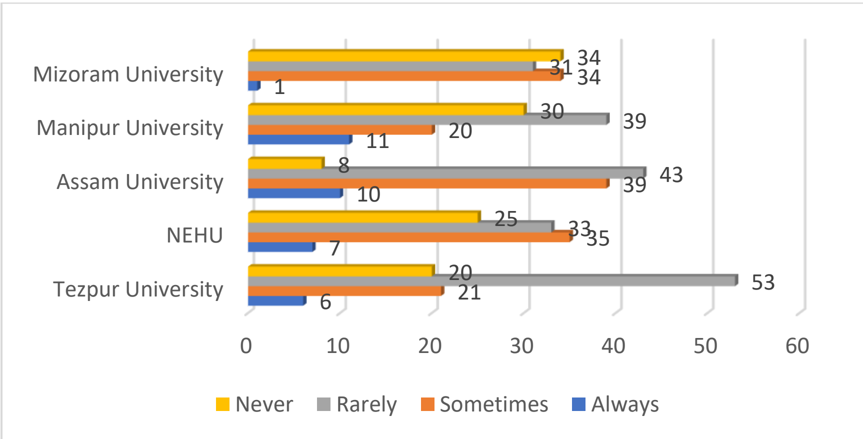


Figure-5.9: Use of Desktop to access internet for academic purpose

The above data shows that desktops are not a primary device for most students, with 39.8% (199 students) reporting that they rarely use desktops for academic activities. This trend is particularly evident at Tezpur University, where 53% of students rarely use desktops, followed by Assam University with 43% and Manipur University with 39%. 33% with NEHU and 31% with Mizoram University. While in the never category, 23.4% (117 students) never used a desktop for academic purposes. Mizoram University, where 34% of students never used a desktop for academic purposes, followed by Manipur University with 30%, and 8% from Assam University. This suggests that desktops are either less accessible or less convenient compared to more portable devices like laptops and smartphones. With 29.8% (149 students) reporting occasional use, the sometimes category also has a substantial percentage. 39% of Assam University sometimes used a desktop, followed by NEHU with 35%, Mizoram University with 34%, Tezpur University and Manipur University has 21% and 20%. This suggests that desktops are often used for specific tasks that may require more processing power or a larger screen, although they are not the preferred tool for regular academic work.

Only 7% (35 students) of the total student population always use desktops, with Manipur University leading at 11%, followed closely by Assam University at 10%. This low percentage indicates that while desktops are essential for some students, possibly for specialized tasks like programming or design, they are not widely relied upon. Overall, the data shows that students are using fewer desktop computers, maybe because they find alternative devices more portable and flexible for their learning needs. This change suggests that educational resources and platforms should be designed with mobile and laptop users in mind, as these devices are more integral to students' academic routines.

5.3.6.5 Use of Smart TV to access internet for academic purpose

The use of a Smart TV to access the internet for academic purposes involves leveraging its internet connectivity to view educational videos, attend virtual lectures, and access academic content on a larger screen. The collected response data has been analysed and is displayed in Table-5.11 and Figure-5.10.

Table-5.11: Use of Smart TV to access internet for academic purpose

University	Always	Sometimes	Rarely	Never	Total
Tezpur University	3	23	39	35	100
NEHU	15	21	21	43	100
Assam University	4	21	47	28	100
Manipur University	5	8	41	46	100

Mizoram University	3	26	28	43	100
Total	**30(6)**	**99(19.8)**	**176(35.2)**	**195(39)**	**500**

N=500

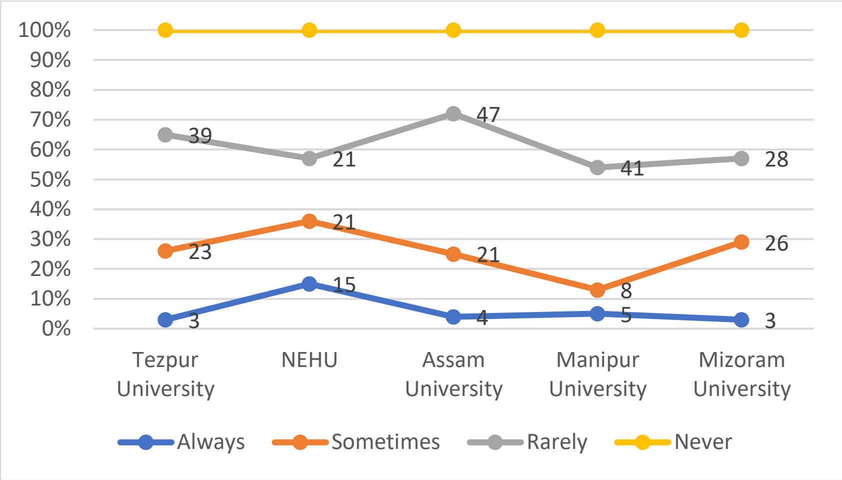


Figure-5.10: Use of Smart TV to access internet for academic purpose

The above table and chart indicate that Smart TVs are not a common tool for academic activities, with 39% (195 students) reporting that they never use them for such purposes. This trend is most prevalent at Manipur University, where 46% of students never used Smart TVs, and at NEHU and Mizoram University, where 43% of students also do not utilize Smart TVs for academic work. In the rarely category, which includes 35.2% (176 students) of the total used TVs rarely, Assam University has the highest with 47%, followed by Manipur University with 41%. It thus further suggests that while some students may occasionally use Smart TVs for educational content, it is not a primary or frequent choice.

On the other hand, the always and sometimes categories reveal limited but notable usage. Only 6% (30 students) of the total student population always use Smart TVs for academic purposes, NEHU having the highest percentage with 15% in this category, followed by Manipur University with 5%, Assam University with 4%, Tezpur University and Mizoram University has 3% each. This suggests that, for a small group of students, Smart TVs may serve as a convenient tool for viewing educational videos or participating in online lectures, possibly due to the larger screen size. The sometimes category, which accounts for 19.8% (99 students), indicates that some students may use Smart TVs sporadically, perhaps when other devices are unavailable or for specific types of content that benefit from a larger display. In this category, Mizoram University has the highest percentage with 26%, followed by Tezpur University with 23%, 21% from both NEHU and Assam University, and only 8% from Manipur University. The information as a whole show that although Smart TVs play a little part in educational activities, most students do not use them as their main device. It is clear many individuals choose more portable and interactive devices, such as laptops and smartphones, which means that platforms that are more compatible with these commonly used technologies should be prioritized when delivering educational information.

5.3.7 Overall analysis on frequency of device usage to access internet for academic purposes

The analysis of the frequency of device usage for academic purposes highlights distinct preferences among students across five Central Universities. Smartphones have emerged as the most commonly used device, with 94.6% of students always relying on them, reflecting their portability, accessibility, and multifunctionality. In contrast, laptops are the second most favoured device, with 36.4% of students always using them, indicating their importance for tasks that require more robust functionality, such as writing papers or accessing complex software. Tablets and desktops see significantly less frequent usage. Only 5.4% of students always use tablets, while a larger proportion, 46.8%, never use them, suggesting that tablets are more of a supplementary device rather than a primary tool for academic tasks. Desktops, though more frequently used than tablets, also have low consistent usage, with only 7% of students always relying on them. This highlights a shift away from stationary devices towards more portable options.

Smart TVs are the least utilized, with 39% of students never using them and only 6% always used. This indicates that Smart TVs are not a primary choice for academic purposes, likely due to their less interactive nature compared to other devices. Overall, the data emphasizes how popular laptops and cell phones are, with other gadgets occupying more specialized areas.

5.4 TO ANALYSE THE USE PATTERN OF INTERNET BY THE RESPONDENTS.

In order to examine how respondents use the internet, we usually look at a number of factors, including how often they use it, how long they spend online, and what kinds of devices they use to access it. Through the examination of these patterns and the scholar can learn more about the reasons for respondents' internet usage as well as the obstacles they encounter.

5.4.1 Universities student's internet access within a day

University students' internet access per day is measured by categorizing their daily usage into four-time intervals: 0-1 hour, 1-3 hours, 3-5 hours, and more than 5 hours. Table-5.12 and Figure-5.11 display the response data related to university students' daily internet usage across defined time intervals.

Table-5.12: Universities student's internet access within a day

University	0-1hr a day	1-3hrs a day	3-5hrs a day	More than 5 hrs	Total
Tezpur University	3	13	34	50	100
NEHU	2	28	21	49	100
Assam University	1	21	39	39	100
Manipur University	5	12	23	60	100
Mizoram University	1	10	30	59	100
Total	**12 (2.4%)**	**84 (16.8%)**	**147(29.4%)**	**257(51.4%)**	**500**

N=500

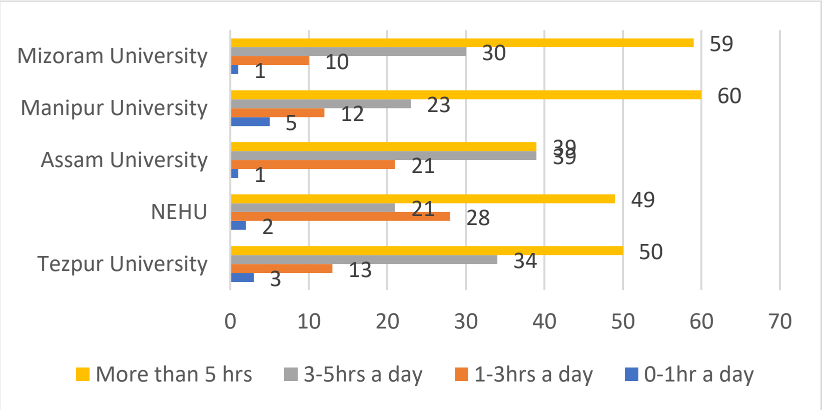


Figure-5.11: Universities student's internet access within a day

The analysis shows that half of the respondents from Tezpur University, which is 50% spend more than 5 hours online, with another 34% spending 3-5 hours,13% spend 1-3hrs a day, and 3% spend 0-1 hrs a day. This suggests a very high level of internet usage among students at this university. NEHU shows a slightly different pattern, with nearly half (49%) of respondents spending more than 5 hours online and 28% spending 1-3 hours. This indicates a significant, though somewhat varied, internet usage pattern. Assam University has a more balanced distribution between those spending 3-5 hours and more than 5 hours online, which is 39%, and 21% spend 1-3 hours a day. This implies that a significant percentage of students engage in moderate to high internet usage. Manipur University has the highest percentage, with 60% of respondents spending more than 5 hours online daily, which indicates a very high reliance on the internet. The higher percentage of respondents, 5%, spend only 0-1 hour; this suggests a small segment with minimal internet usage. Similar to Manipur University, Mizoram University also shows a high level of internet usage, with 59% of respondents spending more than 5 hours online. There is a moderate proportion of students, which is 30%, spending 3-5 hours online daily.

Overall, the majority of students, 51.4%, spend more than 5 hours a day online, indicating a high level of internet engagement across the universities. A significant portion of 29.4% spend 3-5 hours online, while fewer respondents spend less than 3 hours a day on the internet. Very few respondents, which is 2.4%, spend only 0-1 hour online, suggesting that minimal internet use is uncommon among these university students. The high levels of internet use suggest that the internet is likely a critical resource for both academic and social activities. Universities may need to ensure that their digital infrastructure and support services are robust enough to handle this demand.

5.4.2 PURPOSE OF INTERNET USAGE

5.4.2.1 Browsing and downloading online resources

Browsing and downloading online resources for the purpose of internet usage refers to accessing websites to search for information and retrieving digital materials such as e-books, articles, and academic documents for study. Table-5.13 and Figure-5.12 show the response data from the students.

Table-5.13: Browsing and downloading online resources

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Always	71	66	63	44	30	274(54.8)
Sometimes	27	28	29	43	62	189(37.8)
Rarely	2	5	8	9	8	32(6.4)
Never	0	1	0	4	0	5(1)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

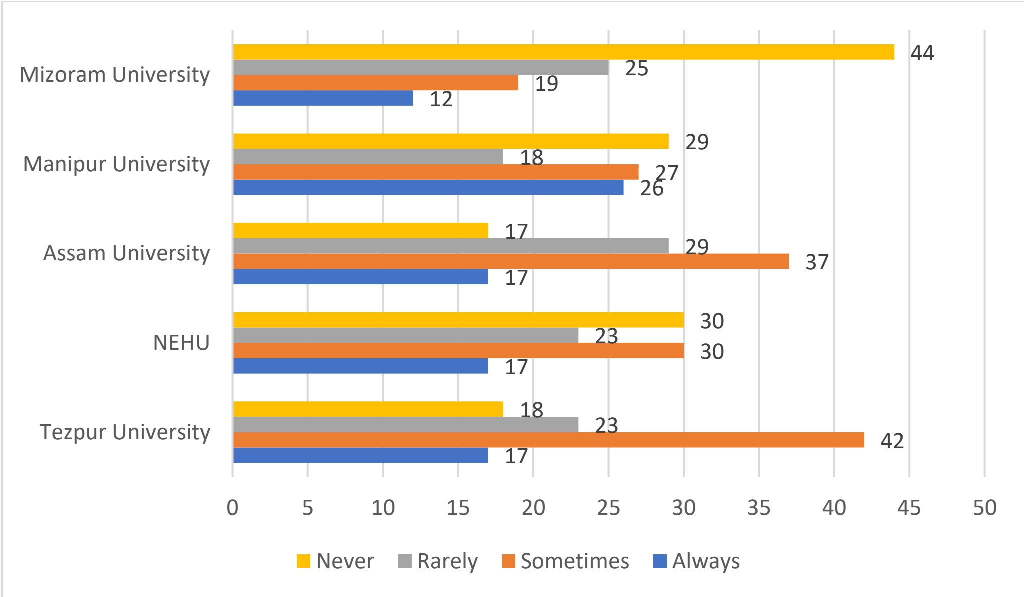


Figure-5.12: Browsing and downloading online resources

The above graph and table provide insights into the frequency with which students from five Central Universities engage in browsing and downloading online resources for academic purposes. The data reveals that a significant majority of students are highly active in this regard, with 54.8% (274 students) reporting that they always browse and download online resources. Tezpur University leads with 71% of its students in this category, indicating a significant tendency to use digital resources for academic work. NEHU and Assam University follow closely with 66% and 63%, respectively. This high percentage suggests that students in these universities are well-versed in accessing and utilizing online academic content, which may be due to better access to digital infrastructure or a greater emphasis on digital literacy within these institutions. Manipur University and Mizoram University have 44% and 30% of students who always browse and download online resources.

In the sometimes category, across the university, 37.8%, which is 189 students, sometimes used the internet for browsing and downloading online resources; it also highlights a substantial portion of students who engage with online resources, though not as regularly. Mizoram University has the highest percentage, 62% in this category, followed by Manipur University, which has 43%, 29% with Assam University, 28% with NEHU, and 27% with Tezpur University. This indicates that while students in these institutions do access online resources, they might not do so as regularly, possibly due to varying levels of digital access, confidence in using online tools, or the availability of alternative resources. The lower frequency in this category suggests that there is room for improvement in encouraging more consistent use of digital academic resources among students.

In both rarely and never categories, which together account for only 7.4% (6.4+1) which is 37 students. This implies that a small percentage of students just occasionally or never browse and download resources from the internet. Manipur University shows a slightly higher percentage in the rarely and never categories, with 9% and 4%, respectively, which may point to potential barriers such as limited internet access, lack of digital skills, or a preference for traditional resources. The overall data highlights the importance of online resources in academic pursuits, with a strong majority of students regularly accessing these resources. However, it also emphasizes the necessity of focused initiatives to promote and support regular use of digital resources, especially in universities where usage is less common.

5.4.2.2 Study online resources and research purpose

The internet is very useful for studying online resources and research purposes, involving accessing digital academic content, scholarly articles, and databases to support learning and conduct research. Table-5.14 and Figure-5.13 show the response data from the students.

Table-5.14: Study online resources and research purpose

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Always	60	50	65	45	33	253(50.6)
Sometimes	36	45	29	51	59	220(44)
Rarely	4	2	6	4	6	22(4.4)
Never	0	3	0	0	2	5(1)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

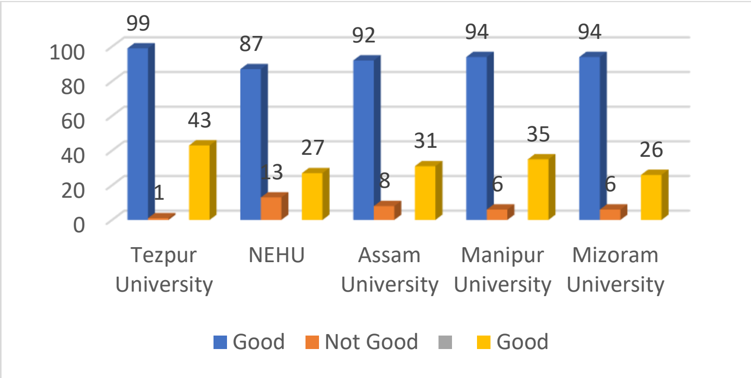


Figure-5.13: Study online resources and research purpose

A significant portion of students, 50.6%, which is 253 students, always utilize online resources for research purposes, with Assam University leading with 65%, followed by Tezpur University with 60%. 50% with NEHU. This indicates a strong reliance on digital resources for academic research in these institutions, reflecting the importance of online access in supporting academic work. Manipur and Mizoram Universities show slightly lower percentages in this category, with 45% and 33%, respectively, suggesting that while many students are actively using online resources, there may be factors limiting more consistent usage.

The sometimes category, overall accounting for 44% (220 students), indicates that a substantial number of students engage with online resources regularly but not consistently. Mizoram University has the highest percentage with 59% in the sometimes category, followed by Manipur University with 51%, NEHU has 45%, Tezpur University has 36%, and Assam University has the lease number, which is 29%. This indicates a pattern in which students frequently use online resources to supplement additional research and for many other purposes. Both the categories rarely and never are minimal, comprising only 5.4% (4.4+1), which is 27 students. In the rarely category, Assam University and Mizoram University account with the same number, which is 6%. At the same time, both Tezpur University and Manipur University have 4% each. NEHU has the least amount, at 2%. In the never category, NEHU and Mizoram University have 3% and 2%, while other university has 0% respondents. The data indicates that a relatively small proportion of students use online resources for study either occasionally or never, despite the fact that digital tools are widely used in academic research at these universities.

5.4.2.3 Playing online games

Using the internet for playing online games refers to engaging in interactive digital games through online platforms, often involving real-time play with other users. Table-5.15 and Figure-5.14 show the frequency of usage of the internet for playing online games by the students.

Table-5.15: Playing online games

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Always	9	9	6	9	14	47(9.4)
Sometimes	18	24	21	13	36	112(22.4)
Rarely	47	29	55	46	31	208(41.6)
Never	26	38	18	32	19	133(26.6)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

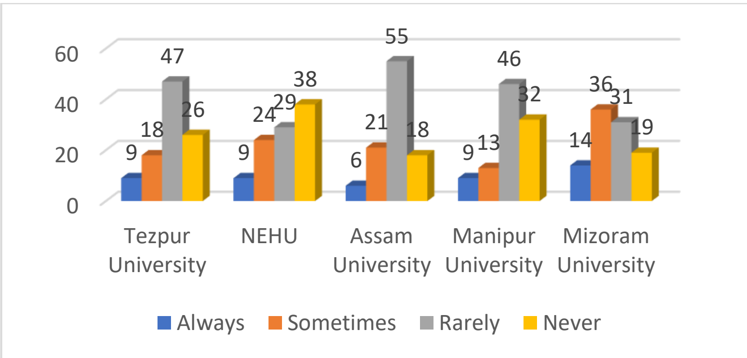


Figure-5.14: Playing online games

The above table and charts present data on the frequency of internet usage for playing online games among students from five Central Universities. The data reveals that a significant portion of students engage in online gaming, though the frequency varies. A small percentage of the total university, which is 9.4% (47 students), always play online games. Mizoram University has the highest percentage, 14%, followed by Tezpur University, NEHU, and Manipur University, which have the same percentage, 9% each. Assam University has the lowest with 6%. This indicates a low interest in gaming compared to other categories. In the sometimes category, 22.4%, which is 112 students, sometimes play online games, where Mizoram University again leads with 36%, followed by NEHU with 24%. Assam University has 21%, Tezpur University has 18%, and Manipur University has 13%. This suggests that while online gaming is a common pastime, it is not a dominant activity for most students.

Almost half of the students, 41.6%, which is 208 students, rarely play online games, indicating that while gaming is an occasional activity, it is not a primary use of internet time for most. Assam University has the highest percentage in this category with 55%, followed by Tezpur University with 47%, Manipur University with 46%, Mizoram University with 31% and NEHU with 29%. The never category comprising 26.6%, which is 133 students, shows that a significant portion of students, particularly at NEHU with 38%, Manipur University with 32%, Tezpur University with 26%, Mizoram University with 19% and Assam University with 18%, do not engage in online gaming at all. Overall, the data suggests that while online gaming is a popular activity, most students either engage in it infrequently or not at all, with academic or other online activities likely taking precedence.

5.4.2.4 Frequency of use of social media

Social media serves as a platform for communication, collaboration, and information sharing. The frequency of social media use by students is measured on a scale of always, sometimes, rarely, and never. Response information is given in the following Table-5.16 and Figure-5.15.

Table-5.16: Frequency of use of social media

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Always	63	71	68	69	56	327(65.4)
Sometimes	27	24	22	24	36	133(26.6)
Rarely	9	3	9	2	5	28(5.6)
Never	1	2	1	5	3	12(2.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

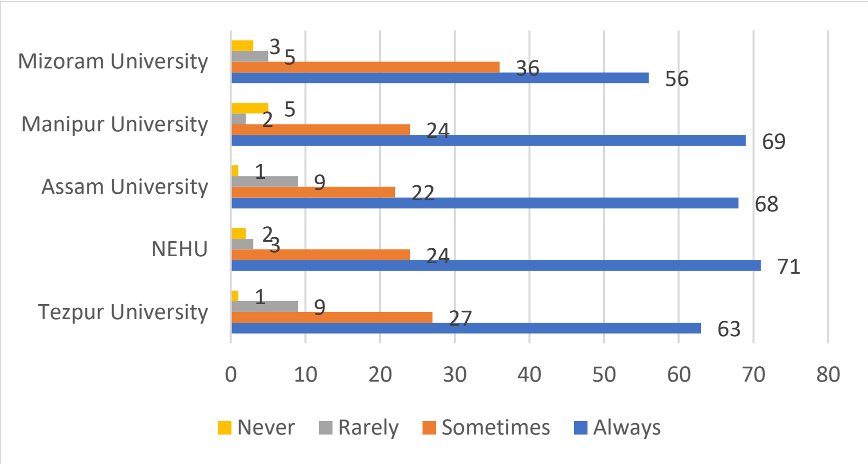


Figure-5.15: Frequency of use of social media

The above data shows that a significant majority, 65.4% (327 students), always use the internet to access social media. NEHU leads with 71% of students in this category, followed closely by Manipur University with 69% and, Assam University with 68%, Tezpur University with 63%, Mizoram University with 56%. This high percentage across all universities suggests that the activity is an important and consistent part of students' routines, likely reflecting its importance or necessity in their academic or daily lives.

The overall total of the sometimes category represents 26.6% (133 students), indicating that while a notable number of students do engage in accessing the internet for social media, they do so less consistently. Mizoram University has the highest percentage in accessing the internet for social media in the sometimes category with 36%, followed by Tezpur University with 27%, both NEHU and Manipur University with 24%, and Assam University has the lowest number with 22%. Suggesting that while the activity is still significant, it may be supplemented by other activities or is less essential for some students. The rarely and never categories together account for a small portion of the total, at 5.6% and 2.4%, respectively. This indicates that only a minority of students either infrequently or never used the internet for social media, further emphasizing its broad adoption across the universities. The majority of students regularly utilize the internet for social media, as evidenced by the data, with only a small percentage not doing so.

5.4.2.5. Frequency of internet usage for marketing and trading

The frequency of internet usage for marketing and trading refers to how often individuals go online to promote products, engage in e-commerce, or participate in buying and selling activities. It is measured on a scale of always, sometimes, rarely, and never. Table-5.17 and Figure-5.16 show the response data from the students.

Table- 5.17: Frequency of internet usage for marketing and trading

	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Always	9(9.1%)	5	6(6.1%)	8(8.1%)	7	**35(7.1)**
Sometimes	25(25.2%)	24	21(21.2%)	23(23.2%)	31	**124(24.9)**
Rarely	35(35.4%)	27	31(31.3%)	27(27.3%)	28	**148(29.8)**
Never	30(30.3%)	44	41(41.4%)	41(41.4%)	34	**190(38.2)**
Total	**99**	**100**	**99**	**99**	**100**	**497**

N=497

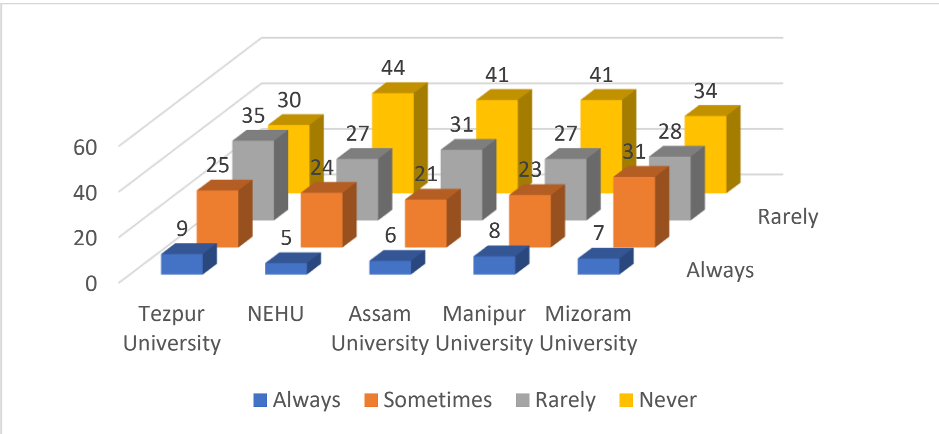


Figure-5.16: Frequency of internet usage for marketing and trading

The above data reveals that a majority of students are not actively engaged in online marketing or trading activities. Specifically, 38.2%, which is 190 students, never use the internet for these purposes, with NEHU having the highest percentage with 44%. Assam University and Manipur University have the second highest percentage, 41%, respectively. This suggests that online marketing and trading are not common activities among the student populations in these universities, possibly due to a lack of interest, knowledge, or resources to participate in these activities.

However, just 7.1% of students, which is 35 in total, always use the internet for marketing and trading; Tezpur University leads with 9.1%, followed by Manipur University with 8.1% and Mizoram University, Assam University and NEHU with a percentage of 7%,6.1%, and 5%. With 24.9% which is 124 students expressing occasional engagement that is sometimes category. Mizoram University holds the highest at 31%, indicating a higher level of interest or potential in this field, followed by Tezpur University at 25.2%. In the rarely category, 29.8%, that is 148 students, indicating infrequent participation, Tezpur University holds the highest with 35.4%, followed by Assam University with 31.3%. Mizoram University with 28%,Manipur University with 27.3% and NEHU has 27%.

The sometimes and rarely categories offer a more complex picture. Overall data, however, shows that although students do engage in some degree in online marketing and trade, it is still a relatively small activity, with the majority of students engaging in these activities either rarely or never. This might be a result of students prioritizing social or scholarly uses of the internet over business endeavors.

5.4.2.6. Frequency of internet usage for podcast and audio streaming

The frequency of internet usage for podcasts and audio streaming indicates how regularly individuals access online platforms to listen to and create content, music, or other audio media**.** Response information is given in the following Table-5.18 and Figure-5.17.

Table- 5.18: Frequency of internet usage for podcast and audio streaming

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Always	17	17	17(17.3%)	24(24.5%)	12	87(17.5)
Sometimes	42	30	37(37.8%)	27(27.5%)	19	155(31.3)
Rarely	23	23	27(27.6%)	18(18.4%)	25	116(23.4)
Never	18	30	17(17.3%)	29(29.6%)	44	138(27.8)
Total	**100**	**100**	**98**	**98**	**100**	**496**

N=496

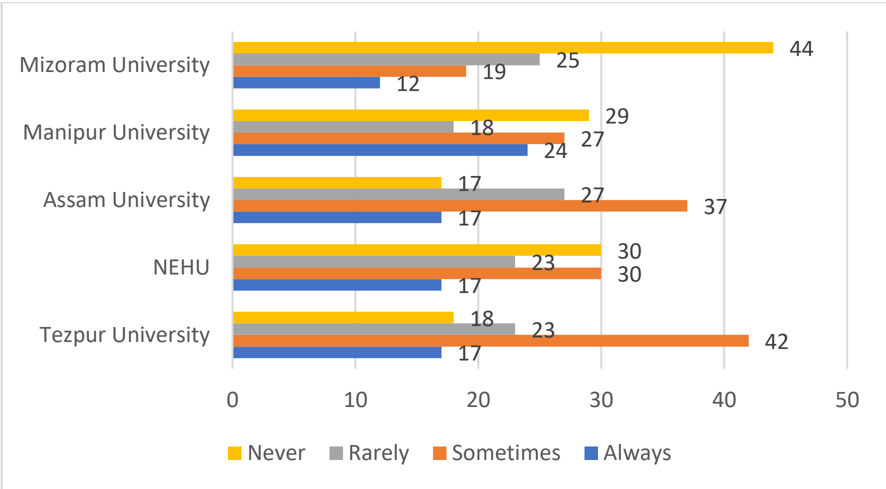


Figure-5.17: Frequency of internet usage for podcast and audio streaming

A notable 17.5%, which is 87 students, always engage in podcasts and audio streaming. Manipur University has the highest percentage, with 24.5%, suggesting a strong interest in these forms of media among its students. On the other hand, Assam University had 17.3%. The usage is consistent across Tezpur University and NEHU, with 17% of students in this category, and Mizoram University has the lowest percentage at 12%, reflecting moderate engagement.

The sometimes category, comprising 31.3%, which is 155 students, represents the most common usage pattern, indicating that many students engage with podcasts and audio streaming occasionally. Tezpur University leads with 42% of students in this category, followed by Assam University with 37.8%, 30% with NEHU, 27.5% with Manipur University, and 19% with Mizoram University. Indicating a balanced approach to the consumption of this content. Meanwhile, the rarely category captures 23.4%, which is 116 students; it appears that a small percentage of students use these sites, with Assam University displaying greater percentages with 27.6%, followed by Mizoram University with 25%, Tezpur University and NEHU the same percentage which is 23%, and Manipur University with 18.4%. In never category, different university total comes with 27.8% (138 students), which indicates that a significant portion of students, especially at Mizoram University with 44%, followed by NEHU with 30%, 29.6% with Manipur University, 18% with Tezpur University and 17.3% with Assam University, do not engage in podcasts or audio streaming at all. This disparity suggests that while audio content is popular for some students, it remains underutilized by a large segment of the student population.

The analysis of internet usage for various purposes among students from five Central Universities reveals diverse patterns of engagement.

Respondents 54.8% always used the internet for browsing and downloading online resources, which is a significant activity, and only 1% never used the internet, which indicates its essential role in education. Similarly, studying online resources shows high engagement, with 50.6% always utilizing them for research, reinforcing the importance of digital tools in academics.

When it comes to leisure activities like playing online games, 41.6% of students rarely engage, and 26.6% never participate, suggesting that gaming is less popular for their internet use compared to academic purposes. Social media, on the other hand, sees much higher engagement, with 65.4% always using the internet, making it the most dominant activity across the board.

For marketing and trading, the majority, 38.2%, never participated, reflecting a lower interest in entrepreneurial activities, with only 7.1% engaging regularly. On the other hand, there is a difference between students who use podcasts and audio streaming frequently and those who don't. Of these, 17.5% of students always watch, while 27.8% of students never do. Therefore, the majority of students' internet usage is dedicated to academic pursuits. In addition, participation in recreational and commercial activities is more irregular and frequently lower.

5.4.3. Students' proficiency in software application

The below table presents a detailed analysis of students' proficiency in various software tools across five Central Universities. The analysis aims to identify the level of proficiency across universities, highlighting areas where students excel and those where they may lack adequate training.

Table-5.19: Students' proficiency in software application

Proficiency in use of MS-Office * University Crosstabulation						
	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Good	99	87	92	94	94	466 (93.2)
Not Good	1	13	8	6	6	34 (6.8)
Total	100	100	100	100	100	500
Proficiency in use of Adobe Creative Suite* University Crosstabulation						
Good	43	27	31	35	26	162 (32.4)
Not Good	57	73	69	65	74	338 (67.6)
Total	100	100	100	100	100	500
Proficiency in use of Data Analysis Tools (SPSS, Excel, Python) * University Crosstabulation						
Good	37	29	32	27	29	154 (30.8)
Not Good	63	71	68	73	71	346 (69.2)
Total	100	100	100	100	100	500
Proficiency in use of Project Management Tools * University Crosstabulation						
Good	7	1	6	3	1	18 (3.6)
Not Good	93	99	94	97	99	482 (96.4)
Total	100	100	100	100	100	500
Proficiency in use of Content Management Tools * University Crosstabulation						

Good	10	13	13	15	19	70 (14)
Not Good	90	87	87	85	81	430 (86)
Total	100	100	100	100	100	500

N=500

The above table presents cross-tabulated data on student proficiency in various software tools across five Central Universities. The tools assessed include MS Office, Adobe Creative Suite, data analysis tools (SPSS, Excel, Python), project management tools, and content management tools. MS Office proficiency is overwhelmingly high, with 93.2%, that is 466 students categorized as good. All universities report high levels of proficiency, with Tezpur University leading at 99%. This indicates that MS Office is a fundamental skill that most students across these universities possess, likely due to its importance in academic tasks like report writing, presentations, and data organization. Only a small fraction, 6.8%, which is 34 students, are not good. This suggests that a minimal number of students may need further training in this essential MS Office suite.

Proficiency in Adobe Creative Suite is significantly lower, with only 32.4% of students rated as good. The majority, 67.6%, are not proficient, indicating that creative software like Photoshop, Illustrator, and InDesign is less commonly mastered. Mizoram University has the lowest proficiency with 26% in the good category, while Tezpur University reports the highest with 43%, followed by Manipur University with 35%. This gap might indicate varying levels of access to technology and software; at the same time, students at some universities might possibly have better access to Adobe products, either through institutional licenses or personal affordability. Additionally, it could reflect differences in student interest or the relevance of creative software to their specific fields of study, with certain disciplines like media studies or design requiring more frequent use of these tools.

Proficiency in data analysis tools such as SPSS, Excel, Python etc. is limited, with only 30.8% of students being proficient. The highest proficiency is found at Tezpur University, with 37%, while Manipur University is the lowest, with 27% in the good category. The second highest in a good category is Assam University with 32%, followed by both NEHU and Mizoram University with 29% each. The majority, 69.2%, which consists of 346 students, are not good at data analysis tools from the total five universities. Manipur University has the highest, at 73%, followed by NEHU and Mizoram University, at 71% each. These differences could indicate that there are fewer opportunities for students to learn and practice these tools, possibly due to limited resources, less focus on quantitative research methods, or lower integration of data-driven subjects. This gap may also reflect different levels of student exposure to research projects or internships that require data analysis.

Project management tools like Trello, Asana, and others have the lowest proficiency levels, with only 3.6% of 18 students proficient in five universities. Tezpur University has the highest, with 7% in the good category. In the not good category, almost all students, 96.4%, which is 482 students from 5 universities, do not know how to use Project management tools. All university students' responses cross the percentage of 90% in not proficient in handling project management tools. This suggests that formal project management skills are not widely taught or used in academic settings despite their relevance in both academic and professional work.

Finally, Content Management System (CMS) tools, which include platforms like WordPress, Drupal, Joomla, etc, also show low proficiency, with only 14% of 70 students rated as good. Mizoram University has the highest percentage of proficient students with 19%, followed by Manipur University with 15%, while NEHU and Assam University are lower with 13%, and Tezpur University has the lowest with 10%. Almost all students from across five universities, with 86%, which is 430 students, don't have proficiency in CMS tools. Tezpur University has 90%, followed by 87% from both NEHU and Assam University, 85% from Manipur University and 81% from Mizoram University. The limited use of CMS tools indicates that students may not be frequently involved in content creation or website management tasks.

The most proficient students in all universities are found using MS-Office, with an astounding 93.2% rating it as good, highlighting the program's critical significance in both academic and professional activity. On the other hand, just 32.4% and 30.8% of students, respectively, demonstrate skill in more specialist technologies like the Adobe Creative Suite and data analytic tools. This indicates that more sophisticated technical abilities are less frequently acquired, even while fundamental software skills are taught and utilized regularly.

5.5 TO FIND OUT WHETHER GEOGRAPHICAL RESTRICTIONS CONTRIBUTE TO THE DIGITAL DIVIDE AMONG THE RESPONDENTS.

To investigate whether geographical restrictions contribute to the digital divide among respondents, it is important to examine how location affects access to digital resources, skills, and infrastructure. Geographical factors, especially in remote or rural areas, can significantly contribute to the disparity, as having dependable internet connections, devices, and technological infrastructure is often limited. In this context, understanding how students from different regions or universities experience access to digital tools and resources can reveal whether geographic disparities influence their digital literacy and academic engagement. Universities in remote areas may face challenges like poor internet connectivity, lack of infrastructure, or fewer digital learning opportunities compared to those in urban settings. This can limit students' ability to fully participate in the digital academic environment. This study aims to identify whether such geographical restrictions contribute to the digital divide among respondents.

5.5.1 Residential background

Table-5.20 and Figure-5.18 analyse the residential background among the respondents to find out whether geographical location impact to digital divide.

Table-5.20: Residential background

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Rural	52	69	53	45	61	280(56)
Urban	48	31	47	55	39	220(44)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

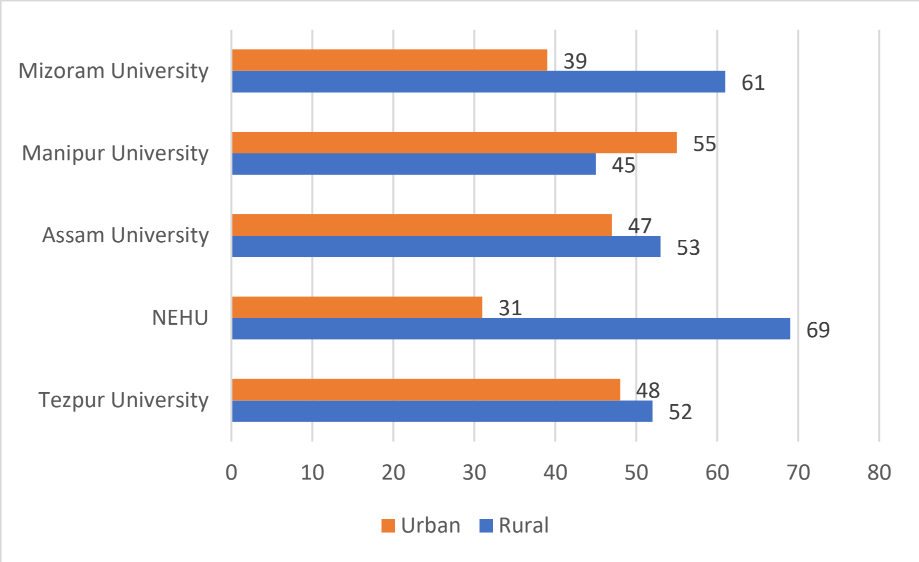


Figure-5.18: **Residential background**

The above charts and table present the distribution of respondents based on their geographical location (rural or urban) across five Central Universities. Overall, 56% of the respondents are from rural areas, while 44% are from urban areas, indicating a majority of the student population comes from rural backgrounds. NEHU, with 69%, and Mizoram University, with 61%, have the highest proportion of students from rural areas. Manipur University has a higher percentage of urban students, 55%, followed closely by Assam University, 47%, and Tezpur University, 48%. Urban students are generally expected to have better access to digital tools, high-speed internet and modern devices, which can enhance their academic engagement and digital literacy. Given that rural students might face greater obstacles to obtaining proficiency in utilizing digital resources, the higher percentage of rural students at certain universities may draw attention to possible geographic limitations that might worsen the digital divide.

5.5.2 Availability to access computer centre/ICT centre

The availability to access computer centre/ICT centre in the respondent's locality can be one of the causes for digital divide. The response data are given in the following Table-5.21 and Figure-5.19.

Table- 5.21: Availability to access computer centre/ICT centre

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Yes	90	63	91	85	73	402 (80.4)
No	10	37	9	15	27	98 (19.6)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

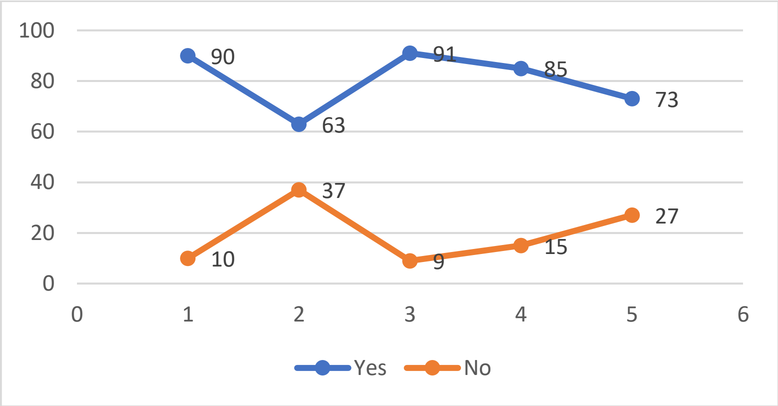


Figure-5.19: Availability to access computer centre/ICT Centre

Overall, 80.4% of respondents report having access to such facilities, while 19.6% do not, suggesting that the majority of students live in areas where basic ICT infrastructure is available. Tezpur University, with 90%, and Assam University, with 91%, have the highest proportion of respondents with the availability to access computer centers or ICT centers, indicating a relatively well-developed technological infrastructure in their localities. This suggests that students from these universities are more likely to have opportunities to engage with digital tools outside of campus, which could enhance their learning experiences and digital literacy.

On the other hand, NEHU has the lowest percentage, with 63% of students having access to an ICT center in their locality, followed by Mizoram University, which has 73%. This lower access could be a contributing factor to the digital divide in these regions, as students may face limitations in utilizing digital resources for academic purposes. Only 19.6 %, which is 98 students, rated there is no ICT center in their locality. In this category, NEHU has the highest, with 37%, followed by 27% at Mizoram University. The disparity in the availability of computer centers and ICT centers between universities highlights the importance of local infrastructure in bridging the digital divide.

5.5.3 Status of telecom network

The status of the telecom network is evaluated based on user experience and connectivity quality, using a five-point scale: Very Good, Good, Acceptable, Poor, and Very Poor. Table-5.22 and Figure-5.20 show the response data from the respondents.

Table-5.22: Status of telecom network

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Very Good	27	9	21	12	8	77(15.4)
Good	47	42	58	64	57	268(53.6)
Acceptable	12	29	9	15	25	90(18)
Poor	13	18	11	9	10	61(12.2)
Very Poor	1	2	1	0	0	4(0.8)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

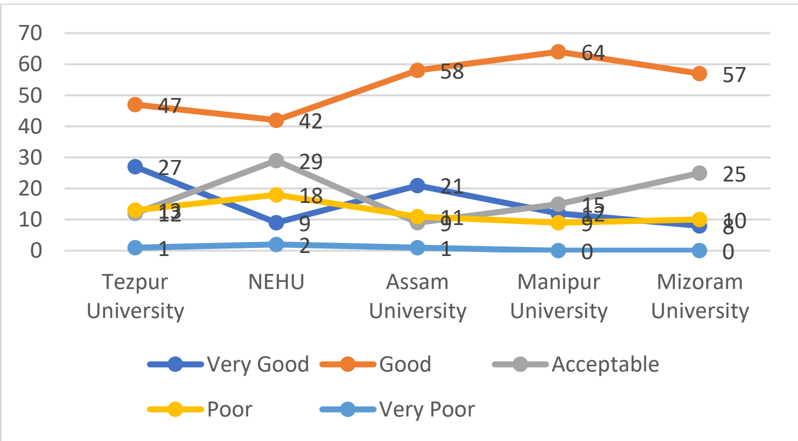


Figure-5.20: Status of telecom network

The above data provides insight into how geographical restrictions might influence the digital divide in these regions. Out of 500 respondents, 53.6% rated their telecommunication conditions as good, and Manipur University comes with the highest among them, 64%, followed by Assam University, 58%. Given that over half of the participants experience relatively stable and accessible connectivity. However, the percentages drop significantly for very good with 15.4%, indicating that only a small segment enjoys optimal telecommunication services. Tezpur University has the highest percentage at 27%, followed by Assam University at 21%. With 27% of the total, Tezpur University looks exceptional in this area, maybe because of its superior infrastructure or more advantageous location.

With an 18%, which is a 90% rating acceptable, the quality of telecommunications services is considered modest. 29% from NEHU has the highest percentage in this category, followed by Mizoram University with 25%. However, this number shows that many respondents have problems with irregular connectivity or limited access, which is largely related to the challenging geography and sparse population of the northeastern regions.

On the other hand, 12.2% of respondents stated telecommunication as poor, NEHU and Tezpur University having comparatively high percentages in this category with 18% and 13%, suggesting that these regions may have more geographical limitations. 0.8% rated very poor category, it indicates severe examples of inadequate telecommunication, maybe because of isolated locations or inadequate infrastructure. In this category, 2% from NEHU and 1% each from Tezpur University and Assam University rated very poor.

Overall, the digital divide in these Central Universities is evident, as geographical barriers likely hinder the consistent and equitable distribution of telecommunication services, impacting the academic and research capabilities of students and faculty.

5.5.4 Status of availability of electricity

The status of electricity availability is assessed using a five-point scale- Very Good, Good, Acceptable, Poor, and Very Poor- to indicate the consistency and reliability of power supply in a given area. The response data are given in the following Table-5.23 and Figure-5.21.

Table-5.23: Status of availability of electricity

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Very Good	37	14	17	18	9	95(19)
Good	47	53	48	54	57	259(51.8)
Acceptable	11	22	18	19	28	98(19.6)
Poor	5	11	11	8	6	41(8.2)
Very Poor	0	0	6	1	0	7(1.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

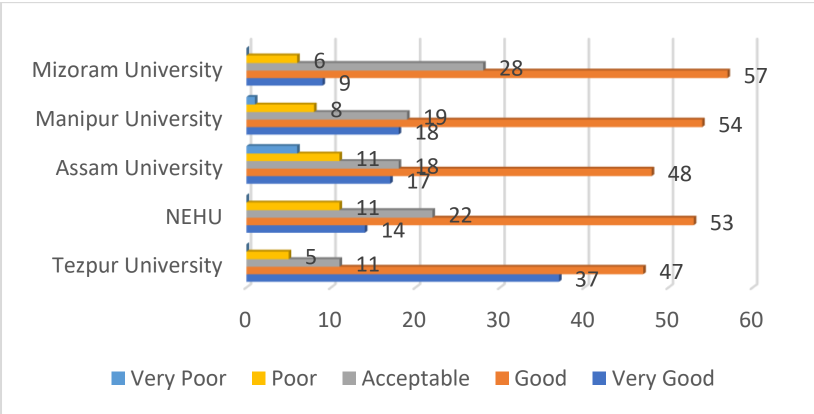


Figure-5.21: Status of availability of electricity

A majority of respondents which is 51.8%, rated their electricity access as good, indicating that over half of the students have a reliable electricity supply, which is critical for digital connectivity. Mizoram University leads in this category with 57%, likely benefiting from better infrastructure despite being located in a remote region.

Only 19% rated electricity as very good, with Tezpur University scoring the highest at 37%. This disparity implies that certain areas have better electrical infrastructure than others, maybe as a result of advantageous topographical conditions or close proximity to cities. On the other hand, 19.6% rated their electricity as acceptable and 8.2% as poor, revealing that nearly 28% of respondents experience suboptimal or unstable electricity supply. This instability could be linked to geographical challenges such as mountainous terrain or remote locations, particularly in the case of NEHU and Assam University, which show relatively higher percentages in the poor category. The very poor rating, though low at 1.4%, still represents significant disruptions for a small portion of respondents, especially at Assam University.

Overall, electricity access in these universities varies considerably, and geographical restrictions play a role in exacerbating the digital divide. Inadequate or inconsistent electricity can directly hinder access to digital resources, further widening the gap between regions with better infrastructure and those facing geographical challenges.

5.5.5 Type of internet connection

The type of internet connection is categorized based on the mode of access, with parameters including Broadband, Mobile Data, and a combination of both Broadband and Mobile Data. The below table and figure analyse the response data.

Table-5.24: Type of internet connection

	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Broadband	1	4	7	18	10	40(8)
Mobile Data	99	91	92	72	90	444(88.8)
Both (Broadband and Mobile)	0	5	1	10	0	16(3.2)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

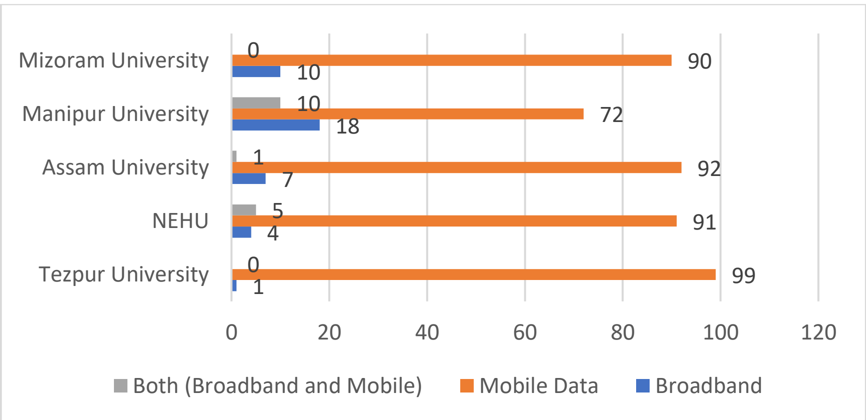


Figure-5.22: Type of internet connection

The above table and chart present data on the type of internet connections used across five universities. This highlights how geographical restrictions affect internet access, contributing to the digital divide. Almost all the respondents, 88.8%, of 444 students, indicate mobile data as their main internet connection; the region's noticeable lack of broadband infrastructure is indicated by the enormous dependence on it. Tezpur University leads in mobile data usage with 99%, followed by Assam University with 92%, NEHU with 91%, Mizoram University with 90%, and Manipur University with 72%. This suggests that broadband availability is minimal in this area. It also indicates that these Northeast states have limited access to broadband.

However, only 8% of respondents said they utilize broadband, Manipur University with 18% and Mizoram University with 10% having the highest numbers. 7%, with Assam University, NEHU at 4% and Tezpur University at 1%. The low availability of broadband in certain areas can be ascribed to physical obstacles such as rough terrain, sparse populations, or insufficient infrastructure funding, which make expanding broadband expensive and difficult. Only 3.2% of respondents have access to both broadband and mobile data, with Manipur University showing the highest figure with 10%, followed by NEHU with 5%, 1% with Assam University, Tezpur University, and Mizoram University with 0% usage. Suggesting that certain areas are beginning to bridge this gap, but some part has to take the initiative. However, the extremely low figure in other universities points to a digital divide where consistent, high-speed broadband is inaccessible for the majority.

5.5.6 Impact of geographical location on reliability and speed of internet connection.

Geographical location can affect the reliability and speed of internet connection due to factors such as urban or rural setting, terrain, and infrastructure influence the consistency and performance of internet services. The corresponding response data is highlighted in the Table-5.25 and Figure-5.23.

Table-5.25: Impact of geographical location on reliability and speed of internet connection.

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Positively	45	52	62	59	68(68.7%)	286(57.3)
Negatively	23	19	20	10	16(16.2%)	88(17.6)
No Impact	32	29	18	31	15(15.1%)	125(25)
Total	**100**	**100**	**100**	**100**	**99**	**499**

N=499

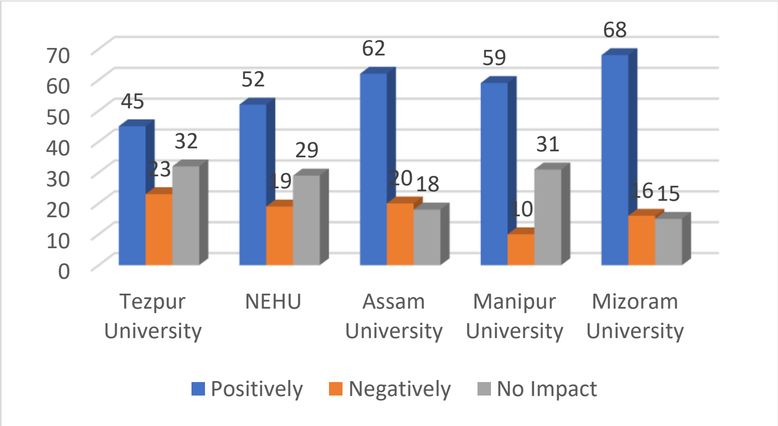


Figure-5.23: Impact of geographical location on reliability and speed of internet connection

The majority, 57.3%, stated that their internet connection is positively impacted by their location. Mizoram University leads with 68.7% in this category, followed by Assam University with 62% and Manipur University with 59%. NEHU with 52%, Tezpur University with 45%. This could indicate that certain areas in these regions are closer to urban centres or have access to better infrastructure, enabling somewhat consistent and quick connections. Nonetheless, 17.6% of the respondents stated that their internet connectivity is negatively impacted by their location. Higher percentages of respondents disagreed with Tezpur University and Assam University (23% and 20%, respectively), followed by NEHU with 19%, 16.2% with Mizoram University, and 10% with Manipur University. This indicates that these regions probably face additional physical barriers, such as rural areas or mountainous terrain, which cause slower speeds and irregular connections.

25% of respondents, a significant portion, stated that their internet connection was not impacted by their location. Higher percentages in this category were obtained by Tezpur University with 32%, followed by Manipur University with 31%. This may suggest that although certain places have geographical difficulties, they can be minimized by the availability of mobile data or other technical advancements. To conclude, although many people have great experiences with internet connectivity due to their location, particularly in places with developed infrastructure, a significant segment of the population still faces obstacles due to their location, which causes the digital divide.

5.5.7 Impact of geographical restriction on the ability to participate in online learning

The data below shows how remote or underdeveloped locations, with limited internet access or technological infrastructure, hinder students' opportunities to effectively engage in digital education platforms and virtual classrooms.

Table-5.26: Impact of geographical restriction on the ability to participate in online learning

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Significantly Hindered	12	19	6	11	15	63(12.6)
Slightly Hindered	37	43	57	34	61	232(46.4)
No Impact	42	24	34	47	17	164(32.8)
Improved	9	14	3	8	7	41(8.2)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

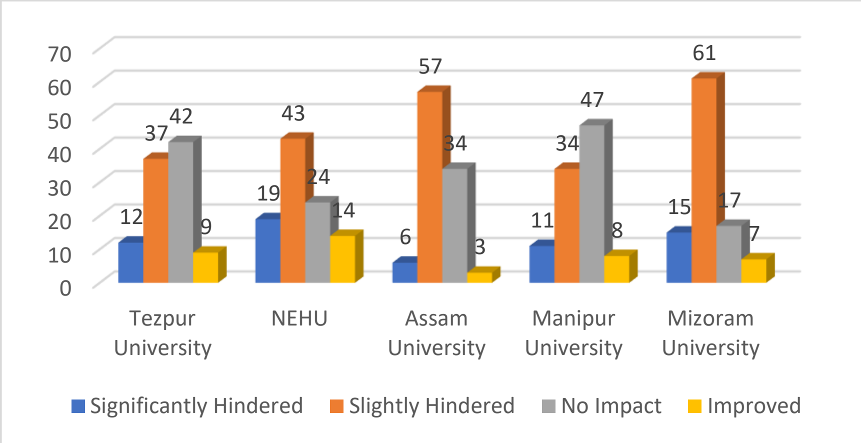


Figure-5.24: Impact of geographical restriction on the ability to participate in online learning

A little over half, 46.4%, stated that their internet access is slightly hindered by geographic limitations. Mizoram University, with 61% and Assam University, with 57%, had the highest percentages, followed by NEHU, with 43%, 37% with Tezpur University, and 34% with Manipur University. Indicating that while users in these areas face some obstacles, such as rough terrain or limited infrastructure, the impact is not extreme. Mobile data networks are widely used, which probably lessens the impact of these obstacles. Nonetheless, 12.6% of participants stated that geographic limitations significantly hinder their ability to access the internet, NEHU with 19% and Mizoram University with 15% citing the most difficulties. They then followed by Tezpur University with 12%, 11% from Manipur University, and 6% from Assam University. These regions could be home to more difficult natural barriers, such as mountains, thick forests, or inadequate road systems, which make it more difficult to set up and maintain telecommunications equipment and result in slower speeds and irregular connectivity.

Remarkably, 32.8%, which is 164 respondents, said that their internet reliability is "not impacted" by their location. Manipur University has a noticeable 47%, followed by Tezpur University with 42%. 34%, with Assam University, NEHU at 24%, and Mizoram University at 17%. Indicating that users have adjusted to the available technologies or infrastructure, possibly due to better mobile data access, despite the university's remote location. With NEHU topping at 14%, just 8.2% of respondents said that their internet speed and dependability have increased as a result of geographic circumstances, indicating little benefit due to environmental or infrastructure conditions. 9% with Tezpur University, 8% with Manipur University, 7% with Mizoram University and lastly 3% with Assam University. Overall, the data shows that although geographical limitations are a barrier for many, their effects differ, with certain places able to lessen the consequences while others still face serious connectivity issues. This exacerbates the digital divide, particularly in isolated or challenging to reach places.

5.5.8 Whether the community has taken initiative to reduce digital divide.

The data below demonstrates efforts made at the local level, or whether the community gives effort to improve technology access and digital skills.

Table-5.27: Whether the community has taken initiative to reduce digital divide.

University	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Yes	13	4	14	7	14	52(10.4)
No	30	23	27	39	27	146(29.2)
Not Sure	57	73	59	54	59	302(60.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

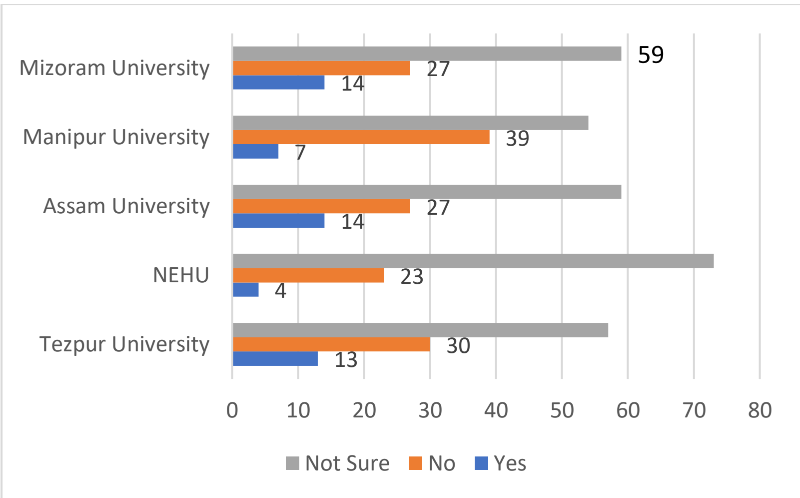


Figure-5.25: Whether the community has taken initiative to reduce digital divide

When questioned about community efforts to bridge the digital divide, the majority of respondents, 60.4%, said they were not sure. This high degree of uncertainty implies that there are either not enough obvious actions in their communities or that a large number of students are unaware that any steps are being taken. This uncertainty can be a sign of inadequate communication or inefficient community involvement in the fight against digital inequality.

A significant number of respondents, 29.2%, said there is no action been taken to bridge the digital divide. In particular, Manipur University with 39%, Tezpur University with 30%, Assam University and Mizoram University has the same number of responses with 27% and NEHU with 23% who have lowest perceptions in this category. It implies that in certain areas, students believe that their communities are not making an attempt to address the problem; this could be because there aren't enough changes in legislation, infrastructure improvements, or community-led initiatives to increase digital access and literacy.

Merely 10.4% of the respondents indicated that they agree that initiative have been taken to mitigate the digital divide. Higher percentages of favourable replies, which is 14% are shown at Mizoram University and Assam University, others like Tezpur University with 13%, Manipur University with 7%, and NEHU with 4%, indicating that certain initiatives, whether through government programs, community-led projects, or university-driven efforts-may be more noticeable or effective in these areas. The overall results show that there is a strong need for initiatives that bridge the digital divide in these communities to be widely recognized, successful, and visible.

5.6 TO KNOW THE INITIATIVE TAKEN BY SELECTED UNIVERSITIES TO REDUCE THE DIGITAL DIVIDE AMONG THE RESPONDENTS.

5.6.1 Whether the university take any initiative to reduce the digital divide.

The data below highlight the institutional efforts. Which is usually offering ICT training, free internet and devices, creating digital access centres, and integrating technology into academic support to ensure equitable digital access for all students.

Table-5.28: Whether the university take any initiative to reduce the digital divide.

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Yes	69	55	48	56	68	296(59.2)
No	31	45	52	44	32	204(40.8)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

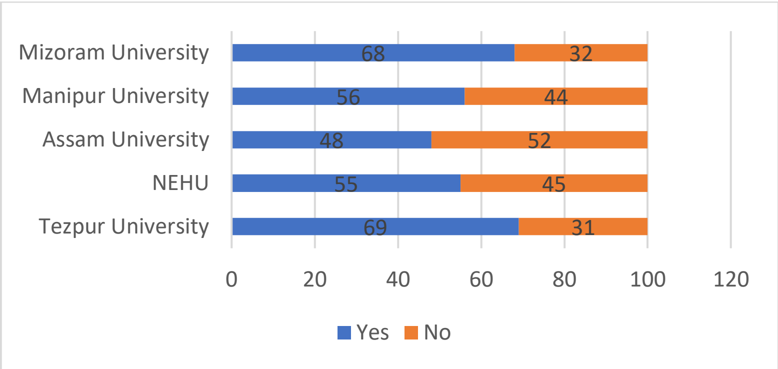


Figure-5.26: Whether the university take any initiative to reduce the digital divide

The majority of students, with 59.2%, which is 296 students, answered yes, demonstrating that most think their universities are doing something to bridge the digital divide. With the highest percentage of affirmative responses, Tezpur University gave 69%, and Mizoram University with 68%, stand out as the institutions that are thought to be actively addressing the problem. Apart from that Manipur University with 56%, NEHU with 55% and Assam University with 48% give affirmative responses. This could be due to their provision of digital resources, upgrades to their infrastructure, or promotion of digital literacy initiatives.

However, 40.8% think their universities have done absolutely nothing in response to the digital divide. A much higher proportion, 52% from Assam University and 45% from NEHU students believe their university is not taking any initiative. Also, Manipur University had 44%, Mizoram University had 32%, and Tezpur University had 31%. This may suggest either insufficient university-led programs or limited communication around existing initiatives that seek to narrow the digital divide. Overall, while most students are aware that their universities have taken action to address the digital divide, a sizable portion are not. The data emphasizes how important it is for all universities to raise the profile and effectiveness of their programs in addressing digital inequality.

5.6.2 Initiative taken by university to reduce the digital divide

Response data based on initiatives taken by the university to reduce the digital divide are given below which include efforts such as improving internet connectivity, conducting digital literacy workshops, organizing awareness programmes on ICT, providing technology grants, ensuring equitable access to digital tools, offering technology support services, and carrying out digital inclusion surveys to assess and address gaps in access and usage.

Table-5.29: Initiative taken by university to reduce the digital divide

	Initiative on internet connectivity					
	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Yes	81	59	61	45	59	305(61)
No	19	41	39	55	41	195(39)
	100	100	100	100	100	500
	Initiative on digital literacy workshop					
Yes	39	20	34	34	30	157(31.4)
No	61	80	66	66	70	343(68.6)
	100	100	100	100	100	500
	Initiative on awareness programme on ICT					
Yes	27	36	38	43	36	180(36)
No	73	64	62	57	64	320(64)
	100	100	100	100	100	500
	Initiative on technology grants					
Yes	18	22	12	3	20	75(15)
No	82	78	88	97	80	425(85)
	100	100	100	100	100	500

	Initiative on equitable access					
Yes	51	31	34	5	27	148(29.6)
No	49	69	66	95	73	352(70.4)
	100	100	100	100	100	500
	Initiative 0n technology support service					
Yes	24	25	25	3	21	98(19.6)
No	76	75	75	97	79	402(80.4)
	100	100	100	100	100	500
	Initiative on digital inclusion survey					
Yes	7	12	20	4	11	54(10.8)
No	93	88	80	96	89	446(89.2)
	100	100	100	100	100	500

N=500

The above table provides a comprehensive view of initiatives taken by five Central Universities in North-East India. The categories analysed include internet connectivity, digital literacy workshops, awareness programs on ICT, technology grants, equitable access, technology support services, and digital inclusion surveys. The analysis is given as follows:

Initiative on internet connectivity: A majority of respondents, 61%, indicated that their universities have taken steps to improve Internet connectivity. Tezpur University leads with 81% of students affirming such initiatives, Assam University with 61%, NEHU and Mizoram University with 59%, while Manipur University lags behind at 45%. In order to bridge the digital divide, improved internet access is essential, and certain universities seem to be making more of an effort in this regard. However, the 39% of respondents who answered "no" shows how much more internet infrastructure across 5 Central Universities is still required to be more inclusive. Manipur University respondents (55%, NEHU and Mizoram University 41%, Assam University 39%, and Tezpur University 19% said "no" to the initiative on internet connectivity.

Initiative on digital literacy workshop: Workshops on digital literacy are essential for bridging the gap between technology access and purposeful use. Only 31.4% of students, however, said that their universities have held these kinds of workshops. Tezpur University, with 39%, Assam University and Manipur University do slightly better at 34%, whereas NEHU, with 20% and Mizoram University, with 30%, exhibit low affirmative replies. According to the research, 68.6% of students stated that no such initiatives had been implemented, which indicates a serious deficiency. 80% of students at NEHU, 70% at Mizoram University, Assam and Manipur University, 66%, and Tezpur University, 61%, say "no" to not having initiative in digital literacy workshops. As an essential tool for bridging the digital divide, universities must place a high priority on digital literacy.

Initiative on awareness programme on ICT: Information and communication technology (ICT) awareness programs are very important for bridging the digital divide among University students. However, the majority of the respondents, 64%, exhibit low affirmative replies, signalling a need for universities to better communicate or implement ICT awareness campaigns. 73% of Tezpur University respondents said "no" to such an initiative, which is the highest in this category. Apart from that 64% each from NEHU and Mizoram University, 62% from Assam University and 57% from Manipur University. 36% of respondents indicated that their universities have undertaken such initiatives. Manipur University, with 43%, Assam University, with 38%, both NEHU and Mizoram University, with 36%, and Tezpur University, with 27%, showed the least engagement.

Initiative on technology grants: The majority, 85% of respondents, said that their universities do not have any technology grant programs. Manipur University with 97%, Assam University with 88%, Tezpur University with 82%, Mizoram University with 80% and NEHU with 78% responded "no" on such initiatives. However, only 15% of students stated that the universities they attended had awarded them grants for technology. 22% with NEHU, 20% with Mizoram University, 18% with Tezpur University, and 12% with Assam University. Particularly at Manipur University, where just 3% of respondents confirmed grant availability, there is a clear disparity.

Initiative on equitable access: The majority of university students with, 70.4% think that no initiatives have been commencing, indicating that most institutions are not doing enough to address the issue of equal access to digital resources. Manipur University has 95%, 73% with Mizoram University, 69% with NEHU, and 66% with

Assam University. The number of respondents who acknowledged initiatives toward fair access to digital resources was approximately 29.6%; the highest rate was recorded by Tezpur University, with 51% out of all respondents. 34% with Assam University, 31% with NEHU, 27% with Mizoram University, Manipur University comes up terribly short, as only 5% of respondents acknowledged any kind of fair access strategy. This implies that even if some colleges are trying, most still have a lot of work to do to guarantee that every student may profit equitably from the technology that is readily available.

Initiative on technology support service: According to the majority of respondents, which is 80.4%, there is a severe lack of technical support services that could prevent students from making the most efficient use of the technology they have access to. 97% with Manipur University, 79% with Mizoram University, 76% with Tezpur University, and 75% with Assam University and NEHU. From an overall total of respondents, only 19.6% of students confirmed the existence of technology support services at their universities, with Tezpur, NEHU, and Assam University 25% performing relatively better than Manipur University 3%.

Initiative on digital inclusion survey: The vast majority 89.2% of students indicated that no surveys have been conducted, highlighting a significant gap in data collection and awareness efforts. 96% are from Manipur University, 93% are from Tezpur University, and 89%/ 88%/ 80% are from Mizoram University, NEHU, and Assam University. This lack of surveys suggests that most universities are not systematically assessing their students' digital needs, limiting informed decision-making to bridge the digital divide successfully. The percentage of students at each of the five universities who said that their school had carried out a survey on digital inclusion, which is crucial for addressing and bridging the digital divide, was just 10.8%. Manipur University has the lowest percentage in this category at 4%, while Assam University leads at 20%. This shows that academic institutions may not be actively gathering information about the digital gap within their student body, which is necessary for focused interventions and well-informed policymaking.

5.7 TO FIND OUT THE AREA OF STRENGTH AND WEAKNESS OF RESPONDENT IN HANDLING DIGITAL ASSETS AND GIVE SUGGESTIONS FOR ENHANCEMENT.

In order to determine the respondents' proficiency with digital devices, a thorough evaluation may focus on specific skills like social media management, data analysis, online ticket booking, web development, digital marketing (online marketing), cloud computing, accessing journal/book database, handling AI technology and updating software. A specific evaluation would highlight areas in need of development, directing future initiatives related to digital literacy training. The following table gives the results of the respondents from different 5 universities.

5.7.1 Digital proficiency in social media management

To find out the areas of strength and weakness of respondents in handling digital assets, it is necessary to investigate among the students about the status of digital proficiency in social media management. The following Table-5.30 and Figure-5.27 show the data collected from the students.

Table-5.30: Digital proficiency in social media management

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	22	49	19	10	0	100
NEHU	13	55	29	3	0	100
Assam University	28	55	10	7	0	100
Manipur University	26	53	9	11	1	100
Mizoram University	16	60	21	3	0	100
Frequency (%)	**105(21)**	**272(54.4)**	**88(17.6)**	**34(6.8)**	**1(0.2)**	**500**

N=500

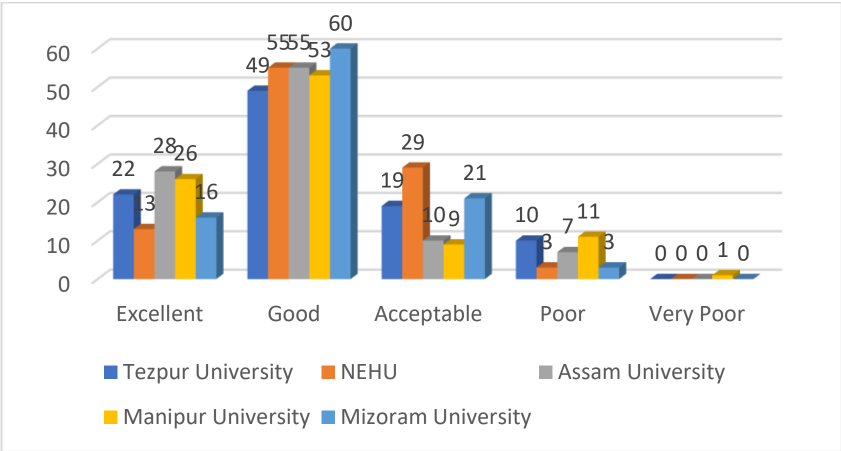


Figure-5.27: Digital proficiency in social media management

The data reveals that a majority number of respondents, 54.4%, rated their digital proficiency in social media management as good. This implies that the students are proficient users of social media platforms and have a basic understanding of them. The majority of the respondents from Mizoram University, with 60%, rated their digital proficiency in social media management as good. All universities have high percentages in this category, reflecting strong digital proficiency in this field. NEHU and Assam University with 55%, Manipur University with 53%, and Tezpur University with 49%. A total of 21% of respondents rated their skills as excellent. Assam University, with 28%, and Manipur University, with 26%, were the top two universities in this respect of excellent column. A total of 17.6% of respondents rated their skills as acceptable. In this category, NEHU has the highest with 29%, followed by Mizoram University with 21%.

The fact is that only 6.8% of students reflected that their skills were poor. With the largest percentage, 11%, in the poor group, Manipur University may need to implement specialized digital literacy programs. Followed by Tezpur University with 10%. Just 0.2% thought they were very poor, which shows how little difficulty most students have managing their social media platforms. Overall, the majority of students have good and excellent social media management skills; just a small number need serious development.

5.7.2 Digital proficiency in data analysis

In order to find out the areas of strength and weakness of respondents in handling digital assets, it is necessary to investigate among the students about the status of digital proficiency in data analysis. The following Table-5.31 and Figure-5.28 show the data collected from the students.

Table-5.31: Digital proficiency in data analysis

University	**Excellent**	**Good**	**Acceptable**	**Poor**	**Very Poor**	**Total**
Tezpur University	4	37	44	14	1	100
NEHU	2	27	44	24	3	100
Assam University	6	45	36	13	0	100
Manipur University	14	16	47	18	5	100
Mizoram University	5	34	47	10	4	100
Frequency (%)	**31(6.2)**	**159(31.8)**	**218(43.6)**	**79(15.8)**	**13(2.6)**	**500**

N=500

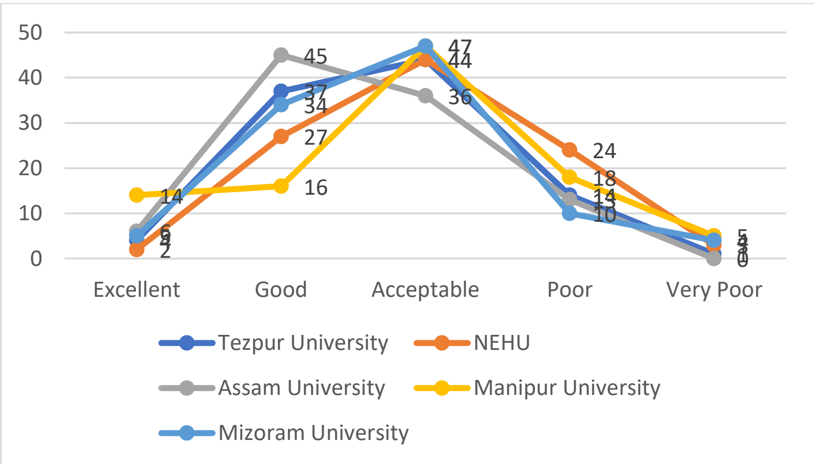


Figure-5.28: Digital proficiency in data analysis

The above table and charts illustrate the digital proficiency of students in data analysis across five Central Universities in North East India. A large percentage of respondents, 43.6%, assessed their data analysis abilities as acceptable, indicating that although most students have some basic understanding, they might not be very proficient. In this category, the highest number of respondents are Mizoram

University with 47% and Manipur University with 47%, followed by both NEHU and Tezpur University with 44%; this indicates the need for more skill development to raise data analysis competence levels. A total of 31.8% of participants evaluated their skills as good, and the highest percentages in this category were reported by Assam University, with 45%, and Tezpur University, with 37%. Only 6.2% of participants assessed their abilities as excellent, with Manipur University leading in this category with 14%, followed by Assam University with 6%. Only 2.6% of respondents from 5 universities rated their skills as very poor, and 15.8% of respondents as poor. The percentage of students who struggle and respond with poor data analysis is higher at NEHU at 24% and Manipur University at 18%, indicating a need for workshops and specific training to improve students' data management and analytical abilities. Mizoram University has the highest percentage in the very poor category with 4%.

5.7.3 Digital proficiency in online ticket booking

In order to find out the areas of strength and weakness of respondents in handling digital assets, it is necessary to investigate among the students about the status of digital proficiency in online ticket booking. The following Table-5.32 and Figure-5.29 show the data collected from the students.

Table-5.32: Digital proficiency in online ticket booking

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	33	47	14	6	0	100
NEHU	6	28	39	19	8	100
Assam University	37	37	15	10	1	100
Manipur University	15	53	22	9	1	100
Mizoram University	30	30	23	9	8	100
Frequency (%)	**121(24.2)**	**195(39)**	**113(22.6)**	**53(10.6)**	**18(3.6)**	**500**

N=500

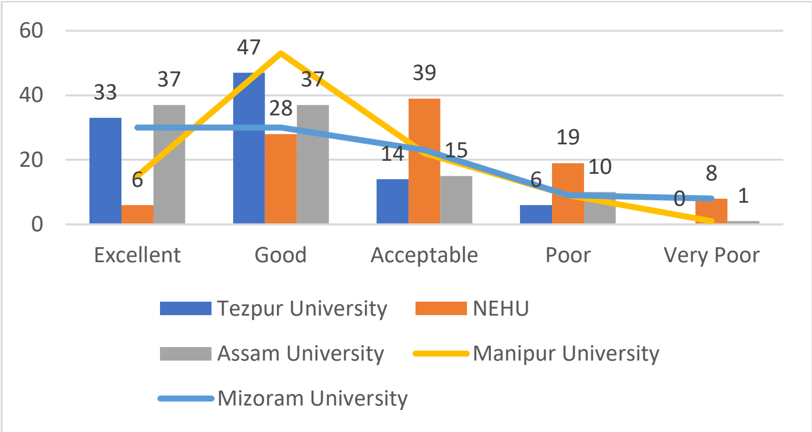


Figure-5.29: Digital proficiency in online ticket booking

The above table and chart display students' digital proficiency in relation to online ticket booking at five Central Universities located in Northeastern India. A large number of students, which is 39%, rate their skills as good, demonstrating a significant ability for handling online ticket booking. In this category, Manipur University, with 53%, is at the top, followed by Tezpur University, with 47%, indicating a greater degree of experience using digital tools for these kinds of activities. A remarkable 24.2% of respondents assessed their abilities as excellent, with the greatest percentages coming from Assam University at 37%, followed by Tezpur University at 33%. This indicates that a sizable percentage of students are extremely skilled at booking tickets online, a prevalent and practical digital ability in the modern world. About 22.6% of respondents rated their skills as acceptable, meaning that although they can complete the task, they might not be entirely confident or productive. In this category, NEHU, with 39% and Mizoram University, with 23%, have the highest percentages, indicating areas where more practice or training could enhance digital efficiency.

Overall, while the students performed very well, 3.6% of them assessed their skills as very poor, and 10.6% as poor. Students who struggle with online ticket booking are most prevalent at NEHU, with 19% poor and 8% very poor, and Mizoram University, with 9% poor and 8% very poor. This shows that some students may still have trouble utilizing online resources, possibly as a result of insufficient exposure or confidence in the platforms. As a result, some students have held their entire education within their particular state, and most probably, they don't have a chance for exposure to other states as well, maybe because of family or financial issues.

5.7.4 Digital proficiency in web development

In order to find out the areas of strength and weakness of respondents in handling digital assets, it is necessary to investigate among the students about the status of digital proficiency in web development. The following Table-5.33 and Figure-5.30 show the data collected from the students.

Table-5.33: Digital proficiency in web development

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	3	11	22	45	19	100
NEHU	1	14	33	41	11	100
Assam University	1	20	20	43	16	100
Manipur University	0	16	16	31	37	100
Mizoram University	3	24	34	20	19	100
Frequency (%)	**8(1.6)**	**85(17)**	**125(25)**	**180(36)**	**102(20.4)**	**500**

N=500

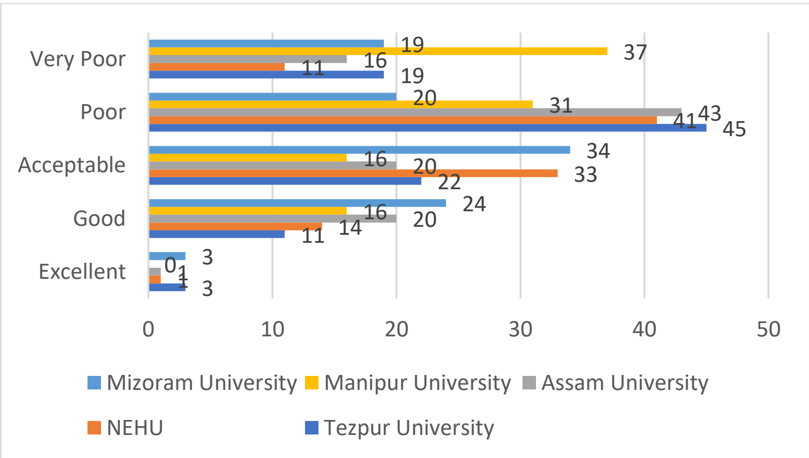


Figure-5.30: Digital proficiency in web development

From the above table, 36% of students said their skills were poor, and 20.4% said they were very poor. Manipur University students rate themselves as very poor at 37% and Poor at 31%, indicating significant obstacles in web development skills. At the same time, Tezpur University rates poor at 45% and Assam University at 43%, where many students have difficulty with web development. Approximately 25% of students rated their abilities as acceptable. The largest percentage in this group comes from Mizoram University at 34% and NEHU at 33%, indicating that some students may have a basic knowledge of web programming but lack confidence or greater skill in more complex work.

Only 1.6% of students said they were excellent at web development, while 17% said they were good. While the percentage of students with good ability is comparatively greater at Mizoram University at 24% and Assam University at 20%, the overall number of highly skilled students is low at all universities. This suggests that a relatively small percentage of students have proficient web development skills, skills that are essential for building and maintaining websites in the digital age. It thus indicates a need for workshops and specific training to improve students' web development.

5.7.5 Digital proficiency in digital marketing

To identify the strengths and weaknesses of respondents in handling digital assets, it is essential to examine students' levels of digital proficiency specifically in the area of digital marketing. The following Table-5.34 and Figure-5.31 show the data collected from the students.

Table-5.34: Digital proficiency in digital marketing

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	14	26	22	27	11	100
NEHU	8	22	32	26	12	100
Assam University	11	23	26	30	10	100

Manipur University	2	16	37	19	26	100
Mizoram University	10	25	30	25	10	100
Frequency (%)	**45(9)**	**112(22.4)**	**147(29.4)**	**127(25.4)**	**69(13.8)**	**500**

N=500

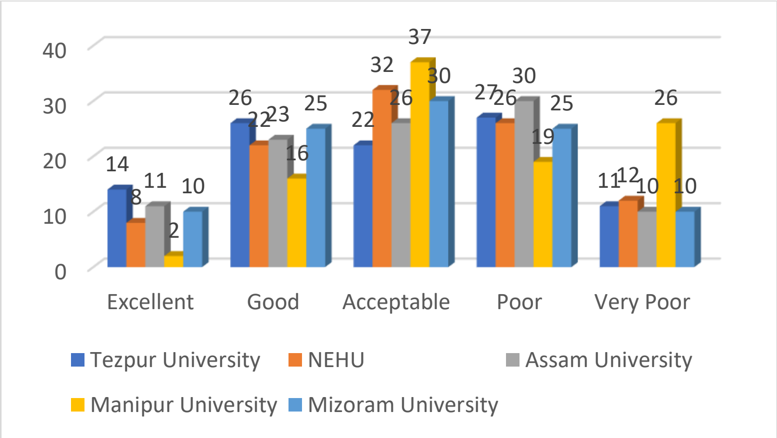


Figure-5.31: Digital proficiency in digital marketing

A large number of students had an average amount of knowledge in digital marketing, as indicated by the percentage of respondents who assessed their skills as acceptable, with 29.4%. The highest percentage in this group comes from Manipur University with 37% and NEHU with 32%, indicating that some students may have a basic knowledge of Digital Marketing. The overall frequency in the poor category is 127(25.4%). There is space for improvement in terms of grasping advanced methods and procedures, which also indicates significant challenges in digital marketing proficiency. However, Assam University rated 30% poor, which is the highest in this category, and 27% from Tezpur University. A percentage of respondents rated their skills as good is, 22.4%, indicating that most students possess a moderate level of proficiency in digital marketing. Tezpur University, with 26%, and Mizoram University, with 25%, have a stronger representation in these categories. Only 9% of students said they had excellent skills, and the highest percentages were found at Tezpur University with 14% and Assam University with 11%, followed by Mizoram University with 10%. This suggests that just a small number of students have advanced knowledge of digital marketing, which is necessary for increasing online exposure and utilizing digital platforms for professional or academic objectives.

A notable 13.8% rated their skills as very poor, indicating significant challenges in digital marketing proficiency. Different universities also show sizable percentages in very poor categories, particularly Manipur University, with 26% very poor and NEHU, with 12% very poor. The overall data shows that even while most students have an average understanding of digital marketing, a sizeable portion of them find it difficult.

5.7.6 Digital proficiency in cloud computing

To identify the strengths and weaknesses of respondents in handling digital assets, it is essential to examine students' levels of digital proficiency specifically in the area of cloud computing. The following Table-5.35 and Figure-5.32 show the data collected from the students.

Table-5.35: Digital proficiency in cloud computing

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	3	17	32	35	13	100
NEHU	2	19	43	24	12	100
Assam University	1	14	27	40	18	100
Manipur University	0	8	25	29	38	100
Mizoram University	4	14	34	32	16	100
Frequency (%)	**10(2)**	**72(14.4)**	**161(32.2)**	**160(32)**	**97(19.4)**	**500**

N=500

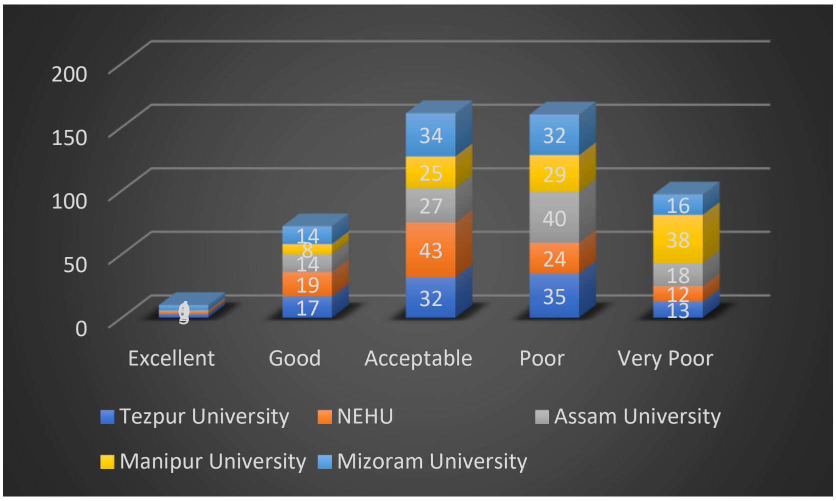


Figure-5.32: Digital proficiency in cloud computing

The cloud computing digital proficiency of students at five Central Universities in Northeast India is displayed in the above table. The above data reveals that a large number of respondents, 32.2%, rated their digital proficiency in Cloud Computing as acceptable. Even though the concept is popular to them, students might not yet fully understand more advanced cloud computing services and tools. The highest percentages in this category belong to Tezpur University, with 32%, and Mizoram University, with 34%. A total of 32+19.4=51.4% of students assessed their skills as poor or very poor, demonstrating a significant deficiency in cloud computing knowledge. Manipur University creates a significant disparity, with 38% as very poor and 29% of students evaluating their skills as poor. At the same time, 40% of Assam University students consider their skills to be poor. According to these statistics, a lot of students have trouble with cloud computing. As a result, universities have to think about providing more specialized instruction. Only 14.4% of respondents thought their skills were good, with Tezpur University at 17% and NEHU at 19% having the highest ratings. This indicates that while advanced skills are still lacking across universities, a smaller percentage of students understand cloud computing better. Merely 2% of the overall respondents rated their skill as excellent; among the universities in the category of excellent, Mizoram University holds 4% of respondents, which is the highest amongst the other, which is very low, indicating significant challenges in cloud computing.

5.7.7 Digital proficiency in accessing journal/ book database

In order to identify the strengths and weaknesses of respondents in handling digital assets, it is essential to examine students' levels of digital proficiency specifically in the area of accessing journal/ book database. The following Table-5.36 and Figure-5.33 show the data collected from the students.

Table-5.36: Digital proficiency in accessing journal/ book database

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	19	37	26	15	3	100
NEHU	9	34	31	25	1	100
Assam University	19	40	20	20	1	100
Manipur University	16	33	31	11	9	100
Mizoram University	9	48	30	9	4	100
Frequency (%)	**72(14.4)**	**192(38.4)**	**138(27.6)**	**80(16)**	**18(3.6)**	**500**

N=500

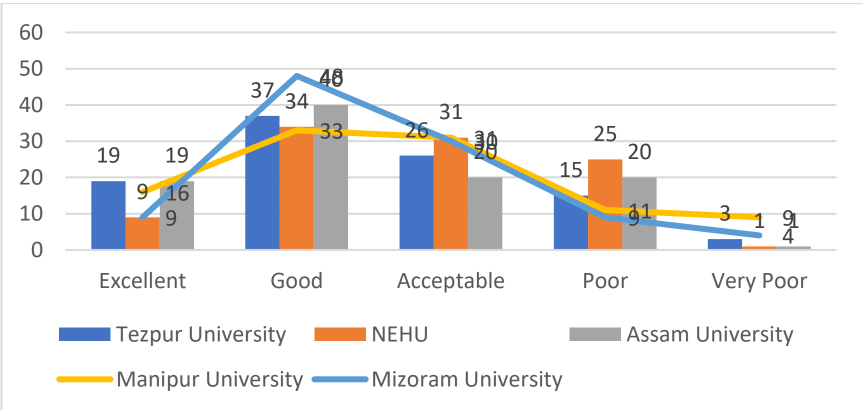


Figure-5.33: Digital proficiency in accessing journal/ book database

The above table and chart give an understanding of how well-versed in digital literacy students are at five major universities in Northeast India when it comes to accessing book and journal databases. A significant number of students which is 38.4%, rated their proficiency as good, demonstrating an important understanding of how to use academic databases. In this category, Mizoram University is in the lead, with 48% of its students rating their skills as good, followed by Assam University with 40%. 27.6% of respondents rated their skills as acceptable. In this category, NEHU and Manipur University both have the same percentage, which is 31%, followed by Mizoram University with 30%. Therefore, the data indicates that students at these universities possess a reasonable level of proficiency in utilizing digital academic resources, an essential skill for conducting research and achieving academic excellence. 16% of overall respondents said their skills were poor; NEHU has the highest percentage of students in the poor category with 25%, followed by Assam University with 20%. Moreover, 14.4% of students said they had excellent skills; 19% of students at Tezpur University and Assam University came into this category.

On the other hand, only 3.6% of students said their skills were very poor; Manipur University has the highest percentage of very poor ratings, with 9% of students greatly struggling, also followed by Mizoram University with 4%. These numbers demonstrate how these universities must implement focused interventions to raise digital literacy.

5.7.8 Digital proficiency in handling AI

In order to find out the areas of strength and weakness of respondents in handling digital assets, it is necessary to investigate among the students about the status of digital proficiency in handling AI. The following Table-5.37 and Figure-5.34 show the data collected from the students.

Table-5.37: Digital proficiency in handling AI

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	16	38	33	10	3	100
NEHU	6	43	27	17	7	100
Assam University	19	28	30	17	6	100
Manipur University	24	19	32	16	9	100

Mizoram University	11	36	39	13	1	100
Frequency (%)	**76(15.2)**	**164(32.8)**	**161(32.2)**	**73(14.6)**	**26(5.2)**	**500**

N=500

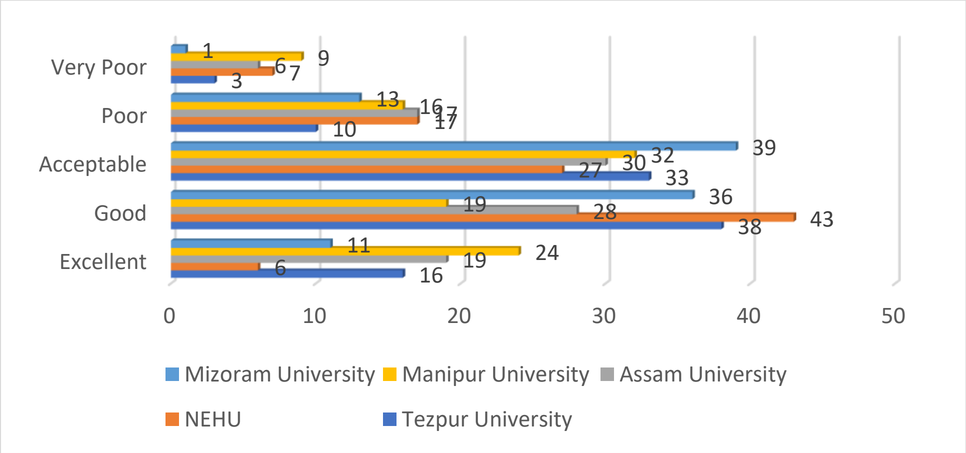


Figure-5.34: Digital proficiency in handling AI

The above table and chart provide a detailed analysis of students' digital proficiency in handling AI across five Central Universities in North-East India. Overall, 32.8% of students rated their skills as good; NEHU leads in this category, with 43% of its students indicating good proficiency, followed by Tezpur University with 38%. This indicates that a significant portion of students at these institutions have a good understanding of AI concepts and tools, which is essential as AI becomes more integrated into various sectors. 32.2 % of respondents from different Universities rated their proficiency as acceptable. Mizoram University rated the highest at 39%, followed by Tezpur University at 33%. Meanwhile, 15.2% of students rated their skills as excellent, with Manipur University having the highest percentage of students with 24% in this category, indicating a stronger focus on AI literacy at this institution, followed by Assam University with 19%.

A smaller but significant number of students, 14.6%, rated their AI proficiency as poor. Assam University and NEHU have the same percentage, which is 17% in this category, followed by Manipur University with 16%. Only 5.2% of overall respondents rated their skills as very poor, which clearly shows that they have difficulties using the technology. The largest percentage comes from Manipur University students, with 9%, who fall into the very poor category, followed by

NEHU with 7%. A significant proportion of students at both Assam University and NEHU, with 17%, rate their skills as poor. The findings indicate that colleges should concentrate more on enhancing students' digital AI skills, especially in those where a significant proportion of students still struggle.

5.7.9 Digital proficiency in updating software

In order to identify the strengths and weaknesses of respondents in handling digital assets, it is essential to examine students' levels of digital proficiency specifically in the area of updating software. Table-5.38 and Figure-5.35 show the data collected from the students

Table-5.38: Digital proficiency in updating software

University	Excellent	Good	Acceptable	Poor	Very Poor	Total
Tezpur University	17	39	32	9	3	100
NEHU	17	42	24	17	0	100
Assam University	25	29	26	17	3	100
Manipur University	9	43	33	6	9	100
Mizoram University	11	41	33	14	1	100
Frequency (%)	**79(15.8)**	**194(38.8)**	**148(29.6)**	**63(12.6)**	**16(3.2)**	**500**

N=500

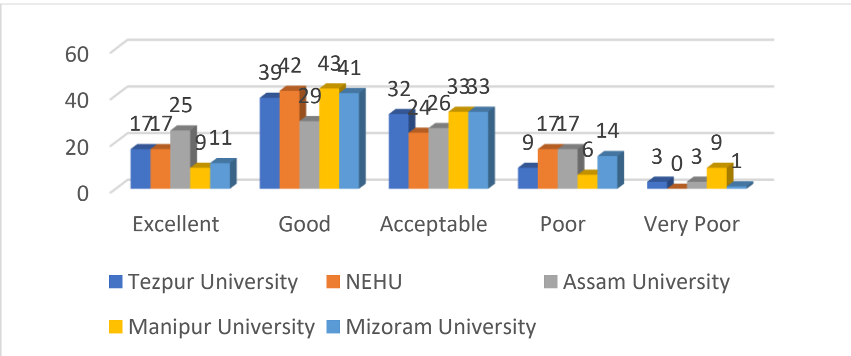


Figure-5.35: Digital proficiency in updating software

Analysing the above table and charts, a significant number of respondents, 38.8%, rated their skills as good, making it the most common proficiency level. Manipur University leads in this category, with 43% of its students indicating good proficiency, followed closely by NEHU with 42% and Mizoram University with 41%. This implies that a large number of respondents across these institutions are relatively skilled at updating Software, an essential skill for performance in the digital age. A smaller but significant number of students, 29.6%, rated their proficiency as acceptable. In this category, Mizoram University and Manipur University have the highest with 33%, followed by Tezpur University with 32%. Meanwhile, 15.8% of students rated their skills as excellent, with Assam University having the highest percentage in this category at 25%, followed by NEHU and Tezpur University with 17%.

On the other hand, 12.6% of students evaluated their skills as poor, and only 3.2% of students assessed their skills as very poor. A minority of students at Manipur University struggle with significant software management, as seen with 9% of students rating their skills as very poor. A significant number of students at Tezpur University, with 9%, and Assam University, with 17%, rated their skills as poor. Overall, the data shows that certain institutions need to concentrate on strengthening this crucial digital skill, especially considering its importance in ensuring digital literacy and device functionality, even though the majority of students show a good ability to update Software.

5.7.10 Level of familiarity with upcoming technology and current digital trends

Knowing the level of familiarity with upcoming technology and current digital trends is necessary among the students, in order to find out the areas of strength and weakness of respondents in handling digital assets. The corresponding response data is highlighted in the below Table-5.39 and Figure-5.36.

Table-5.39: Level of familiarity with upcoming technology and current digital trends

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
To a great extent	29	23	32	25	22	131 (26.2)
Somewhat	62	65	57	55	61	298 (60)
Very Little	9	12	10	18	16	65 (13)
Not at all	0	0	1	2	1	6 (0.8)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

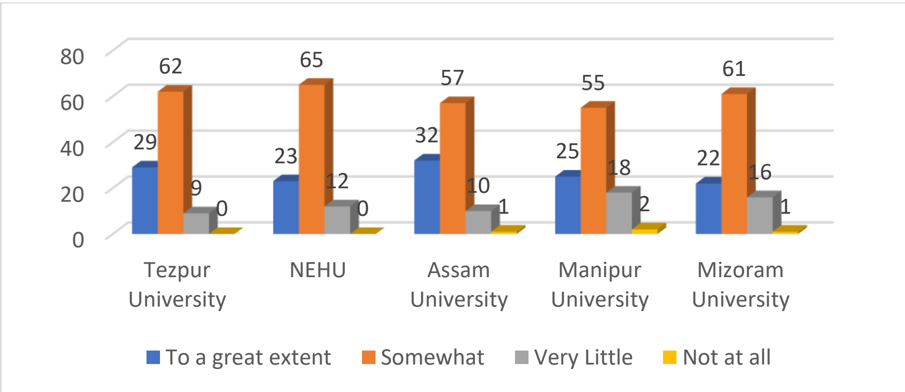


Figure-5.36: Level of familiarity with upcoming technology and current digital trends

The analysis of the data depicts that overall; the majority of respondents rated their level in the somewhat category with 60%. This implies that even if most of the students are aware of current digital developments, their understanding may only be slightly deep. NEHU leads this area with 65%, followed by Tezpur University with 62%, suggesting that a significant number of its students are aware of modern technology but are not highly engaged with it. With 26.2% of the respondents stating a high level of familiarity with new technology and trends, Assam University topped the category with 32% of the responses. Tezpur University also demonstrated a significant reaction with 29%. Meanwhile, NEHU and Mizoram University had somewhat lower percentages of 23% and 22% respectively. The results indicate a significant proportion of respondents are well aware of and involved in digital advances, indicating a strong foundation of technology knowledge among institutions.

From the overall total of the respondents, only 13% of the respondents reported having very little experience with new technologies. Manipur University has the highest in this category with 18%, followed by Mizoram University with 16%. only 0.8% said they had no knowledge of them at all. A good sign is that none of the respondents, both from Tezpur University and NEHU, rated in the not-at-all category. However, the low percentage of lack of familiarity indicates that more training or resources are needed to improve digital literacy.

5.7.11 Levels of barriers face by the respondents in accessing digital contents:

The respondents could face different obstacles when trying to access digital content, however typical difficulties include: lack of ICT background in the family, poor or no connection of internet at home, lack of ICT infrastructure at institution/University, poor network coverage within university campus, lack of skills to access required information and lack of proficiency in English language.

5.7.11.1 Lack of ICT background in the family

The following Table-5.40 and Figure-5.37 highlights the level of barriers faced by the students due to a lack of ICT background in the family.

Table-5.40: Lack of ICT background in the family

	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Extreme	11	16	14	6	13	60 (12)
Moderate	55	48	60	63	65	291 (58.2)
Not a barrier	34	36	26	31	22	149 (29.8)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

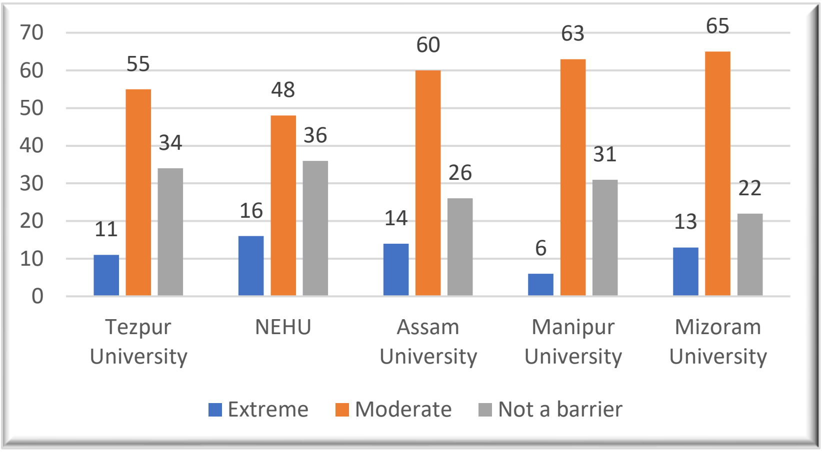


Figure-5.37: Lack of ICT background in the family

The majority of the respondents, 58.2%, indicated that this barrier is moderate. Mizoram University has the highest in this category at 65%, followed by Manipur University at 63%. This implies that most students find it challenging to deal with digital environments when they don't have family support for ICT. From the overall total, 29.8% stated that not having an ICT background in the family does not have a significant barrier. In this category, each of the universities has a rating of 22-36%. At the same time, a smaller group, with 12%, said the barrier was extreme. NEHU had the largest percentage in this category, 16%, followed by Assam University, 14%, and Mizoram University, 13%. These differences show that while many people are impacted by a lack of ICT background, these differences show that whereas many people are impacted by a lack of ICT experience, others are able to make up for it by using different strategies like institutional support or self-learning.

5.7.11.2 Poor or no connection of internet at home

The following Table-5.41 and Figure-5.38 highlight the barriers faced by the students across five universities due to poor or no connection to the internet at home.

Table-5.41: Poor or no connection of internet at home

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Extreme	16	16	8	5	10	55 (11)
Moderate	25	43	32	46	46	192 (38.4)

Not a Barrier	59	41	60	49	44	253 (50.6)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

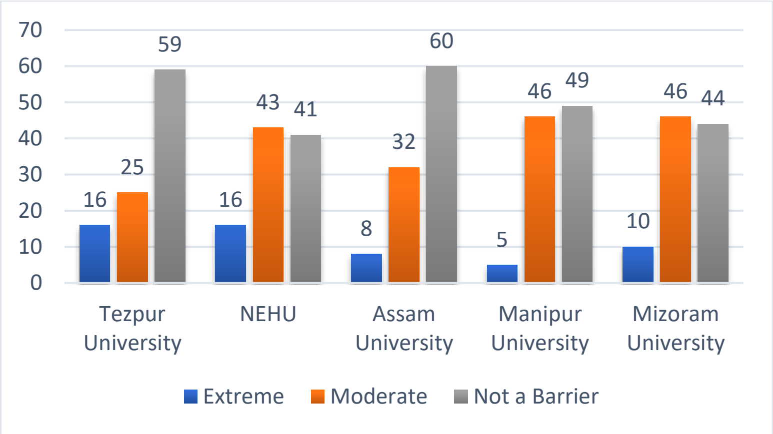


Figure-5.38: Poor or no connection of internet at home

The majority of the respondents in overall, 50.6% of the respondents stated that this problem was not a barrier, with the highest percentage coming from Assam University with 60% and Tezpur University with 59%. This indicates that a majority of the participants possess reliable or sufficient internet connectivity at their residences, enabling them to interact with digital information without experiencing significant problems. However, 38.4% of the respondents classified this issue as moderate, suggesting that although not totally obstructive, unstable internet does impact a significant percentage of students. Both Manipur University and Mizoram University scored 46% in this category. Overall, 11% of respondents said that internet connection was an extreme barrier, and 16% of respondents each reported NEHU and Tezpur University. These numbers demonstrate the need for better internet infrastructure, especially for students who still experience unreliable connections at home.

5.7.11.3 Lack of ICT infrastructure at institution/ University

The following Table-5.42 and Figure-5.39 provides a detailed analysis of barriers faced by students across five universities due to the lack of ICT infrastructure at the university.

Table-5.42: Lack of ICT infrastructure at institution/ University

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Extreme	10	8	3	5	5	31 (6.2)
Moderate	31	48	43	50	45	217 (43.4)
Not a Barrier	59	44	54	45	50	252 (50.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

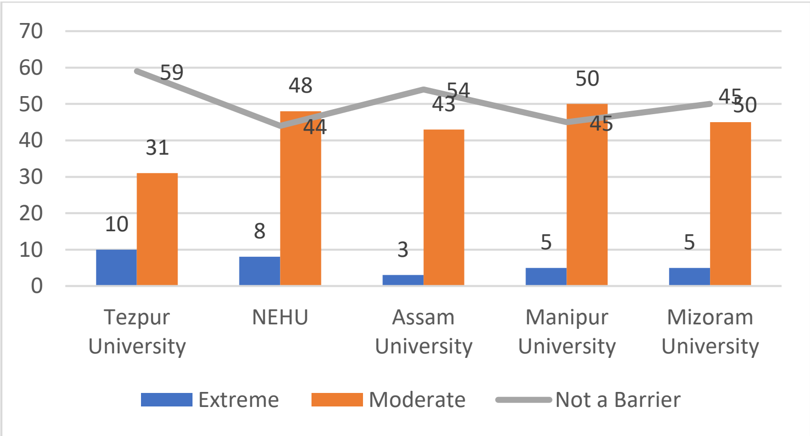


Figure-5.39: Lack of ICT infrastructure at institution/ University

Overall, half of the respondents, 50.4%, stated that the lack of ICT infrastructure was not a barrier, indicating that every university has sufficient equipment. Tezpur University has the highest in this category with 59%, followed by Assam University with 54%. All universities come within 44%-59% of this category. This indicates that all universities have comparatively mature ICT infrastructures. However, overall, respondents from different Universities 43.4% viewed the absence of ICT infrastructure as moderate, indicating possibilities for improvement. The highest percentage in this category is Manipur University, with 50%, followed by NEHU, with 48%; this highlighted problems in their digital infrastructure that prevent students from accessing digital resources. 6.2% of respondents overall said this was an extreme barrier. The highest percentage of respondents was from Tezpur University, 10%, followed by NEHU, 8%. These findings show that although ICT infrastructure is not a big problem for most people, a significant minority still has trouble using digital tools at their institutions.

5.7.11.4 Poor network coverage within the University campus

The below Table-5.43 and Figure-5.40 provides information about the barriers caused by poor network coverage on the campuses of five universities.

Table-5.43: Poor network coverage within the University campus

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Extreme	30	23	17	14	23	107 (21.4)
Moderate	43	45	49	50	49	236 (47.2)
Not a Barrier	27	32	34	36	28	157 (31.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

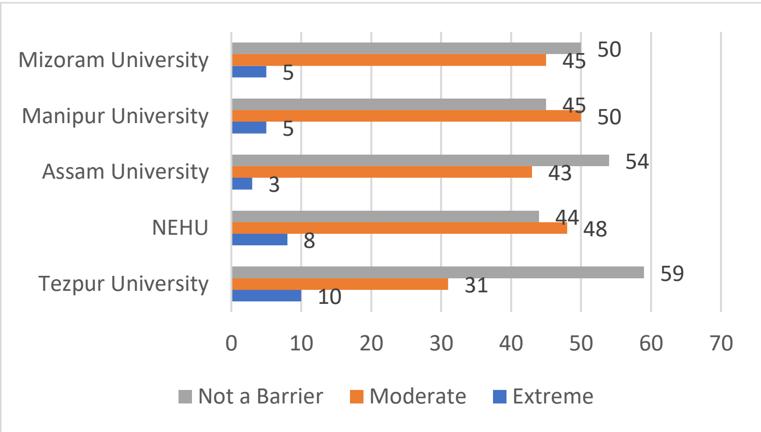


Figure-5.40: Poor network coverage within the University campus

The table above provides information about the barriers caused by poor network coverage on the campuses of five universities. 47.2% of respondents, a significant number, rated this problem as moderate. The highest number of respondents in this category, 50% of respondents from Manipur University and 49% from Assam University and Mizoram University dominated this category. This implies that many of their students have some trouble accessing the campus network. Overall, 31.4% of participants stated that network coverage created no barrier. In this regard, Assam

University and Manipur University, where 34% and 36% of respondents, respectively, reported no major problems. These findings demonstrate that although a large number of universities are impacted, some maintain very reliable network infrastructure.

In the meantime, poor network coverage was highlighted as an extreme barrier by 21.4% of respondents. Tezpur University had the highest percentage of respondents, with 30%, followed by NEHU and Mizoram University, both at 23%. Based on findings, a significant portion of students' access to digital resources and the opportunity for efficient campus communication are adversely affected by network problems.

5.7.11.5 Lack of skills to access required information

The below Table-5.44 and Figure-5.41 highlights the barriers to lack of skills to access the required information among the students from five universities.

Table-5.44: Lack of skills to access required information

	Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Frequency (%)
Extreme	5	10	7	6	7	35 (7)
Moderate	55	63	50	65	70	303 (60.6)
Not a Barrier	40	27	43	29	23	162 (32.4)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

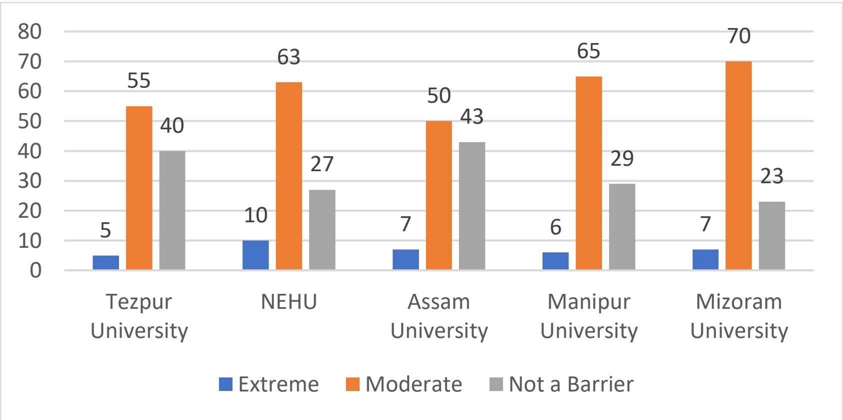


Figure-5.41: Lack of skills to access required information

The majority of the respondents with, 60.6%, rated this issue as a moderate barrier. Mizoram University has the highest percentage, with 70%, followed by Manipur University, with 65%. This shows that even if students have some fundamental knowledge of computers, many still struggle to find the information they need efficiently. In the meantime, 32.4% of respondents said that this was not a barrier. Assam University, with 43%, and Tezpur University, with 40%, leading in this regard. Although there are still skill gaps at many schools, these findings show that a significant number of students are confident in their ability to obtain knowledge. Overall, a lower number, with 7%, considered this lack of abilities to be an extreme barrier. NEHU had the highest percentage with 10%, followed by Assam University and Mizoram University with 7%. This implies that certain students face significant challenges due to their inadequate proficiency with digital tools and methods.

5.7.11.6 Lack of proficiency in English language

The below Table-5.45 and Figure-5.42 reveals the level of barriers faced by respondents due to a lack of proficiency in the English language.

Table-5.45: Lack of proficiency in English language

	Tezpur University	**NEHU**	**Assam University**	**Manipur University**	**Mizoram University**	**Frequency (%)**
Extreme	5	4	3	7	6	25 (5)
Moderate	28	47	33	47	47	202 (40.4)
Not a Barrier	67	49	64	46	47	273 (54.6)
Total	**100**	**100**	**100**	**100**	**100**	**500**

N=500

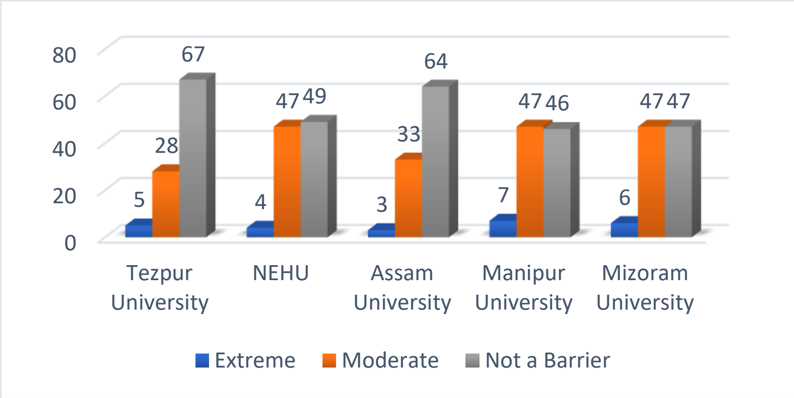


Figure-5.42: Lack of proficiency in English language

A majority overall, 54.6%, indicated that lack of proficiency in the English language was not a barrier. Tezpur University has the highest percentage with 67%, followed by Assam University with 64%. This indicated that most students across these institutions feel confident in their English proficiency, which is essential for accessing digital content and academic resources. However, 40.4% of the respondents observed this as a moderate barrier. This indicates that even with their moderate knowledge of English, they still face difficulties. In this category, NEHU, Manipur University, and Mizoram University all had 47%, showing that a significant number of students occasionally struggle because of language barriers. Only 5% of the overall total of respondents thought that this was an extreme barrier. The highest percentages were found at Manipur University at 7%, followed by Mizoram University at 6%. This demonstrates that even though language competency is not a major issue for most people, a small minority still faces considerable difficulties.

5.8 TO IDENTIFY THE AWARENESS OF COPYRIGHT AMONG THE RESPONDENTS

A number of criteria are taken into consideration when evaluating respondents' copyright awareness in the context of the digital divide. These include questioning the basic awareness such as awareness on what can be protected using copyright, awareness level of copyright, awareness on the basis that respondents have to cite for using someone's ideas and quote for person's exact words to prevent copyright issues, Whether the respondents have ever been accused of copyright infringement. Respondents who often access the internet and other digital resources are more likely to be knowledgeable about copyright regulations. They usually seem to have a better understanding of the legal frameworks that control the use of digital content, including those related to fair use, copyright infringement, and intellectual property protection. In order to raise students' awareness of the legal and ethical implications of using or sharing digital content, educational institutions with well-established ICT infrastructure frequently include copyright teachings in their digital literacy curricula.

5.8.1 Awareness on what can be protected using copyright

The data gathered from the respondents on the awareness level of what can be protected using copyright are highlighted in the following Table-5.46 and Figure-5.43.

Table- 5.46: Awareness on what can be protected using copyright

University	Extremely	Moderate	Not at all	Total
Tezpur University	20	69	11	100
NEHU	17	54	29	100
Assam University	25	58	17	100
Manipur University	15	60	25	100
Mizoram University	22	65	13	100
Frequency (%)	**99 (19.8)**	**306 (61.2)**	**95 (19)**	**500**

N=500

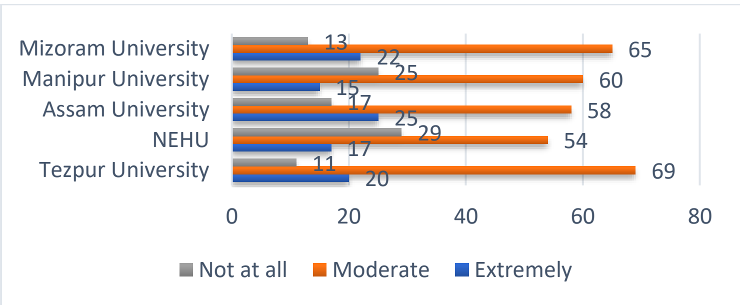


Figure-5.43: Awareness on what can be protected using copyright

A majority 61.2%, have a moderate understanding of copyright protection. Tezpur University had 69%, followed by Mizoram University, which reported the highest at 65%. This implies that even while the majority of students understand copyright in general, their understanding can be basic or inadequate. Only 19.8% of respondents reported an extreme understanding of copyright protection, with Assam University leading with 25% in this category, followed by Mizoram University with 22%. This demonstrates that a lower percentage of students fully understand what kinds of works, such as literary works, digital content, and creative outputs, can be legally protected under copyright. At the same time, 19% of the respondents stated they had no awareness of copyright protection. NEHU had the highest rate in this category with 29%, followed by Manipur University with 25%. This indicates there is still a knowledge gap on the ongoing effects of the digital divide, which is probably driven by different access levels to materials and programs promoting digital literacy.

5.8.2 Awareness level of copyright

The data gathered from the respondents on the awareness level of copyright are highlighted in the following Table-5.47 and Figure-5.44.

Table-5.47: Awareness level of copyright

University	**To a great extent**	**Somewhat**	**Very Little**	**Not at all**	**Total**
Tezpur University	14	72	13	1	100
NEHU	15	54	23	8	100
Assam University	18	54	26	2	100
Manipur University	10	59	19	12	100
Mizoram University	20	49	27	4	100
Frequency (%)	**77 (15.4)**	**288 (57.6)**	**108 (21.6)**	**27 (5.4)**	**500**

N=500

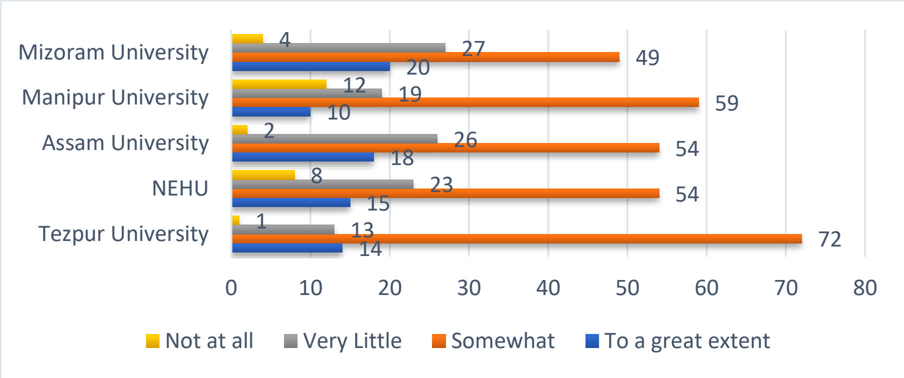


Figure-5.44: Awareness level of copyright

A majority, 57.6%, have a somewhat understanding of copyright. Tezpur University shows the highest proportion in this category, with 72%, followed by Manipur University, with 59%. This indicates that while most students understand the fundamentals of copyright, they might not completely understand their application. At the same time, 21.6% of students said they knew very little about copyright. Mizoram University leads with 27% in this category, followed by Assam University with 26%. The percentage of respondents who strongly understand copyright to a great extent is only 15.4%. Mizoram University leads with 20% in this category, followed by Assam University with 18%. This shows that fewer students have a thorough understanding of copyright laws and their implications. A smaller number of respondents from all universities, with 5.4%, reported having no awareness at all. Manipur University had 12%, followed by NEHU with 8%. These findings show differing degrees of awareness, indicating knowledge gaps about copyright regulations that may be related to variations in university access to digital literacy programs.

5.8.3 Awareness on the basis that respondents have to cite for using someone's ideas and quote for a person's exact words to prevent copyright issues.

The following Table-5.48 and Figure-5.45 highlight the collected data on awareness on the basis that respondents have to cite for using someone's ideas and quote for a person's exact words to prevent copyright issues.

Table-5.48: Awareness on the basis that respondents have to cite for using someone's ideas and quote for a person's exact words to prevent copyright issues.

University	**Extremely**	**Moderate**	**Not at all**	**Total**
Tezpur University	53	38	9	100
NEHU	45	36	19	100
Assam University	40	52	8	100
Manipur University	31	60	9	100
Mizoram University	33	56	11	100
Frequency (%)	**202 (40.4)**	**242 (48.4)**	**56 (11.2)**	**500**

N=500

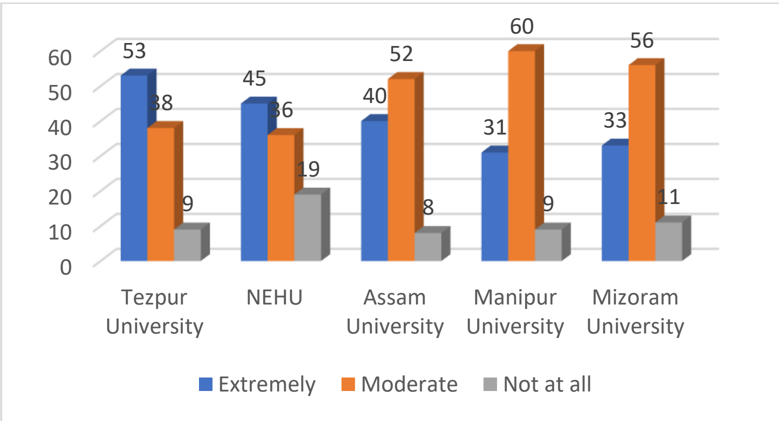


Figure-5.45: Awareness on the basis that respondents have to cite for using someone's ideas and quote for a person's exact words to prevent copyright issues.

The table and chart above evaluate respondents' awareness of the necessity of citing while using exact words and ideas in order to prevent copyright violations. Overall, 48.4% of the respondents have a moderate understanding of this concept. Manipur University is leading with 60%, followed by Mizoram University at 56% in this category. This indicates that most students are aware of copyright and how to cite someone's ideas, which is necessary for research and other purposes, and it is a good sign in order to prevent copyright violations. As for the citation and quote standards, 40.4% of respondents show an extreme understanding, which indicates that they are well aware of appropriate academic and ethical behaviour. In this category, Tezpur University, with 53% of students, shows a high degree of awareness, Followed by NEHU, with 45%. A smaller number of respondents, 11.2%, reported having no awareness of citation requirements to prevent copyright issues. NEHU has the highest percentage in this category, with 19%, followed by Mizoram University, with 11%. Indicating a potential gap in awareness of academic integrity practices. Overall, the data indicates that students have a fair awareness of the importance of citations.

5.8.4 Whether the respondents ever been accused of copyright infringement

The following Table-5.49 and Figure-5.46 highlight the collected data on whether the respondents have ever been accused of copyright infringement.

Table- 5.49: Whether the respondents have ever been accused of copyright infringement

University	Yes	No	Total
Tezpur University	3	97	100
NEHU	2	98	100
Assam University	7	93	100
Manipur University	13	87	100
Mizoram University	5	95	100
Frequency (%)	**30 (6%)**	**470 (94%)**	**500**

N=500

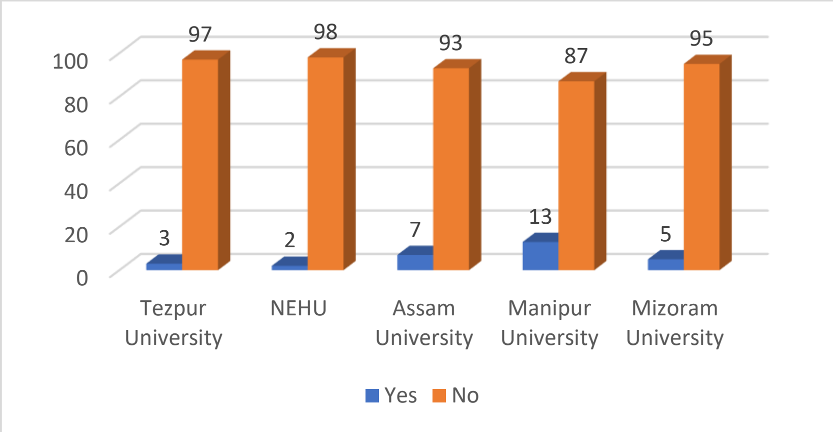


Figure-5.46: Whether the respondents have ever been accused of copyright infringement

The above table and chart show that 94% of respondents have never been charged with copyright infringement, demonstrating that the majority of students are either complying with copyright laws or are not aware that they could be violated. NEHU, with 98%, leading in this category, followed by Tezpur University, with 97%. Mizoram University has 95%, Assam University has 93%, and the lowest in this category is Manipur University, which has 87%. Only 6% of the overall respondents, a very low proportion of students, have been accused of copyright violations. Out of all the universities surveyed, Manipur University has the largest rate of students who have faced accusations of copyright infringement, with 13%. Assam University and Mizoram University had somewhat lower percentages, at 7% and 5%, respectively. With 2% and 3% of the total, respectively, NEHU and Tezpur University have the fewest accusations. The information indicates that while there is a general awareness of copyright compliance, there is little reporting of violations. However, with a small number of reporting violations, students may not be fully aware of copyright regulations, which can be the result of the impact of the digital divide.

5.9 HYPOTHESES TESTING

Analysis of the hypotheses of the present study are given below:

5.9.1 H1: There is a significant difference in the ability to access ICT tools and years of usage of ICT tools among the PG Students of selected universities.

5.9.1.1 Familiarity with the use of computer from 5 universities

Table-5.50: Familiarity with the use of computer from 5 universities

Familiarity of computer * University Crosstabulation							
		University					Total
		Tezpur University	NEHU	Assam University	Manipur University	Mizoram University	Total
Familiarity of computer	Less than 1 year	5.0%	26.0%	15.0%	19.0%	10.0%	15.0%
	1-5 Years	20.0%	33.0%	24.0%	28.0%	25.0%	26.0%
	6-10 Years	29.0%	26.0%	28.0%	21.0%	23.0%	25.4%
	More than 10 years	46.0%	15.0%	33.0%	32.0%	42.0%	33.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

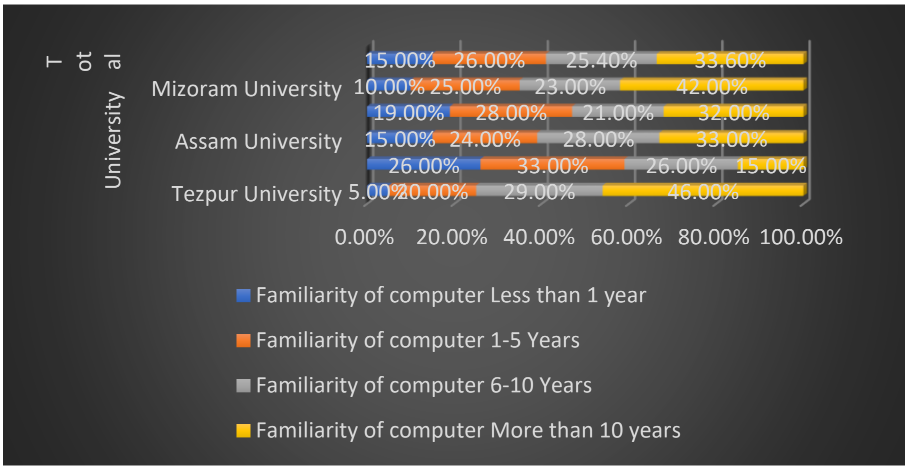


Figure-5.47: Familiarity with the use of computer from 5 universities

The above data highlight varying levels of **familiarity with the use of computers among students across five universities.** In less than 1 Year of computer familiarity, NEHU has the highest percentage with 26% of students with less than 1 year of computer familiarity, indicating a higher proportion of students with limited exposure to computers. Mizoram University has the lowest percentage with 10% in this category, indicating better computer exposure among its students. in 1-5 Years of computer familiarity, NEHU again leads with 33%, showing a significant share of students in this category. Other universities, such as Assam University which is 24%

and Mizoram University with 25%, show similar trends, with moderate exposure to computers. In 6-10 Years of computer familiarity, the familiarity is relatively balanced, with percentages ranging from 21% from Manipur University to 29% from Tezpur University. This shows a consistent exposure across universities for mid-level computer experience. In More than 10 Years of computer familiarity, Tezpur University with 46% and Mizoram University with 42% have the highest percentages, indicating a significant portion of students with extensive computer familiarity. With just 15%, NEHU falls considerably lower in this category. The data highlights the need for interventions in universities like NEHU and Manipur University to bridge gaps in computer familiarity

Table-5.51: Familiarity with the use of computer from 5 universities Chi-Square tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.921[a]	12	.000
N of Valid Cases	500		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.00.			

The results of the Chi-Square test stated that the p-value which is 0.000 is less than the common threshold of 0.05, showing that the variables being studied have a statistically significant relationship. Pearson Chi-Square Value is 39.921, Degrees of Freedom (df) is 12, Asymptotic Significance Level which is p-value is 0.000. With 12 df, the observed data from the crosstab to the expected data which assume that no relationship between variables is compared by the Chi-Square test. Thus, the interpretation shows that since $p<0.05$ the test is statistically significant, meaning we **reject the null hypothesis**.

5.9.1.2 Analysis based on H1: Since the p-value (0.000) < 0.05, the null hypothesis **is rejected**. This confirms a statistically significant difference in the years of ICT usage among students from different universities.

5.9.2 H2: There is a significant difference in the usage of ICT among rural and urban respondents.

5.9.2.1 Type of internet connection cross tabulation based on rural and urban

Table-5.52: Type of internet connection cross tabulation based on rural and urban

Crosstab				
		Residential		
		Rural	Urban	Total
Type of InternetConnection	Broadband	11.1%	20.0%	15.0%
	Mobile Data	87.1%	79.5%	83.8%
	Both (Broadband and Mobile)	1.8%	.5%	1.2%
Total		100.0%	100.0%	100.0%

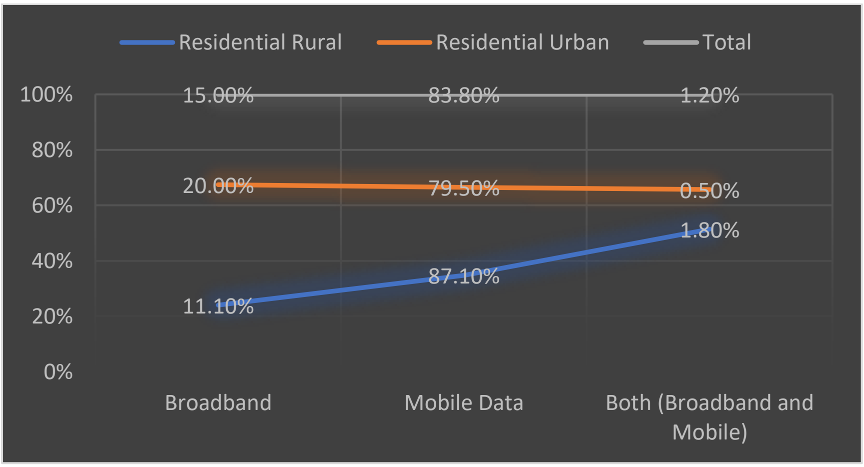


Figure-5.48: Type of internet connection crosstabulation based on rural and urban

The above table and charts highlight the type of internet connections used by students based on their residential background, which is rural and urban. Broadband usage is higher among urban respondents, with 20.0%, compared to rural respondents, which consists of 11.1%. This disparity highlights better infrastructure and accessibility of broadband in urban areas, whereas rural areas may lack sufficient broadband penetration. A significant majority of respondents in rural areas (87.1%)

and urban areas (79.5%) rely on mobile data for internet connectivity. This trend underscores the widespread availability and affordability of mobile data, especially in rural areas, where it serves as the primary mode of internet access due to limited broadband facilities. Very few respondents reported using both broadband and mobile data, with rural areas slightly higher at 1.8% than urban areas with 0.5%. This reflects limited integration of multiple connection types, likely due to financial or infrastructural constraints. The results show a digital gap between rural and urban in types of internet connection, where rural areas rely more on mobile data and urban areas enjoy more effective broadband connectivity. This suggests that in order to bridge the gap and improve digital accessibility, efforts to increase broadband infrastructure in rural regions are required.

Table-5.53: Type of internet connection crosstabulation based on rural and urban Chi-Square tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.134[a]	2	.010
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.65.			

The results of the Chi-Square test stated that the p-value, which is 0.010, is less than the common threshold of 0.05, showing that there is a statistically significant correlation between the type of internet connection and residential area, which is rural and urban. This means that the type of internet connection used by respondents differs significantly based on their residential area. Pearson's Chi-Square Value is 9.134, Degrees of Freedom (df) is 2, and the Significance Level, which is the p-value, is 0.010. the degrees of freedom (df)is 2, and the observed data is compared from the crosstab using the Chi-Square test to the expected data, which assumes that there is no relationship between variables. Thus, the interpretation shows that since $p<0.05$, the test is statistically significant, meaning we **reject the null hypothesis**.

5.9.2.2 Geographical location affect reliability and speed of internet connection based on rural and urban

Table-5.54: Geographical location affects reliability and speed of internet connection based on rural and urban

Crosstab				
		Residential		Total
		Rural	Urban	
Geographical LocationAffectReliability and Speed of Internet Connection	Positively	50.4%	66.2%	57.3%
	Negatively	24.3%	9.1%	17.6%
	No Impact	25.4%	24.7%	25.1%
Total		100.0%	100.0%	100.0%

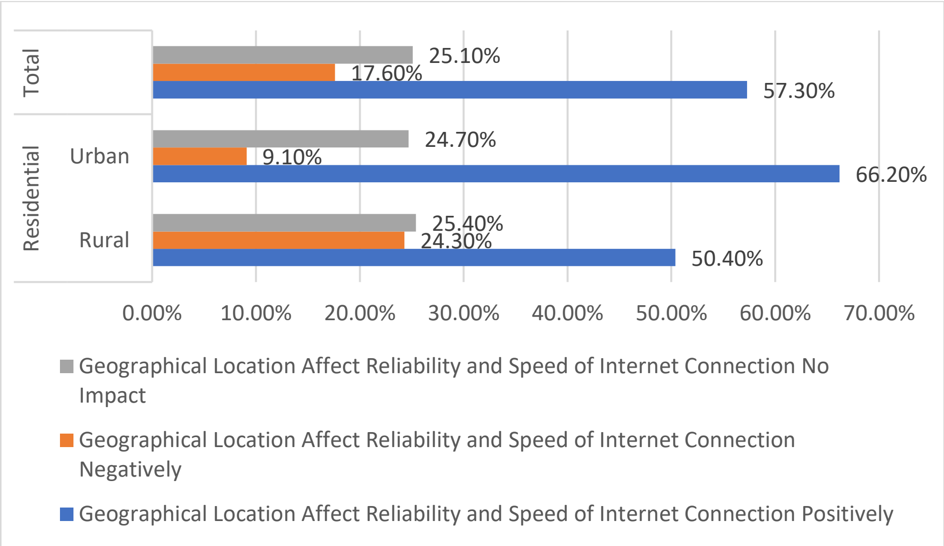


Figure-5.49: Geographical location affects reliability and speed of internet connection based on rural and urban

The above data highlight the effect of geographical location on the reliability and speed of internet connections for students based on whether they reside in rural or urban areas. As a result, urban respondents (66.2%) report a positive impact of their geographical location on internet reliability and speed compared to rural respondents (50.4%). This reflects the better internet infrastructure and stronger network coverage typically found in urban areas. A higher proportion of rural respondents, 24.3%, report a negative impact compared to only 9.1% of urban respondents. This disparity underscores the challenges rural areas faces, such as limited network towers, poor signal quality, and lack of high-speed connectivity. The percentage of respondents who reported no impact is nearly the same between rural, with 25.4%, and urban, with 24.7%; this implies that both users experience stable connections regardless of location. The data highlights a clear digital divide, with urban areas benefiting from more reliable and faster internet

Table-5.55: Geographical location affects reliability and speed of internet connection based on rural and urban Chi-Square tests

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.413[a]	2	.000
N of Valid Cases	499		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 38.62.			

The results of the Chi-Square test stated that the p-value, which is 0.000, is less than the common threshold of 0.05, meaning we reject the null hypothesis. This indicates a statistically significant relationship between **Residential areas** and **the perceived effect of location on internet reliability and speed**. This means that the reliability and speed of the internet used by the respondents differ significantly based on their residential area. Pearson's Chi-Square Value is 21.413, the Degrees of Freedom (df) is 2, and the Significance Level, which is the p-value, is 0.000. With 2 df, the observed data from the crosstab to the expected data which assumes that no relationship between variables is compared using the Chi-Square test. Thus, the interpretation shows that since $p<0.05$, the test is statistically significant.

5.9.2.3 Geographical restriction affects online learning based on rural and urban

Table-5.56: Geographical restriction affects online learning based on rural and urban

Crosstab				
		Residential		
		Rural	Urban	Total
GeographicalRestrictionAffect OnlineLearning	Significantly Hindered	14.3%	10.5%	12.6%
	Slightly Hindered	50.7%	40.9%	46.4%
	No Impact	28.9%	37.7%	32.8%
	Improved	6.1%	10.9%	8.2%
Total		100.0%	100.0%	100.0%

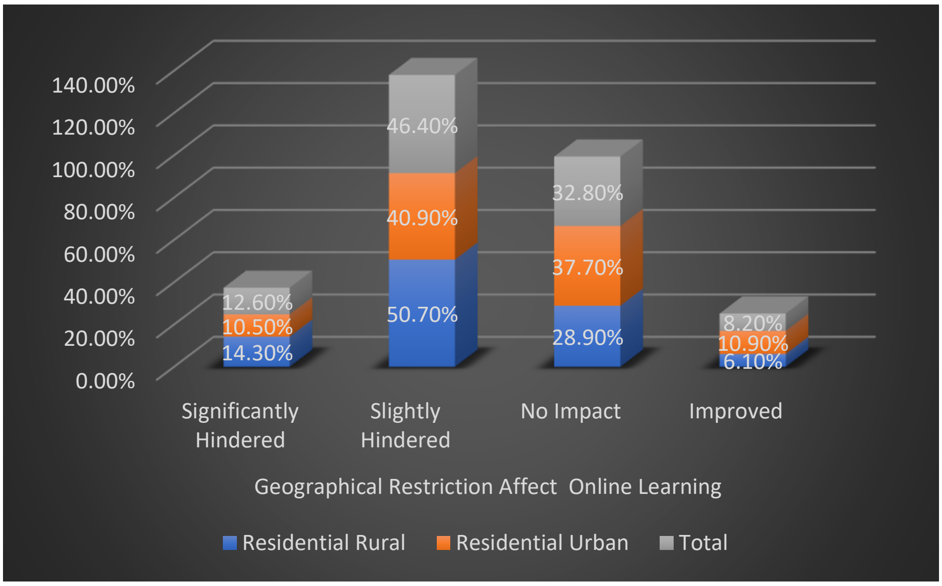


Figure-5.50: Geographical restriction affects online learning based on rural and urban

Table-5.57: Geographical restriction affects online learning based on rural and urban Chi-Square tests

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.412[a]	3	.015
N of Valid Cases	500		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.04.			

The results of the Chi-Square test stated that the p-value, which is 0.015, is less than the common threshold of 0.05, meaning we reject the null hypothesis. This shows that **residential areas** and **geographical restrictions** have a statistically significant impact on online learning. This shows that there is enough evidence to reject the null hypothesis and that the observed distribution of the data is not a result of random chance. Pearson's Chi-Square Value is 10.412, Degrees of Freedom (df) is 3, and the Significance Level, which is the p-value, is 0.015. With 3 degrees of freedom (df), the observed data from the crosstab to the expected data, which assumes that no relationship between variables, is compared by the Chi-Square test. Thus, the interpretation shows that since $p<0.05$, the test is statistically significant.

5.10.2.4 Overall analysis based on H2: The Chi-Square tests reveal statistically significant relationships between students' place of residence and their access to ICT. The p-values for the tests were 0.010, 0.000, and 0.015, all below the threshold of 0.05, indicating rejection of the null hypothesis. This confirms significant associations between residential areas, which are rural and urban and the key factors which are: type of internet connection (X^2=9.134, df = 2), Geographical Location Affect Reliability and Speed of Internet Connection (X^2= 21.413, df = 2), and geographical restrictions affecting online learning (X^2= 10.412, df = 3). These findings highlight residence-based disparities in ICT access and experiences.

CHAPTER-6

MAJOR FINDINGS, CONCLUSION AND SUGGESTION

6.1 FINDINGS, CONCLUSION AND SUGGESTION

The digital divide is the disparity between those who have the knowledge to access, operate, and execute information communication technology and those who do not. So, based on the above analysis, the scholar will highlight this chapter, which is divided into three parts, i.e. 1) Major findings according to the objectives of the study, 2) Conclusion and 3) Suggestions.

6.1.1 FINDINGS ACCORDING TO THE OBJECTIVES OF THE STUDY:

6.1.1.1 The first objective: To know the ability to access ICT tools and technology for academic purpose.

1. **(a) Know how to access the internet**: Findings reveal that, overall, a total of 500 respondents, 497, which is 99.4%, are proficient at using the internet, whereas only 3, which is 0.6%, are not. This indicates that lack of knowledge is not a significant barrier in these universities. **(b) Having a device to access the internet:** Of the overall total of 500 respondents, 490, which is 98%, have a device to access the Internet, while 10 respondents, which is 2%, do not. The majority of respondents across all universities have a device to connect to the internet, with 98% reporting device ownership. The data suggests that device availability is a slightly more significant issue than knowledge of internet access, with 2% of respondents lacking a device. Financial constraints may be the issue in terms of device ownership. The data shows an overwhelming majority, which is 99.4% of respondents, know how to access the internet, highlighting a strong internet literacy rate among students across these Central Universities. While internet access knowledge is nearly universal, 2% of respondents still lack access to devices, which may hinder their ability to fully engage with online resources. (Table-7).
2. Findings based on **acquainted with the use of computers** reveals that a large part of the student population exhibits high levels of familiarity and competency with computers, as seen by the fact that 33.6% of students have been using computers for over ten years. Half of the students, 26% and 25.4%, respectively, have 1-5 years and 6-10 years of computer experience.

15% of students have been using a computer for less than 1 year, indicating that a small but significant portion of the student body is relatively new to computer use. Tezpur University has 46% of students who have been using a computer for more than 10 years, which is the highest percentage in this category among the universities.

3. The findings based on the **major source of learning ICT skills** reveal that 65.8% of students across universities acquired ICT skills through self-learning, highlighting their reliance on independent efforts, likely due to accessible online resources or limited formal training. Teachers played a secondary role, with 23.2% of students learning from them, emphasizing their importance in ICT education. Formal courses accounted for only 8% of ICT learning, showing a lack of structured programs, while peer influence was minimal at 3%. Mizoram University had the highest self-learners with 75%, Assam University led in teacher-taught skills with 36%, and Manipur University had the highest in attending courses with 14%, reflecting varying ICT training approaches across institutions.
4. The findings about the **knowledge of accessing online library databases or repositories** reveal that 58.1%, which is 286 students across five Central Universities, know how to access online library databases or repositories, indicating moderate awareness. However, 32.3% (159) of students are not sure. This implies that there is a lack of confidence or awareness about utilizing these resources, while only 9.6%, which is 47 students, do not know how to access them.
5. Findings based on **the use of AI for academic purposes**, a significant portion of students, 40.8% (203) used AI somewhat, indicating a moderate level of integration of AI tools in academic work. Combining those who used AI to a great extent and somewhat (33.5+40.8=74.3), 74.3% of students have integrated AI into their academic activities, demonstrating widespread adoption across these universities. Only 4.4%, which is 22 students of the total respondents, reported not using AI at all, suggesting that AI tools have become a nearly predominant part of the academic experience.

6. Analyzing the findings **smartphones** emerge as the most commonly used device, with 94.6% of students always relying on them, reflecting their portability, accessibility, and multifunctionality. In contrast, laptops are the second most favoured device, with 36.4% of students always using them, indicating their importance for tasks that require more robust functionality, such as writing papers or accessing complex software. **Tablets** and **desktops** see significantly less frequent usage. Only 5.4% of students always use tablets, while a larger proportion with 46.8% never use tablets, suggesting that tablets are more of a supplementary device rather than a primary tool for academic tasks. **Desktops**, though more frequently used than tablets, also have low consistent usage, with only 7% of students always relying on them. This highlights a shift away from stationary devices towards more portable options. **Smart TVs** are the least utilized, with 39% of students never using them and only 6% always using them. This indicates that Smart TVs are not a primary choice for academic purposes, likely due to their less interactive nature compared to other devices. Overall, the data emphasizes how popular laptops and smartphones are, with other gadgets occupying more specialized areas.

6.1.1.2 The second objectives: To analyse the use pattern of internet by the respondents.

1. Findings indicate that the majority of respondents which is 51.4%, spend more than **5 hours a day online**, indicating a high level of internet engagement across the universities. A significant portion, 29.4%, spend **3-5 hours online**, while fewer respondents spend less than 3 hours a day on the internet. Very few respondents, which is 2.4%, spend only **0-1 hour online**, suggesting that minimal internet use is uncommon among these university students. The high levels of internet use suggest that the internet is likely a critical resource for both academic and social activities. Universities may need to ensure that their digital infrastructure and support services are robust enough to handle this demand.
2. Findings reveal that a significant majority of students are highly active in this regard, with 54.8% (274 students) reporting that they always **browse and**

download online resources. Tezpur University leads with 71% of its students in the always category. The overall data highlights the importance of online resources in academic pursuits, with a strong majority of students regularly accessing these resources. However, it also emphasizes the necessity of focused initiatives to promote and support the regular use of digital resources, especially in universities where usage is less common.

3. A significant portion of students, 50.6% which is 253 students, always utilize **online resources for research purposes**. This indicates a strong reliance on digital resources for academic research in these institutions, reflecting the importance of online access in supporting academic work. Manipur and Mizoram University show slightly lower percentages in this category, with 45% and 33%, respectively, suggesting that while many students are actively using online resources, there may be factors limiting more consistent usage.
4. A small percentage from the total university, which is 9.4% (47 students), always **play online games**. Almost half of the students, 41.6% which is 208 students rarely play online games, indicating that while gaming is an occasional activity, it is not a primary use of internet time for most.
5. A significant majority which is 65.4% (327 students), always use internet for accessing **social media**. This high percentage across all universities suggests that the activity is an important and consistent part of students' routines, likely reflecting its importance or necessity in their academic or daily lives.
6. A majority of students are not actively engaged in **online marketing or trading activities.** Specifically, 38.2% which is 190 students never use the internet for these purposes. It also implies that online marketing and trading are not common activities among the student populations in these universities, possibly due to a lack of interest, knowledge, or resources to participate in these activities.
7. A notable 17.5% which is 87 students always engage in **podcasts and audio streaming.** Manipur University having the highest percentage with 24.5%, suggesting a strong interest in these forms of media among its students. With 27.8% (138 students) never do podcast and audio streaming, indicates that a significant portion of students. This disparity suggests that while audio

content is popular for some students, it remains underutilized by a large segment of the student population.

8. The most proficient students in all universities are found using **MS Office,** with an astounding 93.2% rating it as good, highlighting the program's critical significance in both academic and professional activity. On the other hand, just 32.4% and 30.8% of students, respectively, demonstrate skill in more specialist technologies like the **Adobe Creative Suite** and **data analytic tools**. Proficiency in **data analysis tools** such as SPSS, Excel, Python, etc., is limited, with only 30.8% of students being proficient. Project management tools like Trello, Asana, and others have the lowest proficiency levels, with only 3.6% of 18 students proficient in five universities. Finally, **Content Management System** (CMS) tools, which include platforms like WordPress, Drupal, Joomla, etc, also show low proficiency, with only 14% of 70 students rated as good. This indicates that more sophisticated technical abilities are less frequently acquired, even while fundamental software skills are taught and utilized regularly.

6.1.1.3 The third objectives: To find out whether geographical restrictions contribute to the digital divide among the respondents.

1. Overall, 56% of the respondents are from **rural areas**, while 44% are from **urban areas**, indicating a majority of the student population comes from rural backgrounds.
2. Overall, 80.4% of respondents report having **access to ICT facilities**, while 19.6% do not, suggesting that the majority of students live in areas where basic ICT infrastructure is available. Students from 5 universities are more likely to have opportunities to engage with digital tools outside of campus, which could enhance their learning experiences and digital literacy.
3. Out of 500 respondents, 53.6% rated their **telecommunication** conditions as good and very good, with 15.4% indicating that only a small segment enjoys optimal telecommunication services. Given that over half of the participants experience relatively stable and accessible connectivity. Overall, the digital divide in 5 Central Universities is evident, as geographical barriers likely hinder the consistent and equitable distribution of telecommunication

services, impacting the academic and research capabilities of students and faculty.

4. **Electricity** access in 5 universities varies considerably, and geographical restrictions play a role in exacerbating the digital divide. Inadequate or inconsistent electricity can directly hinder access to digital resources, further widening the gap between regions with better infrastructure and those facing geographical challenges.
5. Almost all the respondents with 88.8% which is 444 students indicating **mobile data as their main internet connection**. The low availability of broadband in certain areas can be ascribed to physical obstacles such as rough terrain, sparse populations, or insufficient infrastructure funding, which make expanding broadband expensive and difficult.
6. The majority of 5 universities, which is 57.3%, stated that their **internet connection is positively impacted by their location**. Mizoram University leads with 68% in this category, followed by Assam University with 62% and Manipur University with 59%. NEHU with 52%, Tezpur University with 45%. This could indicate that certain areas in these regions are closer to urban centers or have access to better infrastructure, enabling somewhat consistent and quick connections. 17.6% of the respondents stated that their internet connectivity is negatively impacted by their location, indicating that these regions probably face additional physical barriers, such as rural areas or mountainous terrain, which causes slower speeds and irregular connections.
7. A little over half, 46.4%, stated that their internet access is **slightly hindered by geographic limitations**. Indicating that while users in these areas face some obstacles, such as rough terrain or limited infrastructure, the impact is not extreme. Mobile data networks are widely used, which probably lessens the impact of these obstacles.
8. When questioned about **community efforts to reduce the digital divide**, the majority of respondents, 60.4%, said they were not sure. This high degree of uncertainty implies that there are either not enough obvious actions in their communities or that a large number of students are unaware that any steps are being taken. This uncertainty can be a sign of inadequate communication or

inefficient community involvement in the fight against digital inequality. The overall results show that there is a strong need for initiatives that bridge the digital divide in these communities to be widely recognized, successful, and visible.

6.1.1.4 The fourth objectives: To know the initiative taken by selected Universities to reduce the digital divide among the respondents.

1. The majority of students, with 59.2% which is 296 students answered yes in terms of **whether universities take initiative or not**, demonstrating that most think their universities are doing anything to bridge the digital divide. At the same time, most students are aware that their universities have taken action to address the digital divide, but a sizable portion are not.
2. **Initiative on internet connectivity:** A majority of respondents, 61%, indicated that their universities have taken steps to improve internet connectivity. **Initiative on digital literacy workshop:** Only 31.4% of students, however, said that their universities have held these kinds of workshops. **Initiative on awareness programme on ICT:** The majority of the respondents, 64%, exhibit low affirmative replies, signaling a need for universities to better communicate or implement ICT awareness campaigns. **Initiative on technology grants:** The majority of 85% of respondents said that their universities do not have any technology grant programs. **Initiative on equitable access:** The majority of university students, 70.4%, think that no initiatives have been commencing, indicating that most institutions are not doing enough to address the issue of equal access to digital resources. **Initiative on technology support service:** According to the majority of respondents, which is 80.4%, there is a severe lack of technical support services that could prevent students from making the most efficient use of the technology they have access to. **Initiative on digital inclusion survey:** The vast majority, 89.2% of students, indicated that no surveys have been conducted, highlighting a significant gap in data collection and awareness efforts. The overall data shows that academic institutions may not be actively gathering information about the digital gap within their student body, which is necessary for focused interventions and well-informed policymaking.

6.1.1.5 The fifth objectives: To find out the areas of strength and weakness of respondent in handling digital assets and give suggestions for enhancement.

1. Majority number of respondents, 54.4%, rated their **digital proficiency in social media management** as good. This implies that the majority of students are proficient users of social media platforms and have a basic understanding of them. 21% of students rated excellent. 17.6% of students' skills are acceptable. Only 6.8% of students reflected their skills were poor. Just 0.2% thought they were very poor. The majority of students have good and excellent social media management skills; just a small number need serious development.
2. A large percentage of respondents with, 43.6% assessed their **data analysis abilities as acceptable**, indicating that although most students have some basic understanding, they might not be very proficient. Only 2.6% of respondents from 5 universities rated their skills as very poor, and 15.8% of respondents as poor. Indicating a need for workshops and specific training to improve students' data management and analytical abilities.
3. A large number of students, which is 39%, rate their skills as good in **proficiency in online ticket booking**, demonstrating a significant ability for handling online ticket booking. This indicates that a sizable percentage of students are extremely skilled at booking tickets online, a prevalent and practical digital ability in the modern world. Overall, while the students performed very well, 3.6% of them assessed their skills as very poor, and 10.6% as poor. This shows that some students have held their entire education within their particular state, and most probably, they don't have a chance for exposure to other states as well, maybe because of family or financial issues.
4. 36% of students said their skills were poor, and 20.4% said they were very poor in terms of **web development**. This suggests that a relatively small percentage of students have proficient web development skills, skills that are essential for building and maintaining websites in the digital age. Approximately 25% of students rated their abilities as acceptable. This indicates that some students may have a basic knowledge of web

programming but lack confidence or greater skills in more complex work. The result thus emphasized a need for workshops and specific training to improve students' web development.

5. A large number of students had an average amount of knowledge in **digital marketing**, as indicated by the percentage of respondents who assessed their skills as acceptable, with 29.4%. This indicates that some students may have a basic knowledge of digital marketing. A percentage of respondents rated their skills as good is, 22.4%, indicating that most students possess a moderate level of proficiency in digital marketing. A notable 13.8% rated their skills as very poor. The overall data shows that even while most students have an average understanding of digital marketing, a sizeable portion of them find it difficult.
6. A large number of respondents, 32.2%, rated their digital proficiency in **Cloud Computing** as acceptable. Even though the concept is popular with them, students might not yet fully understand more advanced cloud computing services and tools. A total of 32+19.4=51.4% of students assessed their skills as poor or very poor, demonstrating a significant deficiency in cloud computing knowledge. This indicates that while advanced skills are still lacking across universities, a smaller percentage of students understand cloud computing better.
7. A significant number of students which is 38.4% rated their proficiency as good in terms of **Accessing Journal/ Book Database**, demonstrating an important understanding of how to use academic databases. 16% from overall respondents said their skills were poor. Moreover, 14.4% of students said they had excellent skills. only 3.6% of students said their skills were very poor. The results highlight the necessity of focused programs to raise digital literacy.
8. Overall, 32.8% of students rated their skills as good. This indicates that a significant portion of students at these institutions have a good understanding of **AI concepts and tools**, which is essential as AI becomes more integrated into various sectors. 32.2 % of respondents from different universities rated their proficiency as acceptable. Meanwhile, 15.2% of students rated their

skills as excellent. The findings indicate that colleges should concentrate more on enhancing students' digital AI skills, especially in those where a significant proportion of students still struggle.

9. A significant number of respondents with 38.8% rated their skills as good in terms of digital proficiency in **updating software**, making it the most common proficiency level. A smaller but significant number of students, 29.6%, rated their proficiency as acceptable. The study shows that certain institutions need to concentrate on strengthening this crucial digital skill, especially considering its importance in ensuring digital literacy and device functionality, even though the majority of students show a good ability to update software.
10. The majority of the total number of respondents rated their level in the somewhat category with 60%. This implies that even if the majority of students are aware of **current digital developments**, their understanding may only be slightly deep. The results indicate a significant proportion of respondents are well aware of and involved in digital advances, indicating a strong foundation of technology knowledge among institutions. Only 13% of the respondents reported having very little experience with new technologies. 0.8% said they had no knowledge of them at all.
11. The barriers faced by the students across five universities are due to **a lack of ICT background in the family**. The findings reveal that the majority of the respondents, 58.2%, indicated that this barrier is moderate. This implies that most students find it challenging to deal with digital environments when they don't have family support for ICT. 29.8% stated that not having an ICT background in the family is not a significant barrier. At the same time, a smaller group, with 12%, said the barrier was extreme.
12. The barriers faced by the students across five universities are due to **poor or no connection to the internet at home**. Findings reveal that the majority of the respondents, 50.6% of the respondents stated that this problem was not a barrier. This indicates that a majority of the participants possess reliable or sufficient internet connectivity at their residences, enabling them to interact with digital information without experiencing significant problems. However,

38.4% of the respondents classified this issue as moderate, suggesting that although not totally obstructive, unstable internet does impact a significant percentage of students. 11% of respondents said that internet connection was an extreme barrier.

13. Barriers faced by the students across five universities due to **lack of ICT infrastructure at university**. Findings reveal that half of the respondents with 50.4% stated that the lack of ICT infrastructure was not a barrier, indicating that every university has sufficient equipment. 43.4% viewed the absence of ICT infrastructure as moderate, indicating possibilities for improvement; this highlighted problems in their digital infrastructure that prevent students from accessing digital resources. 6.2% of respondents overall said this was an extreme barrier.
14. The barriers caused by **poor network coverage on the campuses** of five universities. 47.2% of respondents, a significant number, rated this problem as moderate. This implies that many of their students have some trouble accessing the campus network. 31.4% of respondents stated that network coverage created no barrier. In the meantime, poor network coverage was highlighted as an extreme barrier by 21.4% of respondents. Thus, a significant portion of students' access to digital resources and the opportunity for efficient campus communication are adversely affected by network problems.
15. The barriers by **lack of skills to access required information** among respondents from five universities. Findings reveal that the majority of the respondents, 60.6%, rated this issue as a moderate barrier. This shows that even if students have some fundamental knowledge of computers, many still struggle to find the information they need efficiently. In the meantime, 32.4% of respondents said that this was not a barrier. Although there are still skill gaps at many schools, these findings show that a significant number of students are confident in their ability to obtain knowledge. A lower number, with 7%, considered this lack of abilities to be an extreme barrier.
16. The barriers faced by respondents due to a **lack of proficiency in the English language**. Findings stated that the majority overall rated 54.6%, indicating

that this issue was not a barrier. This indicated that most students across these institutions feel confident in their English proficiency, which is essential for accessing digital content and academic resources. However, 40.4% of the respondents observed this as a moderate barrier. This indicates that even with their moderate knowledge of English, they still face difficulties. Only 5% of the overall total of respondents thought that this was an extreme barrier.

6.1.1.6 The sixth objectives: To identify the awareness of copyright among the respondents.

1. A majority 61.2%, have a moderate understanding of copyright protection. This implies that even while the majority of students **understand copyright** in general, their understanding can be basic or inadequate. Only 19.8% of respondents reported an extreme understanding of copyright protection. At the same time, 19% of the respondents stated they had no awareness of copyright protection. This indicates there is still a awareness gap on the ongoing effects of the digital divide, which is probably driven by different access levels to materials and programs promoting digital literacy.
2. Findings reveal that the majority, 57.6%, have a somewhat **understanding of copyright**. This indicates that while most students understand the fundamentals of copyright, they might not completely understand their application. At the same time, 21.6% of students said they knew very little about copyright. The percentage of respondents who strongly understand copyright to a great extent is only 15.4%. This shows that fewer students have a thorough understanding of copyright laws and their implications. A smaller number of respondents from all universities, with 5.4%, reported having no awareness at all.
3. Overall, 48.4% of the respondents have a moderate understanding of copyright concepts. This indicates that most students are aware of copyright and **how to cite someone's ideas,** which is necessary for research and other purposes, and gives a good sign in order to prevent copyright violation. 40.4% of respondents show an extreme understanding, which indicates that they are well aware of appropriate academic and ethical behavior. A smaller

number of respondents, 11.2%, reported having no awareness of citation requirements to prevent copyright issues.

4. 94% of respondents have never been charged with **copyright infringement**, demonstrating that the majority of students are either complying with copyright laws or are not aware that they could be violated. Only 6% of the overall respondents, a very low proportion of students, have been accused of copyright violations. The information indicates that while there is a general awareness of copyright compliance, there is little reporting of violations. However, with a small number of reporting violations, students may not be fully aware of copyright regulations, which can be the result of the impact of the digital divide.

6.1.2 CONCLUSION

Since the digital divide is all about unequal access and unequal proficiency in information communication technology, the findings collectively illustrate that while progress has been made in fostering digital literacy and access to resources, significant gaps remain. Variability in students' proficiency levels across institutions highlights the unequal access to digital tools, training, and infrastructure. Universities with higher rates of good or excellent skills, such as Tezpur University and Mizoram University, likely benefit from better resource availability and targeted interventions. However, institutions like NEHU, where a higher proportion of students reported low proficiency, demonstrate the pressing need for improvement.

To address these challenges, universities must implement focused efforts such as mandatory digital literacy programs, increased access to digital tools, and enhanced faculty training to support students in building these essential skills. Special attention should be given to proficiency in several skills like cloud computing, web development, online ticket booking, digital marketing, AI literacy, copyright awareness, and database access training to bridge existing gaps. Collaborative efforts between universities, government bodies, and private organizations can further enhance resource availability and skill development, ensuring that students at all universities have the same opportunity to prosper in a world that is becoming more and more digital.

To conclude, there are various barriers affecting students' access to digital resources across five universities. A lack of ICT background in families (58.2%) and poor network coverage on campuses (47.2%) emerged as moderate barriers, reflecting challenges in foundational support and campus infrastructure. While poor internet connectivity at home, with 50.6%, and insufficient ICT infrastructure at universities, with 50.4%, were not major obstacles for most, a significant minority still faces issues. The skills to access information are 60.6%, and moderate English proficiency is 40.4%, which also hindered some students. While progress in digital access is evident, targeted interventions are needed to address persistent barriers for specific student groups.

The majority of students, 59.2%, which is 296 students, answered positively in terms of whether universities take the initiative or not, demonstrating that most think their universities are doing anything to bridge the digital divide. At the same time, most students are aware that their universities have taken action to address the digital divide, a sizable portion are not. The data emphasizes how important it is for all universities to raise the profile and effectiveness of their programs in addressing digital inequality. Thus, to reduce the digital divide, universities should implement targeted initiatives. These include providing widespread access to ICT infrastructure, such as high-speed internet, modern devices, and well-equipped digital libraries. Regular workshops and training programs on ICT skills and digital literacy, including copyright awareness, should be organized to enhance students' competence. Universities should also offer online resources and user-friendly platforms, ensuring inclusivity for all students. Collaborating with government and private organizations to improve campus network coverage and connectivity can further bridge gaps. Additionally, mentorship and support systems should be established to assist students from underprivileged backgrounds in adapting to digital learning environments. Also, if the initiative was already taken by the university, the institution should take the initiative in such a way that students can be easily noticed and publicize the information regarding the same.

The digital divide may grow if students without dependable internet access or digital devices are unable to access online materials, workshops, or digital learning platforms that teach copyright. Some students find it more difficult to understand the copyright rules, license terms, and intellectual property rights necessary for academic and creative work because of the digital gap, which is frequently associated with lower levels of digital literacy. Among the five Universities, 61.2% are aware of what can be protected and 57.6% understand the basics. However, only 15.4%-19.8% demonstrate a thorough grasp of copyright laws, and gaps remain, as 19%-21.6% report little to no awareness. Awareness of citation practices is fair, with 48.4% moderately and 40.4% highly understanding its importance. Though 94% have never faced copyright infringement charges, limited reporting suggests insufficient awareness of copyright laws, likely influenced by the digital divide.

6.1.3 SUGGESTION

Based on the analyzed data and study results, some suggestions are made to enhance the digital divide among students at five Central Universities in North-East India, which are the NIRF ranking 2021 top 5 Central University i.e Tezpur University, NEHU, Assam University, Manipur University and Mizoram University-

1. Governments and universities should advocate for better internet infrastructure in rural areas to ensure reliable and high-speed connectivity, reducing geographical disparities.
2. Universities should collaborate with good service providers to address network issues especially for students in rural and remote areas and to increase campus network reliability and reduce interruptions.
3. Develop mobile friendly learning platforms and offline resources for students in areas with unreliable connectivity to bridge the digital divide in online learning.
4. Improve ICT infrastructure to reduce barriers brought on by insufficient infrastructure; universities should make investments in cutting-edge ICT facilities and guarantee that all students have access to them as well.
5. Encourage ICT skill development within the University. Regular workshops, training sessions, and digital literacy initiatives should be conducted. Ensuring access to computers and fostering a technology-friendly

environment can enhance students' exposure and confidence in using digital tools effectively.

6. Increase copyright awareness in order to help students better understand and comply with copyright laws, ethical standards, and citation requirements, universities can incorporate these topics into their curricula.
7. Since majority of respondents have experience of self-learning, University should encourage Self-Learning. University should offer access to user-friendly e-learning platforms and digital libraries to promote individual learning and resource usage.
8. To ensure the success of strategies aimed at reducing the digital divide, universities must establish strong mechanisms for monitoring and evaluation. This involves systematically assessing the effectiveness of implemented initiatives to identify strengths, weaknesses, and areas for improvement.

6.1.4 AREAS FOR FUTURE RESEARCH

The following areas of research are recommended for more investigation so as to bridge the digital divide in higher educational settings. The following areas of topics provide a wide range for further study with the goal of resolving continuing disparities and maximizing digital inclusion in the area.

1. The study based on gendered dimensions of the digital divide. Investigate whether and how gender plays a role in access to ICT tools, skills acquisition, and digital literacy in higher education settings in North East India.
2. Studies can be conducted based on the digital divide among experts in handling digital devices and software.
3. A comparative study of the digital divide among different university students of North East India can also be conducted.
4. Analyze the disparities in digital access and competency between Northeastern urban students and those from isolated rural areas.
5. Digital divide based on the role of language for digital access. Evaluate how English language proficiency affects students' use of digital tools and online learning materials.

BIBLIOGRAPHY

Abrol, A., & Jha, R.K. (2016). Power Optimization in 5G Networks: A Step Towards GrEEn Communication. *IEEE Access, 4,* 1355-1374.

Abu-Shanab, E. & Al-Jamal, N. (2015). Exploring The Gender Digital Divide in Jordan. *Gender, Technology and Development.* 19(1). 91-113.

Acılar, A. (2011). Exploring The Aspects of Digital Divide in a Developing Country. *Issues in Informing Science and Information Technology*, 8, 231-244. https://www.researchgate.net/publication/228295762_Exploring_the_Aspects_of_Digital_Divide_in_a_Developing_Country. Accessed on 06th August 2022

Afzal, A., Khan, S., Daud, S., Ahmad, Z., & Butt, A. (2023). Addressing the Digital Divide: Access and Use of Technology in Education. *Journal of Social Sciences Review*, 3(2), 883-895. https://doi.org/10.54183/jssr.v3i2.326. Accessed on 20th March 2024

Agrawal, P., Narain, R. and Ullah, I. (2019). Analysis of Barriers in Implementation of Digital Transformation of Supply Chain Using Interpretive Structural Modelling Approach. Journal of Modelling in Management. 15(1). 297-317. doi: 10.1108/JM2-03-2019-0066

Ahn, J. (2011). Digital Divides and Social Network Sites: Which Students Participate in Social Media? *Journal of Educational Computing Research*, *45*(2), 147-163. https://doi.org/10.2190/EC.45.2.b. Accessed on 25th August 2022

Ahuja, R., & Yadav, S. (2020). Indian Higher Education: Challenges and Opportunities. Journal of Educational Planning and Administration, 34(4), 5-18.

Aissaoui, Najeh. (February, 2021). The Digital Divide: A Literature Review and Some Directions for Future Research in Light Of COVID-19. *Global Knowledge Memory and Communication*. https://www.researchgate.net/publication/349291437_The_digital_divide_a_literature_review_and_some_directions_for_future_research_in_light_of_COVID-19. Accessed on 20th March 2023.

Alka, Rai. (2019). Digital Divide in Higher Education Comparative Study of the Library Users in the Universities of Delhi. *Shodhganga*. http://shodhganga.inflibnet.ac.in:8080/jspui/handle/10603/298955. Accessed on 29th August 2022

Alliance for Affordable Internet. (2022). Mobile Data Cost Have Increased, Making Internet Connectivity Unaffordable for Many. https://a4ai.org/news/mobile-data-cost-have-increased-making-internet-connectivity-unaffordable-for-many/Accessed on 20th August 2024

Alliance for Affordable Internet. (2023). *Affordability Report 2023*. Retrieved from A4AI.

Antonio, A., & Tuffley, D. (2014). The Gender Digital Divide in Developing Countries. *Future Interne. 6 (4),*673–687.

Assam University (2024). http://www.aus.ac.in/Accessed on 2nd September 2024

Association of College and Research Libraries (ACRL). (2000). Information Literacy Competency Standards for Higher Education. https://alair.ala.org/server/api/core/bitstreams/ce62c38e-971a-4a98-a424-7c0d1fe94d34/content. Accessed on 20th November 2023.

Association of College and Research Libraries (ACRL). (2000). Information Literacy Competency Standards for Higher Education. https://alair.ala.org/server/api/core/bitstreams/ce62c38e-971a-4a98-a424-7c0d1fe94d34/content. Accessed on 20th November 2023.

Aswathi P, & Haneefa K, Mohamed. (May 2015) Bridging the Digital Divide Among Students. *Journal of Knowledge & Communication Management*. 5(1). 42-52. DOI:10.5958/2277-7946.2015.00004.2. Accessed on 25th September 2022

Aswathi P. (2019). Digital Divide Among Students of Universities in Kerala. *Shodhganga*. https://shodhganga.inflibnet.ac.in/handle/10603/286917. Accessed on 25th September 2022

Aswathi P., & Haneefa K, Mohamed. (2020). Attitude towards Information Technology and Digital Divide: A Study Among Students in Universities in Kerala, India. *Library Philosophy and Practice (e-journal)*. 4437.

https://digitalcommons.unl.edu/libphilprac/4437. Accessed on 25th September 2022

Badiger, Mallikarjuna., Choudhary, Pallavi., & Badiger, Kalikadevi G. (2017). Information literacy: Need and Importance. *International Journal of Applied Research*. 3(7). 173-175. https://www.allresearchjournal.com/archives/2017/vol3issue7/PartC/3-6-267-177.pdf. Accessed on 20th March 2024

Bansode, S.Y., & Patil, S.K. (January, 2011). Bridging Digital Divide in India: Some Initiatives. Asia Pacific Journal of Library and Information Science, 1 (1), 58-68. https://www.researchgate.net/publication/236141535_Bridging_Digital_Divide_in_India_Some_Initiatives. Accessed on 26th March 2023

Baturay, M. H., & Demiray, U. (2018). The Digital Divide and Its Effects on Education. *Journal of Education and Practice*. 9(7), 1-8.

Beile, P. M. (2007). The ILAS-ED: A Standards-Based Instrument for Assessing Pre-Service Teachers' Information Literacy Levels. In *Society for Information Technology & Teacher Education International Conference*. 2007. 1-27. http://eprints.rclis.org/16928/Accessed on 04th August 2022

Ben Youssef, A., Dahmani, M., & Ragni, L (March, 2022). ICT Use, Digital Skills and Students' Academic Performance: Exploring the Digital Divide. *Information*. 13 (129). https://doi.org/10.3390/info13030129. Accessed on 20th March 2023.

Bengaluru Urban District. Government of Karnataka (2024). Bhoomi Project. https://bengaluruurban.nic.in/en/bhoomi/. Accessed on 08th November 2024.

Bhashini (2024). National Language Translation Mission (NLTM). https://bhashini.gov.in/. Accessed on 08th November 2024.

Bhatnagar, Subhash., Dewan, Ankita., Moreno Torres, Magui., & Kanungo, Parameeta. (2003). GyandootProject : ICT Initiative in The District of Dhar, Madhya Pradesh (English). Empowerment case studies Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/621851468267614396/Gyandoot-Project-ICT-initiative-in-the-district-of-Dhar-Madhya-Pradesh. Accessed on 18th November 2023.

Bo Kinney (2010). The Internet, Public Libraries, and the Digital Divide. *Public Library Quarterly*, 29:2, 104-161. https://www.tandfonline.com/doi/full/10.1080/01616841003779718.Accessed on 20th February 2023.

Brindha, T. (2016). Information Literacy and Librarians. *Shanlax International Journal of Arts, Science & Humanities*, 85 - 87. https://www.shanlaxjournals.in/pdf/ASH/V3N4/Ash_V3_N4_013.pdf. Accessed on 18th April 2024.

Brown, Terry. (May 2020). The Importance of Information and Communication Technology(ICT). *IT Chronicles*. https://itchronicles.com/information-and-communication-technology/the-importance-of-information-and-communication-technology-ict/. Accessed on 04th March 2023

Centeio, E. E. (2017). The Have and Have Nots: An Ever-Present Digital Divide. *Journal of Physical Education, Recreation & Dance*, 88(6), 11-12. https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1067&context=coe_khs. Accessed on 18thApril 2024.

Ceviker, Elife., & Gezer, Tuba (2023). Examining the Digital Divide in Education During COVID-19 From Teachers' Perspectives. *Mid-Western Educational Researcher*. 35 (2), Article 2. DOI: https://doi.org/10.25035/mwer.35.02.02.

Chanchinmawia, F. (2018). Information Literacy Competency Among Faculty Members and Research Scholars of Mizoram University in Digital Environment. (Ph.D. thesis, Mizoram University). http://hdl.handle.net/10603/219513. Accessed on 20th February 2024

Chanchinmawia, F., & Verma, M. K. (2017). Assessment of Information Literacy Skills Among Students of Academy of Integrated Christian Studies, Aizawl: A Survey. *International Research: Journal of Library & Information Science*, 7(3), 449-465.

Chanchinmawia, F., & Verma. M. K. (2018). Assessment of Information Literacy Skills Among Research Scholars of Mizoram University : A Study.

International Research: Journal of Library and Information Science, 8(1), 387-399

Charted Institute of Library and Information Professionals. (2004). Information Literacy: Definition. London: CILIP.http://www.cilip.org.uk/professional guidance/ informationliteracy/definition/. Accessed on 18th April 2024.

Chaudhuri, S., & Roy, S. (2021). Digital Divide and Education During COVID-19 Pandemic: A Global Perspective. *Interactive Learning Environments*, 1-14. doi: 10.1080/10494820.2021.1915387

Chen, W. & Wellman, B. (2004). The Global Digital Divide - Within and Between Countries, IT & Society, 1(7), 39-45. https://www.researchgate.net/publication/242208935_The_Global_Digital_Divide-Within_and_Between_Countries . Accessed on 20th October 2022

Chen, Xiaotian. (2023). ChatGPT and Its Possible Impact on Library Reference Services. *Internet Reference Services Quarterly*. 27(2). 121-129. https://doi.org/10.1080/10875301.2023.2181262. Accessed on 25th May 2024

Chikati, R. (2013). An Assessment of The Impact of High School Digital Divide to Students Performance at Tertiary Education in Botswana. *International Journal of Scientific & TechnologyResearch*, *2*(9), 68-72. https://typeset.io/pdf/an-assessment-of-the-impact-of-high-school-digital-divide-to-2axvs9kmcc.pdf. Accessed on 20th February 2024

Chinn, M. D., & Fairlie, R. W. (2004). The Determinants of The Global Digital Divide: A Crosscountry Analysis of Computer and Internet Penetration. *Oxford Economic Papers*, 59(1), 16-44. https://www.researchgate.net/publication/5185344_The_Determinants_of_the_Global_Digital_Divide_A_Cross-Country_Analysis_of_Computer_and_Internet_Penetration . Accessed on 25th October 2022

Chinn, M. D., & Fairlie, R. W. (2010). The Determinants of The Global Digital Divide: A Cross-Country Analysis of Computer and Internet Penetration. *Oxford Economic Papers*. 62(3), 561-582.

Chipeva, P., Cruz-Jesus, F., Oliveira, T., & Irani, Z. (2018). Digital Divide at Individual Level: Evidence for Eastern and Western European countries. *Government Information Quarterly*, 35(3), 460-479. DOI: 10.1016/j.giq.2018.06.003

Chou, Jyh-Rong., & Shieh, Chich-Jen (April 2011). The Digital Divide in Taiwanese Unemployed Adult Population. *Scientific Research and Essays*, 6 (7). 1514-1521. https://www.researchgate.net/publication/260518364_The_digital_divide_in_Taiwanese_unemployed_adult_population. Accessed on 21st September 2023

Cooper, J. (2006). The Digital Divide: The Special Case of Gender. *Journal of Computer Assisted Learning*, *22*(5), 320–334. https://doi.org/10.1111/j.1365-2729.2006.00185.x . Accessed on 21st September 2023

Cox, Andrew. (2022). How Artificial Intelligence Might Change Academic Library Work: Applying the Competencies Literature and The Theory of The Professions. *Journal of the Association for Information Science and Technology*. 72(3). 367-380. https://asistdl.onlinelibrary.wiley.com/doi/full/10.1002/asi.24635. Accessed on 20th February 2024

Cruz-Jesus, F., Vicente, M. R., Bacao, F., & Oliveira, T. (2016). The Education-Related Digital Divide: An Analysis for the EU-28. *Computers in Human Behavior*, *56*, 72–82. https://doi.org/10.1016/j.chb.2015.11.027.Accessed on 21st September 2023.

Cullen, R. (2001). Addressing the Digital Divide. *Online Information Review*, 25:5, 311-320. https://doi.org/10.1108/14684520110410517. Accessed on 29th August 2022

Das, M., Saha, B., & Deka, J. (2020). Infrastructure Development in the North Eastern Region of India: Challenges and Opportunities. International Journal of Innovative Research in Engineering & Management, 7(5), 214-222.

Davis, E. L., Lundstrom, K., & Martin, P. N. (2011). Librarian Perceptions and Information Literacy Instruction Models. *Library Faculty & Staff Publications*, 1–24. https://digitalcommons.usu.edu/lib_pubs/106. Accessed on 21st September 2022.

Dhiman, A. K. (2006). Information Literacy and The Role of Librarian. *4th International Convention CALIBER-2006, Gulbarga*. 390-398. https://ir.inflibnet.ac.in:8443/ir/bitstream/1944/1207/1/42.pdf. Accessed on 21st September 2022.

Dijk, Jan A. G. M. Van. (March 2017). Digital Divide: Impact of Access.https://www.researchgate.net/publication/314732108_Digital_Divide_Impact_of_Access. Accessed on 21st September 2022.

DiMaggio, P., &Hargittai, E. (2023). From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases. https://doi.org/10.31235/osf.io/rhqmum.Accessed on 18th April 2024.

DiMaggio, P., &Hargittai, E. (2001). From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases. Working paper series 15. Princeton,NJ: Princeton University Center for Arts and Cultural Policy Studies. https://digitalinclusion.typepad.com/digital_inclusion/documentos/digitalinequality.pdf. Accessed on 21st September 2022.

Domingo, M. G., &Garganté, A. B. (2016). Exploring The Use of Educational Technology in Primary Education: Teachers' Perception of Mobile Technology Learning Impacts and Applications' Use in The Classroom. *Computers in Human Behavior*, *56*, 21-28. https://doi.org/10.1016/j.chb.2015.11.023.Accessed on 16th September 2022.

Doyle, C.S. (1992). Outcome Measures for Information Literacy within the Nation Education Goals of 1990. Final Report to National Forum on Information Literacy Summary of Findings. ERIC Digest No. 351033. https://eric.ed.gov/?id=ED351033. Accessed on 21st September 2022.

Eastin, M. S., & LaRose, R. (2006). Internet Self-Efficacy and The Psychology of The Digital Divide. *Journal of Computer-Mediated Communication*, *6*(1). https://doi.org/10.1111/j.1083-6101.2000.tb00110.x. Accessed on 11th November 2022

European Commission. (2023). *Digital Economy and Society Index (DESI) 2023*. European Commission.Accessed on 18th April 2023.

Fairlie, R. (2017). Have We Finally Bridged the Digital Divide? Smart Phone and Internet Use Patterns by Race and Ethnicity. *UC Santa Cruz. Report:9.* https://escholarship.org/uc/item/2591v2w7. Accessed on 16th September 2022.

Fernandez-Otoya, F., Cabero-Almenara, J., Perez-Postigo, G., Bravo, J., Alcazar-Holguin, M. A., & Vilca-Rodriguez, M. (2024). Digital and Information Literacy in Basic-Education Teachers: A Systematic Literature Review. *Education Sciences, 14*(2), 127. https://doi.org/10.3390/educsci14020127. Accessed on 18th April 2023.

Freeman, R. L. (2005). *Telecommunication System Engineering*. John Wiley & Sons. https://www.academia.edu/28190761/Telecommunication_System_Engineering. Accessed on 18th April 2023.

Fuchs, C., & Seo, J. (2021). The COVID-19 Pandemic and the Digital Divide: Exploring the Relationship between COVID-19 and Internet Access. *Journal of Information, Communication and Ethics in Society*. doi: 10.1108/JICES-05-2020-0099

Garcia-Martin, J, & Garcia-Sanchez, J.N. (2022). The Digital Divide of Know-How and Use of Digital Technologies in Higher Education: The Case of a College in Latin America in the COVID-19 Era. *International Journal of Environmental Research and Public Health*.19 (6): 3358. https://doi.org/10.3390/ijerph19063358. Accessed on 07th May 2023.

Garuba, Abdul Rahman. (2013). The Prospects of Bridging the Digital Divide in Africa. *Library Philosophy and Practice (e-journal).* 882. https://digitalcommons.unl.edu/libphilprac/882.Accessed on 18th April 2023.

Gautam, Devendra Kumar. (December 2014). Impact of Digital Divide and Public Libraries. *IOSR Journal Of Humanities And Social Science*. 19 (12). http://www.iosrjournals.org/iosr-jhss/papers/Vol19-issue12/Version-4/J0191245963.pdf.Accessed on 07th May 2023.

Giuliano, R. (2024). From 5G-Advanced to 6G in 2030: New Services, 3GPP Advances, and Enabling Technologies, *IEEE Access*. 12, 63238-63270. doi: 10.1109/ACCESS.2024.3396361.

Goldfarb, Avi., & Prince, Jeffrey. (2007). Internet Adoption and Usage Patterns Are Different: Implications for the Digital Divide. *SSRN Electronic Journal*. 20 (1), 2-15. DOI:10.1016/j.infoecopol.2007.05.001. Accessed on 06th May 2023.

Govinda, R., & Sood, N. (May, 2000). DIET: An Evaluation Study. https://www.educationforallinindia.com/page113.html. Accessed on 18th February 2023.

Greenberg, R., & Zhu, E. (2021). Digital Divide in Education in the Time of COVID-19. Handbook of Research on Online Discussion-Based Teaching Methods, 222-237. doi: 10.4018/978-1-7998-8620-9.ch013

GSMA. (2023). *The Mobile Economy 2023*. https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2023/03/270223-The-Mobile-Economy-2023.pdf. Accessed on 18th July 2024

Gurung, Lina. (2018). The Digital Divide: An Inquiry from Feminist Perspectives. Dhaulagiri Journal of Sociology and Anthropology, 12, 50-57. https://pdfs.semanticscholar.org/8e06/13df78e649aca3e2eb220e64e218a1b98b16.pdf?_ga=2.149791862.1348750775.1647589527-479336643.1644946499 Accessed on 12th April 2023.

Hanafizadeh, M. R., Hanafizadeh, P., & Bohlin, E. (2013). Digital Divide and E-Readiness: Trends and Gaps. *International Journal of E-Adoption (IJEA)*, *5*(3), 30–75.

Hargittai, E. (2002). Second-Level Digital Divide: Differences in People’s Online Skills. *First Monday*, *7*(4). https://doi.org/10.5210/fm.v7i4.942. Accessed on 16th September 2022.

Hebert, Andrea. (2018). Information Literacy Skills of First-Year Library and Information Science Graduate Students: An Exploratory Study. *Evidence*

*Based Library and Information Practice.*13(3). 32-52. DOI: 10.18438/eblip29404

Hilbert, M. (2009). When Is Cheap, Cheap Enough to Bridge the Digital Divide? Modeling Income Related Structural Challenges of Technology Diffusion In Latin America. *World Development*. 38(5). 756-770.

Hoffman, Donna L., Novak, Thomas P. (February, 1998). Bridging the Digital Divide: The Impact of Race on Computer Access and Internet Use. https://eric.ed.gov/?id=ED421563.Accessed on 18th April 2023.

Hrastinski, S. (2020). Digitalisation of Higher Education in The COVID-19 Pandemic. *Nordic Journal of Digital Literacy*, 15(4), 193-198. doi: 10.18261/issn.1891-943x-2020-04-03

http://mulibrary.manipuruniv.ac.in/Accessed on 11thNovember 2024.

http://www.aus.ac.in/library_old/. Accessed on 11thNovember 2024.

https://icetpess2022.manipuruniv.ac.in/venue.html. Accessed on 11thNovember 2024.

https://lib.mzu.edu.in/ . Accessed on 11thNovember 2024.

https://mzu.edu.in/about-the-university/ . Accessed on 11thNovember 2024.

https://nehu.ac.in/About-NEHU. Accessed on 11thNovember 2024.

https://themeghalayanexpress.com/education-ministry-sends-team-to-resolve-crisis-at-north-eastern-hill-university-in-meghalaya/ . Accessed on 11thNovember 2024.

https://www.eastmojo.com/news/2024/03/18/tezpur-university-to-launch-seven-new-courses-see-details-here/. Accessed on 11thNovember 2024.

https://www.flickr.com/photos/chinavine/215720587. Accessed on 11thNovember 2024.

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DhQvNnzL_pEk&psig=AOvVaw0dlIjERQU5NR8AqW8omBKH&ust=1736329114896000&source=images&cd=vfe&opi=89978449&ved=0CBgQ3YkBahcKEwiY3JyZqOOKAxUAAAAAHQAAAAAQBA. Accessed on 11thNovember 2024.

https://www.nehu.ac.in/library/index.html. Accessed on 11thNovember 2024.

https://www.tezu.ernet.in/Library/. Accessed on 11thNovember 2024.

https://www.tezu.ernet.in/Library/index.php/about-us/about-library. Accessed on 11th November 2024.

Hussain, A. (2023). Use of Artificial Intelligence in The Library Services: Prospects and Challenges. *Library Hi Tech News*. 40(2), 15-17. https://doi.org/10.1108/LHTN-11-2022-0125Accessed on 21st September 2024.

India. MHRD (2020). National Education Policy 2020, Ministry of Human Resource Development, New Delhi. https://www.education.gov.in/nep/about-nep#:~:text=In%20school%20education%2C%20the%20National,solving%20%E2%80%93%20but%20also%2C%20social%20and. Accessed on 05th November 2024.

ITU. (2023). *Global Connectivity Report 2023*. https://www.itu.int/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx#:~:text=Geneva%2C%2012%20September%202023&text=The%20reduction%20from%20the%20estimated,people%2C%20are%E2%80%8B%20now%20online. Accessed on 18th July 2024

Jaggars, S. S., Motz, B. A., Rivera, M. D., Heckler, A., Quick, J.D., Hance, E. A., &Karwischa, C. (2021). The Digital Divide Among College Students: Lessons Learned From the COVID-19 Emergency Transition. Midwestern Higher Education Compact. https://eric.ed.gov/?id=ED611284#:~:text=Policy%20Report%2C%20Midwestern%20Higher%20Education%20Compact%2C%202021%2DJan&text=This%20report%20examines%20the%20meaning,emergency%20shift%20to%20remote%20learning.Accessed on 21st September 2024.

Jayaprakash, A. and Gupta, V.U. 2005. Information Literacy: Need to Promote the Use of Digital Information Services in Digital Era. In R. Chandra edited ‘Libraries, Information Literacy and Lifelong Learning. Indian Library Association, Delhi. 292-301.

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook and Academic Performance. *Computers in Human Behavior*, 26(6), 1237-1245.

Krubu, Dorcas., Osawaru, Kingsley. (2010). The Impact of Information and Communication Technology (ICT) In Nigerian University Libraries. *Library Philosophy and Practice (ejournal).* 515. https://digitalcommons.unl.edu/libphilprac/515.Accessed on 21st August 2023.

Kumar, V. (2017). Ethnic Conflicts in North East India: Causes, Consequences, and Resolutions. *Journal of Asian and African Studies*, 52(6), 847-865.

Labrianidis, L., &Kalogeressis, T. (2006). The Digital Divide in Europe's Rural Enterprises. *European Planning Studies,* 14(1), 23-39. https://www.researchgate.net/publication/27377382_The_digital_divide_in_Europe's_rural_enterprises . Accessed on 19th April 2023.

Maceviciute, E., & T. D. Wilson. (2018). Digital Means for Reducing Digital Inequality: Literature Review. *Informing Science: The International Journal of an Emerging Transdiscipline.* 21: 269–287. doi:10.28945/4117

Mahmoud, H. H. H., & Ismail, T. (2020). A Review of Machine learning Use-Cases in Telecommunication Industry in the 5G Era. *2020 16th International Computer Engineering Conference (ICENCO),* Cairo, Egypt, 159-163. doi: 10.1109/ICENCO49778.2020.9357376.

Manipur University (2024). https://www.manipuruniv.ac.in/. Accessed on 05thNovember 2024.

Marrall, Rebecca M. (2014). Teaching the Digital Divide: Connecting Students to Community, Knowledge, and Service Learning. *Library Philosophy and Practice (e-journal).*1126. http://digitalcommons.unl.edu/libphilprac/1126.Accessed on 19th September 2024.

Miah, Muhammed. (March, 2024). Digital Inequality: The Digital Divide and Educational Outcomes.https://www.researchgate.net/publication/379258768_Digital_Inequality_The_Digital_Divide_and_Educational_Outcomes. Accessed on 21st November 2024.

Michalak, R., & Rysavy, M. D. T. (2016). Information Literacy In 2015: International Graduate Business Students' Perceptions of Information Literacy Skills

Compared to Test-Assessed Skills. *Journal of Business & Finance Librarianship*, *21*(2), 152–174.

Ministry of Agriculture. Government of India (2024). Kisan Call Center. https://dackkms.gov.in/account/login.aspx. Accessed on 21st November 2024.

Ministry of Education (2024). DIKSHA (Digital Infrastructure for Knowledge Sharing).https://pmevidya.education.gov.in/diksha.html. Accessed on 22nd November 2024.

Ministry of Education (2024). SWAYAM. https://swayam.gov.in/. Accessed on 21st November 2024.

Ministry of Electronic and Information Technology (2024). Digital India. https://www.digitalindia.gov.in/. Accessed on 22nd November 2024.

Ministry of Electronic and Information Technology (2024). National Language Translation Mission (NLTM). https://www.meity.gov.in/archive-nltm. Accessed on 19th August 2024.

Ministry of Electronic and Information Technology (2024). National e-Governance Plan (NeGP). https://www.meity.gov.in/divisions/national-e-governance-plan. Accessed on 22nd November 2024.

Ministry of Electronic and Information Technology (2024). Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA).https://www.pmgdisha.in/about-pmgdisha/. Accessed on 18th November 2024.

Ministry of Human Resource Development (2017). NIRF India Ranking 2017. https://www.nirfindia.org/Docs/Ranking_Methodology_And_Metrics_2017.pdf. Accessed on 05thNovember 2024.

Miras, S., Ruiz-Bañuls, M., Gómez-Trigueros, I.M., & Mateo-Guillen, C. (2023). Implications of the Digital Divide: A Systematic Review of Its Impact in the Educational Field. *Journal of Technology and Science Education*, 13(3), 936-950. https://doi.org/10.3926/jotse.2249. Accessed on 29st September 2024.

Mishra, A. K. (2018). Household Income Inequality and Income Mobility: Implications Towards Equalizing Longer Term Incomes in India. *International Economic Journal.* 32 (2): 271–290. doi:10.1080/10168737.2018.1480640.

Mitchell, M. (2002). Exploring The Future of the Digital Divide Through Ethnographic Futures Research. *First Monday*. https://doi.org/10.5210/fm.v7i11.1004. Accessed on 02st September 2023.

Morgan, H. (2017). The Effect of The Digital Divide on Student Achievement. The Elon Journal of Undergraduate Research in Communications, 8(1), 46-55.

MZU. (2024). https://mzu.edu.in/. Accessed on 06thNovember 2024.

Naidoo, Segarani., Raju, Jaya. (November 2012). Impact of the Digital Divide on Information Literacy Training In a Higher Education Context. *South African Journal of Libraries and Information Science. 78 (1).* https://sajlis.journals.ac.za/pub/article/view/46#:~:text=The%20findingsof%20the%20study%20revealed,lessons%20while%20advantaged%20students%20already. Accessed on 18thSeptember 2023

National Telecommunications and Information Administration. (1998). Falling Through the Net III: Defining the Digital Divide. https://www.ntia.gov/report/1998/falling-through-net-ii-new-data-digital-divide. Accessed on 13th April 2023.

NEHU. (2024). https://www.nehu.ac.in/Accessed on 17thNovember 2024.

NIRF. (2024). About NIRF. https://www.nirfindia.org/Home/About/Accessed on 14thNovember 2024.

NIRF. (2024). Ranking. https://www.nirfindia.org/#. Accessed on 20thNovember 2024.

Nkanu, W. O., Okon, Henry Itohowo. (2010). Digital Divide: Bridging the Gap Through ICT in Nigerian Libraries. *Library Philosophy and Practice (e-journal)*. 492. http://digitalcommons.unl.edu/libphilprac/492.Accessed on 07th September 2022.

Norris, P. (2001). Digital Divide: Civic Engagement, Information Poverty, and The Internet Worldwide. New York, NY: Cambridge University Press.

Ntui, Aniebiet Inyang. (2014). Information and Communication Technology (ICT) Usage and Undergraduate Students Study Habits in Universities in Cross River State, Nigeria. *Library Philosophy and Practice (e-journal)*. 1187.

http://digitalcommons.unl.edu/libphilprac/1187. Accessed on 02st September 2023.

OECD. (2019). *Bridging the Digital Divide: Include, Upskill, Innovate*. OECD iLibrary

Okunlaya, R.O., Syed Abdullah, N. & Alias, R.A. (2022). Artificial Intelligence (AI) Library Services Innovative Conceptual Framework for The Digital Transformation of University Education. *Library Hi Tech*, 40(6), 1869-1892. https://doi.org/10.1108/LHT-07-2021-0242. Accessed on 13th November 2024.

Omame, Isaiah Michael., Alex-Nmecha, Juliet C. (2020). Artificial Intelligence in Libraries. Managing And Adapting Library Information Services for Future Users: IGI Global. 120_144. https://www.researchgate.net/publication/338337072_Artificial_Intelligence_in_Libraries. Accessed on 17th November 2023.

OneWorld Foundation India (2024). Life Line. https://oneworld.net.in/Accessed on 12th November 2024.

Pew Research Center. (2023). *Internet/Broadband Fact Sheet*. https://www.pewresearch.org/internet/fact-sheet/internet-broadband/Accessed on 18th July 2024

Prasad, H.N. (2018). Information Literacy: Definition, Objectives and Subject Coordinator Importance. *Library Use and User Studies*. (n.d.). https://ebooks.inflibnet.ac.in/lisp15/chapter/information-literacy-definition-objectives-and-subject-coordinator-importance/. Accessed on 06th May 2023.

Prathap, S. (2024). NEP 2020 and the Infrastructure for ICT-based Teaching Learning. *International Journal for Multidisciplinary Research (IJFMR).* 6 (1). https://www.ijfmr.com/papers/2024/1/11597.pdf. Accessed on 06th December 2024.

Rai, Alka., & Sharma, Arvind. (January 2019). Digital Divide and Libraries: A Systematic Literature Review. *Library Herald*. 57(3): 402. DOI:10.5958/0976-2469.2019.00026.5. Accessed on 06th May 2023.

Ramsetty, Anita., & Adams, Cristin. (April 2020). Impact of The Digital Divide in The Age of COVID-19. *Journal of the American Medical Informatics Association*, 27(7), 1147-1148. https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC7197532&blobtype=pdf. Accessed on 21st November 2024.

Rios-Campos, C., Zambrano, E. O. G., Cantos, M. F. M., Anchundia-Gómez, O., León, M. E. C., Moya, G. E. M., García, E. a. M., Batalla, E. a. P., De La Oliva, N. a. R., & Zelada, O. S. (2024). Universities And Artificial Intelligence. *South Florida Journal of Development*, *5*(6), e4016. https://doi.org/10.46932/sfjdv5n6-010Accessed on 18st November 2024.

SCONUL. (2011). The SCONUL Seven Pillars of Information Literacy: Core Model for Higher Education. https://www.researchgate.net/publication/259341007_The_SCONUL_Seven_Pillars_of_Information_Literacy_Core_model#:~:text=3-,The%20SCONUL%20Seven%20Pillars%20of%20Information%20Literacy%3A%20Core%20Model,data%20curation%20and%20data. Accessed on 25th November 2024.

Selwyn, N. (2004). *Reconsidering Political and Popular Understandings of the Digital Divide*. New Media & Society, 6(3), 341-362. doi:10.1177/1461444804042519

Selwyn, N. (2022). The Future of AI and Education: Some Cautionary Notes. *European Journal of Education*. *57*(4), 620-631. https://doi.org/10.1111/ejed.12532. Accessed on 21st November 2024.

Shokat, S., Riaz, R., Rizvi, S. S., Riaz, F., Aziz, S., Hussain, R. S., & Shabir, S. (2018). Impact of Web 2.0 on Digital Divide in AJ & K Pakistan. *International Journal of Advanced Computer Science and Applications*, *9*(2), 221–228. https://doi.org/10.14569/IJACSA.2018.090231Accessed on 07th May 2023.

Shukla, Ravi. (2020). Information Literacy Skills Among PG Students of Social Sciences Of Mizoram University And Tezpur University: A Comparative Study. [Doctoral Theses, Mizoram University]. INFLIBNET.

https://mzuir.inflibnet.ac.in/bitstream/123456789/1057/1/RAVI%20SHUKLA%20PhD%20Thesis%202020.pdf. Accessed on 25th June 2024.

Singh, Kirti. (September, 2012). Digital Divide Factors in Indian Management Libraries Introduction. *International Journal of Advanced Research in IT and Engineer*. 1(3), 34-43. https://www.academia.edu/5379938/DIGITAL_DIVIDE_FACTORS_IN_INDIAN_MANAGEMENT_LIBRARIES_INTRODUCTION. Accessed on 16th July 2023

Solyman, Ahmed Amin Ahmed., & Yahya, Khalid. (August 2022). Evolution of Wireless Communication Networks: From 1G to 6G and Future Perspective. *International Journal of Electrical and Computer Engineering (IJECE*). 12 (4). DOI: 10.11591/ijece.v12i4.pp3943-3950

Soomro, K.A., Kale, U., Curtis, R. et. al.(2020). Digital Divide Among Higher Education Faculty. *Int J Educ Technol High Educ* 17, 21. https://doi.org/10.1186/s41239-020-00191-5. Accessed on 06th May 2023.

Statista (2024). Worldwide Digital Population 2024**.** https://www.statista.com/statistics/617136/digital-population-worldwide/. Accessed on 28th August 2024.

Sufyan, A., Khan, K.B., Khashan, O.A., Mir, T., & Mir, U. (2023). From 5G to Beyond 5G: A Comprehensive Survey of Wireless Network Evolution, Challenges, and Promising Technologies. *Electronics*. 12, 2200. https://doi.org/10.3390/electronics12102200. Accessed on 28th November 2024.

Sun, Jerry Chih-Yuan., & Metros, Susan E. (2011). The Digital Divide and Its Impact on Academic Performance. *US-China Education Review A 2*. 153-161. https://files.eric.ed.gov/fulltext/ED524846.pdf. Accessed on 20th May 2023

Taba, P. (2023). Challenges and Prospects of Higher Education in Northeast India: A Comprehensive Analysis. In *International Journal of Novel Research and Development*.8 (9). https://www.ijnrd.org/papers/IJNRD2309340.pdf. Accessed on 08th August 2024.

Tata Trusts (2024). Internet Saathi. https://www.tatatrusts.org/our-work/digital-transformation/digital-literacy/internet-saathi. Accessed on 02nd November 2024.

Taylor, Kiara. (February, 2022). Digital Divide. *Investopedia*. https://www.investopedia.com/the-digital-divide. Accessed on 24th July 2024

Tayo, Omolaro., Thompson, Randall., & Thompson, Elizabeth. (2016). Impact of the Digital Divide on Computer Use and Internet Access on the Poor in Nigeria. *Journal of Education and Learning.* 5(1). https://files.eric.ed.gov/fulltext/EJ1085410.pdf.Accessed on 20th May 2023

Tezpur University (2024).https://www.tezu.ernet.in/. 21stNovember 2024.

Tuominen, S., & Kotilainen, S. (2012). Pedagogies of Media and Information Literacies. UNESCO Institute for Information Technologies in Education: Moscow. Comunicação E Sociedade, 23, 314-316. https://doi.org/10.17231/comsoc.23(2013).1633. Accessed on 06th December 2022.

UNESCO. (2005). Towards Information Literacy Indicators. https://unesdoc.unesco.org/ark:/48223/pf0000158723. Accessed on 24th August 2024.

UNESCO. (2008). Towards Information Literacy Indicators: Conceptual Framework Paper. *United Nations Educational, Scientific and Cultural Organization*. https://unesdoc.unesco.org/ark:/48223/pf0000158723. Accessed on 28th May 2024.

UNESCO. (2021). Information and Communication Technology (ICT). *United Nations Educational, Scientific and Cultural Organization*. https://uis.unesco.org/en/glossary-term/information-and-communication-technologies-ict. Accessed on 03rdMay 2024

UNESCO. (2023). *Digital Literacy Global Framework*. https://unesdoc.unesco.org/Accessed on 18thJuly 2024.

UNESCO. (2005). Towards Information Literacy Indicators. https://unesdoc.unesco.org/ark:/48223/pf0000158723. Accessed on 18thJuly 2024.

Val, S., & Lopez-Bueno, H. (2024). Analysis of Digital Teacher Education: Key Aspects for Bridging the Digital Divide and Improving the Teaching–Learning Process. *Educ. Sci.*, *14*, 321. https://doi.org/10.3390/educsci14030321. Accessed on 21st November 2024

Van Deursen, A. J., & van Dijk, J. A. (2014). The Digital Divide Shifts to Differences in Usage. *New Media & Society*, 16(3), 507-526. https://doi.org/10.1177/1461444813487959. Accessed on 06th May 2023.

Van Dijk J. A. G. M. (2006). Digital Divide: Research, Achievements And Shortcomings. *Poetics*,34, 221-235. https://www.researchgate.net/publication/241880596_Digital_Divide_Research_Achievements_and_ShortcomingsAccessed on 21st November 2024.

Van Dijk, J. A .G, M. (2012). The Evolution of The Digital Divide: The Digital Divide Turns To Inequality of Skills and Usage. In J. Bus et al. (Eds.), Digital Enlightenment Yearbook2012: IOS Press.doi: 10.3233/978-1-61499-057-4-57

Van Dijk, J. A. G. M. (2005). *The Deepening Divide: Inequality in the Information Society*. Thousand Oaks, CA: SAGE Publications.

Van Dijk, J. A. G. M., & Hacker, K. (2003). The Digital Divide as A Complex and Dynamic Phenomenon. *Information Society*, 19, 315-326. https://www.researchgate.net/publication/220175432_The_Digital_Divide_as_a_Complex_and_Dynamic_Phenomenon . Accessed on 20thJuly 2023

Venkatesh, V., & T. A. Sykes. (2013). Digital Divide Initiative Success in Developing Countries: A Longitudinal Field Study in a Village in India. *Information Systems Research.* 24 (2): 239–260. doi:10.1287/isre.1110.0409.

Verma, Manish. (2023). Novel Study on AI-Based Chatbot (ChatGPT) Impacts on the Traditional Library Management. *International Journal of Trend in Scientific Research and Development*. 7(1), 961-964. https://www.ijtsrd.com/papers/ijtsrd52767.pdf. Accessed on 08th November 2024.

Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital Divide*. Cambridge, MA: MIT Press. https://direct.mit.edu/books/oa-monograph/1817/Technology-and-Social-InclusionRethinking-the. Accessed on 24th August 2024.

Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the Digital Divide*. Cambridge, MA: MIT Press. https://direct.mit.edu/books/oa-monograph/1817/Technology-and-Social-InclusionRethinking-the. 18thSeptember 2023

Warschauer, M., &Matuchniak, T. (2010). New Technology and Digital Worlds: Analyzing Evidence of Equity in Access, Use, And Outcomes. Review of Research in Education, 34(1), 179-225.

Warschauer, M., Knobel, M., & Stone, L. (2004). Technology And Equity in Schooling: Deconstructing the Digital Divide. *Educational Policy*, 18(4), 562-588.

Wikipedia (2024). Global Digital Divide. https://en.wikipedia.org/wiki/Global_digital_divide. Accessed on 16th November 2024.

Wikipedia (2024). Telecommunication. https://en.wikipedia.org/wiki/Telecommunications. Accessed on 16th November 2024.

Wikipedia (2024). Digital India. https://en.wikipedia.org/wiki/Digital_India#:~:text=7%20External%20links-,History,networks%20and%20improving%20digital%20literacy. Accessed on 09thSeptember 2024

Wikipedia. (2024). Central University (India). https://en.wikipedia.org/wiki/Central_university_(India)#:~:text=Central%20universities%20in%20India%20are,the%20purview%20of%20other%20ministries. 08thNovember 2024.

World Bank. (2023). *World Development Report 2023: Data for Better Lives*. https://www.worldbank.org/en/publication/wdr/wdr-archive. 14thJune 2024

World Economic Forum. (2023). *The Global Risks Report 2023*. https://www.weforum.org/publications/global-risks-report-2023/. 14thJune 2024

Yadav, Anubhuti. (2018). Media and Information Literacy. *INFLIBNET Center*. https://ebooks.inflibnet.ac.in/lisp20/. Accessed on 18th November 2023.

Yadav, Rajesh. (2017). Challenges and Evolution of Next generation Wireless Communication. *Proceedings of the International Multi Conference of Engineers and Computer Scientists*. https://www.iaeng.org/publication/IMECS2017/IMECS2017_pp619-623.pdf. Accessed on 08th November 2024.

Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J., Yuan, J., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity*. 1-18. https://doi.org/10.1155/2021/8812542. Accessed on 08th November 2024.

Zurkowski, P.G. (1974). The Information Service Environment Relationships and Priorities. Washington DC: National Commission on Libraries and Information Sciences. https://eric.ed.gov/?id=ED100391. Accessed on 20th November 2022.

QUESTIONNAIRE FOR STUDENTS

'DIGITAL DIVIDE AMONG PG STUDENTS OF SELECTED CENTRAL UNIVERSITIES OF NORTH EAST INDIA: AN EVALUATIVE STUDY'

Dear Students,

My name is R Laltlanzova, a Doctoral Research Scholar under the supervision of Dr. F Chanchinmawia, Department of Library and Information Science, Mizoram University, Mizoram is surveying '**Digital Divide Among PG Students of Selected Central Universities of North East India: An Evaluative Study'**. In this survey, the researcher is seeking the status of Digital Divide among PG students of selected Central Universities of North East India. The information provided by you will help us in getting the authentic source for the research. I assure you that all information/ data provided by you will remain confidential, as well as free from manipulation and will be used for research purpose only.

1. **Personal Information:**

1.1 Gender: a) Male ☐ b) Female ☐

1.2 Name of the University:
- a) Tezpur University ☐ b) North Eastern Hill University ☐
- c) Assam University ☐ d) Manipur University ☐
- e) Mizoram University ☐

1.3 Name of the Department: ………………………………………………………….

1.4 Age group: Below 24 ☐ / 25-29 ☐ /30-34 ☐
35-39 ☐ / 40 and above ☐

2. **To know the ability to access ICT tools and technology for academic purposes.**

2.1 How long have you been familiar with the use of computer:
- a) Less than 1 year ☐
- b) 1-5 years ☐
- c) 6-10 years ☐
- d) More than 10 years ☐

2.2 Do you know how to access internet?
Yes ☐ /No ☐

2.3 Do you have devices (any) to access internet?
Yes ☐ /No ☐

2.4 Frequency of device usage to access internet for academic purpose?

Sl.No.	Device Name	Always	Sometimes	Rarely	Never
1.	Laptop				
2.	Smartphone				
3.	Tablet				
4.	Desktop				
5.	Smart TV				

2.5 Indicate your major source for learning digital/ICT skills?
a) Self-learning ☐ b) Attending course ☐ ☐

c) Friends d) Teachers
e) YouTube

2.6 Have you ever used AI chatbot (Chat GPT, Bard, Jasper chat, Botsify etc..) in support of your studies?
a) To a great extent
b) Somewhat
c) Very little
d) Not at all

2.7 Do you know how to access scholarly journals and materials through online library databases or repositories?
Yes /No /Not sure

3 To analyse the use pattern of the internet by the respondents.

3.1 How often you access to internet within a day?
a) 0-1 hr a day
b) 1-3 hrs a day
c) 3-5 hrs a day
d) More than 5 hrs

3.2 Purpose of Internet usage:

Sl.No.	Purpose	Always	Sometimes	Rarely	Never
1.	Browsing and downloading online resources				
2.	Study online resources and research purpose				
3.	Playing online games				
4.	For social media				
5.	Marketing and trading				
6.	Podcast and audio streaming				

3.3 List of software applications you are proficient in: (you can tick more than one)

Sl.No.	Application Software	Please tick	
		Good	Not Good
1.	Microsoft Office Suite (word, PowerPoint, etc.)		
2.	Adobe Creative Suite (Photoshop, Illustrator, etc.)		
3.	Data Analysis Tools (SPSS, Excel, Python, etc..)		
4.	Project Management Tools (Trello, Asana, Zoho Project, Teamwork, etc..)		
5.	Content Management Tools (WordPress, Drupal, Joomla, etc…)		

4 To find out whether geographical restrictions contribute to the digital divide among the respondents

4.1 Residential: Rural ☐ / Urban ☐

4.2 Does your locality have a computer centre/ ICT device to access?

Yes ☐ /No ☐

4.3 Rate the following parameter for geographical restriction:

Sl. No.	Parameter	Very Good	Good	Acceptable	Poor	Very Poor
1.	Telecom network					
2.	Electricity					

4.4 Type of Internet Connection:

a) Broadband ☐
b) Mobile data ☐
c) Both (Broadband and Mobile) ☐

4.5 Does your geographical location affect the reliability and speed of your internet connection?

a) Positively ☐
b) Negatively ☐
c) No impact ☐

4.6 Does your geographical restriction affect your ability to participate in online learning?

a) Significantly hindered ☐
b) Slightly hindered ☐
c) No impact ☐
d) Improved ☐

4.7 Is there any step taken by your community to reduce the digital divide?

Yes ☐ /No ☐ /Not sure ☐

5 To know the initiative taken by selected universities to reduce digital divide among the respondents.

5.1 Does your university take any initiative to reduce digital divide?

Yes ☐ /No ☐

5.2 Initiative taken by your university to reduce digital divide.

a) Internet connectivity support ☐
b) Digital literacy workshop ☐
c) Awareness programme on use of ICT ☐
d) Technology grants and scholarship ☐
e) Equitable access to online resources ☐
f) Technology support service ☐
g) Digital inclusion survey ☐
h) Others (specify)………………………………………….

6 Find out the areas of strength and weakness of respondent in handling digital assets and give suggestions for the enhancement.

6.1 Rate your proficiency in the following digital skills:

Sl. No.	Digital Proficiency	Excellent	Good	Acceptable	Poor	Very Poor
1	Social media management					
2	Data analysis					
3	Online ticket booking					
4	Web development					
5	Digital marketing (Online Marketing)					
6	Cloud computing					
7	Accessing journal/Book Database					
8	Handling AI technology					
9	Updating software					

6.2 What level of familiarity do you have with upcoming technologies and current digital trends?

a) To a great extent
b) Somewhat
c) Very little
d) Not at all

6.3 Levels of barriers face by you in accessing digital contents:

Sl. No.	Barriers	Extreme	Moderate	Not a Barrier
1	Not having an ICT background in the family			
2	Poor or no connection to the internet at home			
3	Lack of ICT infrastructure at institution/university			
4	Poor network coverage in the University campus			
5	Lack of skills to access required information			
6	Lack of proficiency in English language			
7	Others (Please specify.):			

7. Identify the awareness of copyright among the respondents.

7.1 Do you know what can be protected using copyright?
  a) Extremely
  b) Moderately
  c) Not at all

7.2 Awareness level of copyright.
  a) To a great extent
  b) Somewhat
  c) Very little
  d) Not at all

7.3 Do you know that you have to cite for using someone's ideas and quote for person's exact words to prevent from copyright issue?
  a) Extremely
  b) Moderately
  c) Not at all

7.4 Have you ever been accused of copyright infringement?
  Yes /No

Suggestions (if any):
…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
………………………………………

BIO-DATA OF THE RESEARCHER

Name	:	**Mr. R Laltlanzova**
Degree	:	Ph.D.
Department	:	Library and Information Science
Title of Theses	:	Digital Divide Among PG Students of Selected Central Universities of North East India: An Evaluative Study
Date of Admission	:	04.08.2021
Year of Completion of Coursework	:	2021
MZU Registration No.	:	5943 of 2012
Ph.D. Registration No. & Date	:	MZU/PhD/1940 of 04.08.2021
Date of Pre-Submission	:	05.12.2024

Paper Presented in Conference/Seminar:

1. National Seminar on "Social Media and Librarianship: Connecting the Communities" held during 26th-28th February, 2020. Paper Title: "ROCHUN: Pay It Forward, Bussiness Model: Non-Profit. Alineri's Social Venture for Library in Connecting the Communities through Social Media."
2. 20th MANLIBNET Convention, International Seminar on "Libraries of the Future: Emerging Trends" held during 5th-7th May, 2022. Paper Title: "Status of E-learning in Mizoram during Covid-19 pandemic: A study of Selected Colleges in Aizawl City, Mizoram."
3. IASLIC 29th National Seminar. Held during 15th-17th March, 2023. Paper Title: "Digital Divide among Rural and Urban Areas of Mizoram. A Case study on Govt. Kolasib College, Kolasib and Govt. T. Romana College, Aizawl."
4. National Seminar on "National Education Policy 2020: A Forward-Looking Vision for LIS Education and Services" held during 1st-3rd March, 2023.

Paper Title: MOOC-Swayam Course offered and its usefulness for LIS Education.

5. National Seminar on "Revamping Libraries and Librarianship in Digital Environment" held during 11th-12th May, 2023. Paper Title: "Possible Impact of Chat GPT in traditional Library and Library Reference Services."
6. International Seminar on "New Era of Social Responsibility, Sustainability and Innovations" held on March 4th -6th, 2024 at Mizoram University. Paper Title: Digital Divide in India: Prospects and Challenges.

Journal Publication:

1. **Laltlanzova. R.** & Chanchinmawia. F. (2021). Utilization And Users' Satisfaction on Library Resources and Services by School of Engineering and Technology, Mizoram University. *Library Philosophy and Practice (e-journal)*. 6503. https://digitalcommons.unl.edu/libphilprac/6503 **(Scopus)**
2. Boro, Bhaigyashree., **Laltlanzova, R**., & Chanchinmawia, F. (January, 2024). Examining Digital Literacy Skills Among Gen Z Students of Mizoram University: The Impact of the Internet in the Academic Environment. *DESIDOC Journal of Library & Information Technology*. 44(1):32-36. DOI:10.14429/djlit.44.1.19291 **(Scopus)**
3. Boro, Bhaigyashree., **Laltlanzova, R.,** & Chanchinmawia, F. (2023). Digital Literacy Skills among the Postgraduate (P.G.) Students: a study of selected Central Universities of North East India. *College Libraries*, *38*(II), 40–49. https://collegelibraries.in/index.php/CL/article/view/112 **(UGC-CARE List)**

PARTICULARS OF THE CANDIDATE

Name of Candidate	**:**	**R LALTLANZOVA**
Degree	**:**	Ph.D.
Department	**:**	Library and Information Science
Title of Thesis	**:**	Digital Divide Among PG Students of Selected Central Universities of North East India: An Evaluative Study
Date of Admission	**:**	04.08.2021
Approval of Research Proposal		
1. DRC	**:**	04.04.2022
2. BOS	**:**	03.06.2022
3. School Board	**:**	06.06.2022
MZU Registration No.	**:**	5943 of 2012
Ph.D. Registration No. & Date	:	MZU/Ph.D./1940 of 04.08.2021
Extension (If Any)	**:**	NIL

Head
Department of Library and Information Science

ABSTRACT

DIGITAL DIVIDE AMONG PG STUDENTS OF SELECTED CENTRAL UNIVERSITIES OF NORTH EAST INDIA: AN EVALUATIVE STUDY

AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

R LALTLANZOVA

MZU REGISTRATION: 5943 of 2012

Ph.D. REGISTRATION: MZU/Ph.D./1940 of 04.08.2021

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

SCHOOL OF ECONOMICS, MANAGEMENT, AND INFORMATION SCIENCE

JANUARY, 2025

DIGITAL DIVIDE AMONG PG STUDENTS OF SELECTED CENTRAL UNIVERSITIES OF NORTH EAST INDIA: AN EVALUATIVE STUDY

BY

R LALTLANZOVA

Department of Library and Information Science

Supervisor

Dr F CHANCHINMAWIA

Submitted

In partial fulfillment of the requirement of the Degree of Doctor of Philosophy in Library and Information Science of Mizoram University, Aizawl

1. INTRODUCTION

Digital Literacy is a crucial component for developing lifelong learning skills. Since the digital environment has emerged rapidly, people from different parts of the world know how to access information. However, there can be a considerable barrier to accessing the information. Some people lack access to or expertise in using information and communication technologies (ICTs), whereas others have all of these things and have extensive knowledge of them (Naidoo & Raju, 2012). Access to ICTs varies significantly among the privileged class, the haves, and the impoverished class, the have-nots, in developing countries (Venkatesh and Sykes 2013).

People from different places might have different abilities in handling ICT tools; the main reason may be economic status, environmental factors, family problems, geographical region, etc. The digital gap is frequently caused by a number of factors, including low economic and literacy levels, regional limitations, a lack of desire to use technology, physical access issues, and digital illiteracy. The unequal distribution of household income in developing countries leads to wide disparities between the affluent and the poor, which unfortunately compromises a person's ability to pursue their educational goals (Mishra, 2018). Furthermore, the majority of families impacted by digital inequality are low-income households, such as those found in rural or semi-urban areas (Maceviciute & Wilson, 2018).

Singh (2012) has emphasized that uneven access to ICTs has resulted in a significant digital divide. Even though India is one of the new IT superpowers, the gains have been incredibly gradual, particularly in remote areas. In addition to socioeconomic considerations, the government has faced obstacles when implementing IT-focused initiatives due to regional, educational, and cultural variables. Political instability, financial barriers, infrastructure constraints, content barriers, literacy and skill barriers and linguistic diversity are some of the factors that limit the benefits that underprivileged groups in India receive from having access to ICT.

2. ETYMOLOGY OF THE TERM DIGITAL DIVIDE

The term first appeared in the United States in the middle of the 1990s. The National Telecommunications and Information Administration of the US Department of Commerce published it for the first time in 1999. Sadly, there is a lot of misunderstanding regarding the term "digital divide." However, it is a metaphor that has led to at least four misunderstandings. First, the metaphor suggests a simple distinction between two divided groups with a yawning gap between them. Second, it suggests that this gap is difficult to bridge. Third, it can imply absolute inequalities between those who are included and those who are excluded, whereas inequalities are of a more relative kind. Finally, the digital divide is not a static and permanent condition.' (Dijk, 2017).

3. DEFINITION OF DIGITAL DIVIDE

Dijk (2017) defined the digital divide as "the concept is usually defined as the gap between people who do and do not have access to forms of information and communication technology. These forms are primarily computers and the internet. Sometimes, smartphones and other digital hardware and software are also included. The concept figures in discourses about social and information inequality. In this respect, inclusion and exclusion in particular social units are common concepts."

Taylor (2022) defined the digital divide as "the digital divide refers to the gap between demographics and regions that have access to modern information and communications technology and those that don't. Though the term now includes the technical and financial ability to utilize available technology with access (or a lack of access) to the internet gap, it refers to the constant shifting with the development of technology. When the term was first used in the late 20th century, for example, it described the gap between those who had Smartphone access and those who did not." The increased access to communication tools has helped rural areas somewhat, but the geographical disparity is increasingly noticeable in emerging nations. The factors contributing to the digital divide range from one place to another; however, the gap is widening, and the disparities in how different countries and regions use communication resources are growing.

The difference between those with and without access to ICTs is known as the "digital divide." The internet and computers make up the majority of these, but smartphones and other software and digital gadgets might potentially be included. The idea comes up in discussions about information and inequality in society. Under these circumstances, the terms "exclusion" and "inclusion" within particular social groups are used frequently.

4. DIGITAL DIVIDE BARRIERS AND CHALLENGES

The digital divide can be led by challenges and obstacles that affect people individually, in groups, and across entire countries. Here are a few main barriers and challenges:

4.1 Economic barriers

The high expenses of purchasing digital gadgets and internet services are the root cause of the economic obstacles known as the "digital divide." Smartphones, laptops, and tablets are frequently beyond low-income households' means, and the ongoing costs of internet connections might be unaffordable. The gap is further widened by the expenses of upkeep, repairs, and required software updates. Economically disadvantaged people and communities are consequently left without the necessary resources to engage in the digital world properly (Warschauer, 2003).

4.2 Infrastructure barriers

The digital divide is mostly caused by infrastructure hurdles, particularly in isolated and rural areas where consistent internet access is usually not available. These areas might not have internet connectivity, inadequate broadband networks, or use antiquated technologies. Investment is discouraged by the high expense and logistical difficulties associated with setting up and maintaining digital infrastructure in remote or hard-to-reach places. As a result, the divide between the urban and rural populations gets wider as inhabitants in these areas have fewer chances for digital participation, education, and economic progress (OECD, 2019).

4.3 Educational barriers

The persistence of the digital gap is primarily due to educational constraints. Many people lack the digital literacy abilities necessary to operate and navigate technology. Poor schools may lack the tools to teach these subjects or give students access to computers and the internet. Adults without sufficient digital education also have difficulty adjusting to the quickly changing digital landscape. Insufficient digital literacy impedes one's capacity to interact with digital services and data, advance personally, and secure employment opportunities (Van Dijk, 2005).

4.4 Social and cultural barriers

Social and cultural obstacles affect attitudes and access to technology, which substantially impacts the digital divide. Non-native speakers may find it difficult to access digital content due to language obstacles, and cultural resistance may hinder the uptake and application of new technology. The usage of digital tools may be discouraged in some countries by customs and beliefs, particularly about specific demographic groups. Due to these constraints, diverse communities cannot fully benefit from technology improvements and online services, which also cause inequities in digital participation and inclusion (Selwyn, 2004).

5. HIGHER EDUCATION'S OBSTACLES AND ISSUES IN NORTH EASTERN INDIA

Northeastern India's physical, socioeconomic, and infrastructure constraints present particular barriers and problems for higher education. Many students, particularly those from rural areas, struggle to access high-quality educational institutions due to the region's isolated locations and rough terrain. Educational inequities are exacerbated by inadequate infrastructure, which makes it difficult for staff and students to commute, access digital resources, and stay connected. Examples of this include insufficient transportation and irregular electricity.

Socioeconomic issues also significantly impact the quality and accessibility of higher education. Many students come from low-income families, making it hard for them to afford educational expenses like the internet connectivity and digital devices needed for modern education. Additionally, an absence of well-equipped research facilities and a shortage of experienced teachers and administrative staff limit students' exposure to academic courses and professional skills, affecting the overall quality of education.

As online learning and digital literacy become increasingly important in higher education, the digital divide makes these issues even more difficult. Many areas in the region lack adequate digital infrastructure and a limited internet connection, which hinder students from using digital tools necessary for research and successful education or fully engaging in online learning. Improved digital resources, better infrastructure, targeted financial aid for students from low-income families, and programs that increase teacher capacity are just some of the many strategies required to deal with these issues. Northeastern India may work toward a high-quality, inclusive higher education system by tackling these issues.

Taba, P. (2023) highlight a number of issues and Challenges of Higher Education in Northeast India. They are as follows:

5.1 Language dilemma: The language diversity that exists throughout North East India is a significant barrier to higher education in the area. Students find it difficult to get educational materials in their native tongues because different states have unique languages. Consequently, the Lack of accessible educational resources in their mother tongues discourages many people from pursuing higher education. Students who want to succeed academically in a bilingual setting face additional challenges due to this language barrier, which also restricts understanding.

5.2 Shortage of vocational courses: Although India has many universities, its curricula lack many vocational courses. These universities primarily provide traditional academic programs, ignoring the need for vocational training and practical skills. As a result, students' career options are limited because they frequently graduate with a lack of practical experience required for positions particular to their field. Increasing vocational courses could help bridge the gap by providing graduates with the specific knowledge and skills they need to meet today's labour market expectations.

5.3 Inadequate research infrastructure: Inadequate facilities and infrastructure in North Eastern states limit research prospects and make it difficult for the region to conduct research at the worldwide level. A good example of this is the region's relatively low enrolment in Ph.D. programs. Academic development and innovation are hampered by a lack of possibilities for advanced research, which further divides Northeast India from other research-driven areas.

5.4 Wastage and stagnation: Similar to the challenges in basic and secondary education, waste and stagnation are still problems in higher education. Inadequate hostel amenities, poor teacher-student interactions, an inefficient test system, and administrative difficulties are all contributing reasons. Additionally, this problem is made worse by Northeast India's high cost of higher education, which results from private universities' domination.

5.5 Lack of specific educational objectives: Many students in higher education feel aimless since there aren't clear learning objectives, even though enrolment has increased. When educational goals are unclear, students may become frustrated and find it difficult to successfully apply what they have learned. This Lack of focus can undermine academic motivation by causing disengagement and a weakened feeling of purpose. To solve this, educational institutions should set defined learning objectives that support students' professional and personal development and give them a clear way forward.

5.6 Privatization and commercialization: With the rise of private universities that frequently put profit before of academic quality, the higher education privatization has resulted a significant problem in northeastern India. The entire educational process may be compromised by this commercialization. Many private schools might not have the resources necessary for thorough education, such as sufficient facilities, knowledgeable professors, or research opportunities. Students can thus encounter obstacles in their academic and professional growth, which could worsen the regional educational disparity.

5.7 Traditional curriculum: The Indian higher education system's strong emphasis on theoretical knowledge over real-world applications is one of its main issues. This problem also exists in Northeast India, where curricula frequently don't address issues that arise in the actual world. Students' employability may be limited as a result of graduating without the practical skills required to succeed in the modern workforce. Curriculum reform that prioritizes internships, industry engagement, and experiential learning is necessary to close this gap and better prepare students for real-world employment.

5.8 Insufficient practical knowledge: Most of the time, students are not given the practical skills they need for their careers by the knowledge that is taught in syllabus and curriculum. One major worry is the disconnect between theoretical knowledge and real-world application. Because of this gap, graduates are ill-equipped to handle the demands of the real world, which hinders their ability to adjust in changing work settings. To solve this, universities must incorporate industry-relevant training and skill-based learning into their curricula.

5.9 Teacher dedication and employment conditions: Professional courses have been added to many North East Indian universities' standard academic offerings. Nonetheless, most of the instructors in these establishments work on contract and receive little compensation. Their commitment to teaching may suffer as a result of this unstable work environment. High turnover rates among contractual instructors also affect the quality of education by interfering with the continuity of instruction. Resolving this issue through equitable hiring procedures and competitive pay may increase teacher staying and improve students' educational experiences.

6. IMPORTANCE OF HIGHER EDUCATION IN BRIDGING DIGITAL DIVIDE AT NORTH EASTERN STATES

For bridging the digital divide, higher education plays a crucial role by fostering digital literacy, improving access to technology, and promoting equitable learning opportunities. Students can be prepared to succeed in an increasingly digital environment by attending universities and colleges and gaining the necessary ICT skills. By integrating technology-based learning and practical applications into curricula, higher education institutions help students overcome barriers related to internet access, device familiarity, and digital competency. Higher education not only reduces digital disparities among students but also prepares them to contribute positively to digitally inclusive societies.

India, a country known for its "unity in diversity," has an impressive array of languages, customs, and civilizations. The northeastern part of this enormous subcontinent is a significant physical and cultural region. The northeastern area, which is made up of eight different states such as-Assam, Sikkim, Mizoram, Meghalaya, Arunachal Pradesh, Manipur, Nagaland and Tripura, represents a unique combination of languages, ethnic groups, and landscapes that add to its complex personality (Taba, 2023).

Despite its indisputable significance, a number of obstacles have prevented this region from developing to its full potential. The inadequate infrastructure, which prevents both economic development and social development, is an important challenge. The creation of vital transportation and communication networks is a difficult undertaking due to the geographical layout, which is marked by hilly terrain and unfavorable climate conditions (Das et al., 2020). By limiting access to necessary online services and digital knowledge, this infrastructure gap makes the digital divide worse. Higher education institutions may help communities and students overcome limited technological exposure and geographic isolation by implementing digital learning initiatives that give them access to vital skills, resources, and connectivity.

The frequent border conflicts and ethnic tensions in the northeast are another enduring problem. Periodically, these tensions have turned into violent clashes that have disrupted the region's unity and peace. Conflicts between nearby ethnic groups frequently arise over matters of political representation, resources, and identity (Kumar, 2017). These disputes affect stability and access to education, which worsens the digital divide. By fostering multicultural awareness and offering venues for peacebuilding projects that support regional stability, higher education can serve as a unifying factor. By encouraging digital literacy and creating inclusive learning environments, universities can bridge the gap and equip students with the abilities they require in a connected society.

However, higher education institutions can also act as community centres, facilitating wider digital outreach by providing training, workshops, and internet access to local people as well as students. A more inclusive digital environment is promoted by this outreach, which lessens regional differences in digital awareness and skill development.

7. ECONOMIC STRATIFICATION AND THE DIGITAL DIVIDE: GLOBAL PERSPECTIVE

Still, the digital divide remains a major problem throughout the world, with significant differences in internet availability and usage across various income levels. The most recent data clarifies the impact of economic stratification on global digital inclusion.

7.1 Global internet access

- **High-income countries**: Internet penetration rates are highest in high-income countries. For instance, in North America and Western Europe, internet penetration exceeds 90% (ITU, 2023).
- **Low-income countries**: In contrast, low-income countries, particularly those in South Asia and Sub-Saharan Africa, have internet penetration rates below 40% (World Bank, 2023).

7.2 Digital device ownership

- **High-income countries**: The majority of households own multiple digital devices, including smartphones, laptops, and tablets. Device ownership in countries like the US, Canada, and Germany is nearly universal among middle and high-income households (Pew Research Center, 2023).
- **Low-income countries**: Many low-income households cannot afford a single device. For example, in many African and South Asian countries, smartphone ownership is often limited to less than 30% of the population (GSMA, 2023).

7.3 Broadband and mobile data costs

- **High-income countries**: Broadband and mobile data are relatively affordable. In OECD countries, the cost of a 1GB mobile data plan is less than 2% of average monthly income (OECD, 2023).
- **Low-income countries**: A 1GB mobile data plan can cost more than 10% of the typical monthly salary in low-income countries, making it prohibitively expensive for many (Alliance for Affordable Internet, 2022).

7.4 Digital literacy and skills

- **High-income countries**: Higher levels of digital literacy and skills are prevalent, supported by robust education systems and continuous digital training programs. Nearly all adults in countries like South Korea and Finland possess basic digital skills (European Commission, 2023).
- **Low-income countries**: Digital literacy levels are significantly lower, with limited access to digital education. In many low-income regions, less than 20% of the population has basic digital skills (UNESCO, 2023).

7.5 Effect of COVID-19

- **High-income countries**: The pandemic accelerated digital adoption and integration, with many services moving online. Remote work and online education became the norm, supported by widespread digital infrastructure.
- **Low-income countries**: The pandemic exacerbated existing digital inequalities, as many were unable to access online services, remote work opportunities, or digital education, further widening the digital divide (World Economic Forum, 2023).

8. SIGNIFICANCE AND SCOPE OF THE STUDY

ICT permeates every part of life, offering individuals faster, better, and more innovative ways to network, communicate, ask for assistance, obtain information, and learn (Brown 2020). Digital technology is having a major impact on the education sector. The digital divide is becoming a major concern, and universities must initiate appropriate measures to reduce social friction. Universities should play a proactive role in supporting library users in getting equipped with the latest technology. Uneven access to ICT, both at academic Institutions and at home, increases educational and socioeconomic stratification, resulting in a digital divide among PG students. As a result of limited access to ICT the gap in learning outcomes could increase. The status of the digital divide among the PG students of NE Region is not yet identified. It is necessary to take a study to express the difference in number, degree, quality, amount of their ability and skills in handling digital assets. Taking the whole NE will be a huge case to tackle; it is necessary to take a specific area of the population to study. Even though the target groups are in the higher level of education, differences can exist in their access to and use of ICT due to various factors.

The study’s scope is confined to the top five Central Universities of India by NIRF on University Ranking 2021 within the Northeast Region. The lists are as follows:

Table No.1.1: List of 5 Central University and their year of establishment

Sl.No.	Name of University	NIRF Rank 2021	State	Year of Estd.
1	Tezpur University (TU)	46	Assam	1994
2	North Eastern Hill University (NEHU)	59	Meghalaya	1993
3	Assam University (AU)	93	Assam	1994
4	Manipur University (MU)	101-150	Manipur	1980
5	Mizoram University (MZU)	101-150	Mizoram	2001

(*Source: NIRF -2024*)

After having analysis of five universities one school from science and one school from social sciences. Therefore, the School of Social Sciences and School of Life Sciences are selected, since the two schools have the most similar department compared to other schools, it is therefore selected as the area for the study. The study selected a total sample of 500 PG students, and 100 questionnaires were distributed among the five Universities randomly from that the target is 100 questionnaires from each University. The study has not considered all dimensions of digital divide. The definition of ICT includes an array of networking components, digital devices and software applications. Practical measures to assess the digital competency of students will not be used in this study.

10. RESEARCH DESIGN

10.1 STATEMENT OF THE PROBLEM

It is clear that the rapid growth of technology in the 21st century creates a huge gap among PG students. In the present day, each and every student should have digital skills. A lack of digital literacy might result in a lot of problems and challenges. Digital literacy skills enable PG students to become lifelong learners. The digital age pushes the firsthand Information that comes with the digital form. Most of the publication systems are done in electronic form. PG students should have the knowledge to handle, evaluate, retrieve, disseminate, download and access e-resources in order to take up an effective learning system. Every PG student has to cope and update with the latest technology to supplement his/her activity. This digital revolution and the digital divide created a huge gap among PG students. It is not possible to determine whether the PG students have the skills to access the data analysis software, utilize Google Forms, and use other application software that are necessary for their academic usage.

As far as Covid-19 is concerned, the digital platform is the main environment for studying and imparts knowledge among the PG students. Some may face problems with the telecommunication infrastructure, poor internet connection, lack of motivation to use technology, geographical restriction, poor digital literacy, and social environment. So, there can be a huge impact regarding the digital divide among PG students. Such an impact may result in a lack of competency in handling the ICT tools. So far, research has not been undertaken among the PG students of selected Central Universities of North East India, such as Tezpur University, North Eastern Hill University, Assam University Manipur University and Mizoram University. The researcher will be able to find out the conditions and measures for the evaluative study in this area.

10.2 OBJECTIVE OF THE STUDY

The objectives of the study are-

1. To know the ability to access ICT tools and technology for academic purposes.
2. To analyze the use pattern of the internet by the respondents.
3. To find out whether geographical restrictions contribute to the digital divide among the respondents.
4. To know the initiative taken by selected universities to reduce the digital divide among the respondents.
5. To find out the areas of strength and weakness of respondents in handling digital assets and give suggestions for enhancement.
6. To identify the awareness of copyright among the respondents.

10.3 HYPOTHESES

The hypotheses of the present study are:

H1: There is a significant difference in the ability to access ICT tools and years of usage of ICT tools among the PG Students of selected universities.

H2: There is a significant difference in the usage of ICT among rural and urban respondents.

10.4 RESEARCH METHODOLOGY

The present study adopted survey method for assessing digital divide among PG students of top five Central University by NIRF Ranking 2021 within North East Region. The study is for investigating a number of aspects of the digital divide, including ICT proficiency, device availability, internet access, computer usage and awareness of copyright.

I. Survey of Central Universities

The study analyses the digital divide among PG students of the top five Central Universities in the North East Region, selected based on the NIRF Ranking 2021. The research focuses specifically on students from the School of Social Sciences and the School of Life Sciences at these universities.

II. Survey of respondents

Data collection involved administering a structured questionnaire to PG students. The questionnaire was designed to assess multiple aspects of the digital divide, including personal information, ability to access ICT tools and technology for academic purposes, patterns of internet usage, the impact of geographical restrictions on the digital divide, initiatives by the selected universities to reduce the digital divide, strengths and weaknesses in handling digital assets, with suggestions for improvement and awareness of copyright among respondents.

III. Sample selection

A cluster random sampling technique was employed to select participants. A total of 500 respondents were surveyed, with 100 structured questionnaires distributed randomly to each of the five selected universities. The collected data from the respondents have been analyzed and presented in (Chapter-5).

IV. Response rate

The study achieved a 100% response rate, with all 500 questionnaires successfully completed and returned-100 from each selected university.

V. Tools for analysis

The collected data was compiled and analyzed using SPSS for statistical analysis. Microsoft Excel for data organization and visualization and Chi-square test to test hypotheses and investigate relationships between variables related to the digital divide.

The Chi-square formula:

$$\chi^2 = \sum(O_i - E_i)^2/E_i$$

where-

- **O_i = observed value (actual value)**
- **E_i = expected value.**

11. FINDINGS ACCORDING TO THE OBJECTIVES OF THE STUDY:

11.1 The first objective: To know the ability to access ICT tools and technology for academic purpose.

1. **(a) Know how to access the internet**: Findings reveal that, overall, a total of 500 respondents, 497, which is 99.4%, are proficient at using the internet, whereas only 3, which is 0.6%, are not. This indicates that lack of knowledge is not a significant barrier in these universities. **(b) Having a device to access the internet:** Of the overall total of 500 respondents, 490, which is 98%, have a device to access the Internet, while 10 respondents, which is 2%, do not. The majority of respondents across all universities have a device to connect to the internet, with 98% reporting device ownership. The data suggests that device availability is a slightly more significant issue than knowledge of internet access, with 2% of respondents lacking a device. Financial constraints may be the issue in terms of device ownership. The data shows an overwhelming majority, which is 99.4% of respondents, know how to access the internet, highlighting a strong internet literacy rate among students across these Central Universities. While internet access knowledge is nearly universal, 2% of respondents still lack access to devices, which may hinder their ability to fully engage with online resources. (Table-7).

2. Findings based on **acquainted with the use of computers** reveals that a large part of the student population exhibits high levels of familiarity and competency with computers, as seen by the fact that 33.6% of students have been using computers for over ten years. Half of the students, 26% and 25.4%, respectively, have 1-5 years and 6-10 years of computer experience. 15% of students have been using a computer for less than 1 year, indicating that a small but significant portion of the student body is relatively new to computer use. Tezpur University has 46% of students who have been using a computer for more than 10 years, which is the highest percentage in this category among the universities.
3. The findings based on the **major source of learning ICT skills** reveal that 65.8% of students across universities acquired ICT skills through self-learning, highlighting their reliance on independent efforts, likely due to accessible online resources or limited formal training. Teachers played a secondary role, with 23.2% of students learning from them, emphasizing their importance in ICT education. Formal courses accounted for only 8% of ICT learning, showing a lack of structured programs, while peer influence was minimal at 3%. Mizoram University had the highest self-learners with 75%, Assam University led in teacher-taught skills with 36%, and Manipur University had the highest in attending courses with 14%, reflecting varying ICT training approaches across institutions.
4. The findings about the **knowledge of accessing online library databases or repositories** reveal that 58.1%, which is 286 students across five Central Universities, know how to access online library databases or repositories, indicating moderate awareness. However, 32.3% (159) of students are not sure. This implies that there is a lack of confidence or awareness about utilizing these resources, while only 9.6%, which is 47 students, do not know how to access them.
5. Findings based on **the use of AI for academic purposes**, a significant portion of students, 40.8% (203) used AI somewhat, indicating a moderate level of integration of AI tools in academic work. Combining those who used AI to a great extent and somewhat (33.5+40.8=74.3), 74.3% of students have

integrated AI into their academic activities, demonstrating widespread adoption across these universities. Only 4.4%, which is 22 students of the total respondents, reported not using AI at all, suggesting that AI tools have become a nearly predominant part of the academic experience.

6. Analyzing the findings **smartphones** emerge as the most commonly used device, with 94.6% of students always relying on them, reflecting their portability, accessibility, and multifunctionality. In contrast, laptops are the second most favored device, with 36.4% of students always using them, indicating their importance for tasks that require more robust functionality, such as writing papers or accessing complex software. **Tablets** and **desktops** see significantly less frequent usage. Only 5.4% of students always use tablets, while a larger proportion with 46.8% never use tablets, suggesting that tablets are more of a supplementary device rather than a primary tool for academic tasks. **Desktops**, though more frequently used than tablets, also have low consistent usage, with only 7% of students always relying on them. This highlights a shift away from stationary devices towards more portable options. **Smart TVs** are the least utilized, with 39% of students never using them and only 6% always using them. This indicates that Smart TVs are not a primary choice for academic purposes, likely due to their less interactive nature compared to other devices. Overall, the data emphasizes how popular laptops and smartphones are, with other gadgets occupying more specialized areas.

11.2 The second objectives: To analyse the use pattern of internet by the respondents.

1. Findings indicate that the majority of respondents which is 51.4%, spend more than **5 hours a day online**, indicating a high level of internet engagement across the universities. A significant portion, 29.4%, spend **3-5 hours online**, while fewer respondents spend less than 3 hours a day on the internet. Very few respondents, which is 2.4%, spend only **0-1 hour online**, suggesting that minimal internet use is uncommon among these university students. The high levels of internet use suggest that the internet is likely a critical resource for both academic and social activities. Universities may need to ensure that their

digital infrastructure and support services are robust enough to handle this demand.

2. Findings reveal that a significant majority of students are highly active in this regard, with 54.8% (274 students) reporting that they always **browse and download online resources**. Tezpur University leads with 71% of its students in the always category. The overall data highlights the importance of online resources in academic pursuits, with a strong majority of students regularly accessing these resources. However, it also emphasizes the necessity of focused initiatives to promote and support the regular use of digital resources, especially in universities where usage is less common.
3. A significant portion of students, 50.6% which is 253 students, always utilize **online resources for research purposes**. This indicates a strong reliance on digital resources for academic research in these institutions, reflecting the importance of online access in supporting academic work. Manipur and Mizoram University show slightly lower percentages in this category, with 45% and 33%, respectively, suggesting that while many students are actively using online resources, there may be factors limiting more consistent usage.
4. A small percentage from the total university, which is 9.4% (47 students), always **play online games**. Almost half of the students, 41.6% which is 208 students rarely play online games, indicating that while gaming is an occasional activity, it is not a primary use of internet time for most.
5. A significant majority which is 65.4% (327 students), always use internet for accessing **social media**. This high percentage across all universities suggests that the activity is an important and consistent part of students' routines, likely reflecting its importance or necessity in their academic or daily lives.
6. A majority of students are not actively engaged in **online marketing or trading activities.** Specifically, 38.2% which is 190 students never use the internet for these purposes. It also implies that online marketing and trading are not common activities among the student populations in these universities, possibly due to a lack of interest, knowledge, or resources to participate in these activities.

7. A notable 17.5% which is 87 students always engage in **podcasts and audio streaming.** Manipur University having the highest percentage with 24.5%, suggesting a strong interest in these forms of media among its students. With 27.8% (138 students) never do podcast and audio streaming, indicates that a significant portion of students. This disparity suggests that while audio content is popular for some students, it remains underutilized by a large segment of the student population.
8. The most proficient students in all universities are found using **MS Office,** with an astounding 93.2% rating it as good, highlighting the program's critical significance in both academic and professional activity. On the other hand, just 32.4% and 30.8% of students, respectively, demonstrate skill in more specialist technologies like the **Adobe Creative Suite** and **data analytic tools**. Proficiency in **data analysis tools** such as SPSS, Excel, Python, etc., is limited, with only 30.8% of students being proficient. Project management tools like Trello, Asana, and others have the lowest proficiency levels, with only 3.6% of 18 students proficient in five universities. Finally, **Content Management System** (CMS) tools, which include platforms like WordPress, Drupal, Joomla, etc, also show low proficiency, with only 14% of 70 students rated as good. This indicates that more sophisticated technical abilities are less frequently acquired, even while fundamental software skills are taught and utilized regularly.

11.3 The third objectives: To find out whether geographical restrictions contribute to the digital divide among the respondents.

1. Overall, 56% of the respondents are from **rural areas**, while 44% are from **urban areas**, indicating a majority of the student population comes from rural backgrounds.
2. Overall, 80.4% of respondents report having **access to ICT facilities**, while 19.6% do not, suggesting that the majority of students live in areas where basic ICT infrastructure is available. Students from 5 universities are more likely to have opportunities to engage with digital tools outside of campus, which could enhance their learning experiences and digital literacy.

3. Out of 500 respondents, 53.6% rated their **telecommunication** conditions as good and very good, with 15.4% indicating that only a small segment enjoys optimal telecommunication services. Given that over half of the participants experience relatively stable and accessible connectivity. Overall, the digital divide in 5 Central Universities is evident, as geographical barriers likely hinder the consistent and equitable distribution of telecommunication services, impacting the academic and research capabilities of students and faculty.
4. **Electricity** access in 5 universities varies considerably, and geographical restrictions play a role in exacerbating the digital divide. Inadequate or inconsistent electricity can directly hinder access to digital resources, further widening the gap between regions with better infrastructure and those facing geographical challenges.
5. Almost all the respondents with 88.8% which is 444 students indicating **mobile data as their main internet connection**. The low availability of broadband in certain areas can be ascribed to physical obstacles such as rough terrain, sparse populations, or insufficient infrastructure funding, which make expanding broadband expensive and difficult.
6. The majority of 5 universities, which is 57.3%, stated that their **internet connection is positively impacted by their location**. Mizoram University leads with 68% in this category, followed by Assam University with 62% and Manipur University with 59%. NEHU with 52%, Tezpur University with 45%. This could indicate that certain areas in these regions are closer to urban centres or have access to better infrastructure, enabling somewhat consistent and quick connections. 17.6% of the respondents stated that their internet connectivity is negatively impacted by their location, indicating that these regions probably face additional physical barriers, such as rural areas or mountainous terrain, which causes slower speeds and irregular connections.
7. A little over half, 46.4%, stated that their internet access is **slightly hindered by geographic limitations**. Indicating that while users in these areas face some obstacles, such as rough terrain or limited infrastructure, the impact is not extreme. Mobile data networks are widely used, which probably lessens the impact of these obstacles.

8. When questioned about **community efforts to reduce the digital divide**, the majority of respondents, 60.4%, said they were not sure. This high degree of uncertainty implies that there are either not enough obvious actions in their communities or that a large number of students are unaware that any steps are being taken. This uncertainty can be a sign of inadequate communication or inefficient community involvement in the fight against digital inequality. The overall results show that there is a strong need for initiatives that bridge the digital divide in these communities to be widely recognized, successful, and visible.

11.4 The fourth objectives: To know the initiative taken by selected Universities to reduce the digital divide among the respondents.

1. The majority of students, with 59.2% which is 296 students answered yes in terms of **whether universities take initiative or not**, demonstrating that most think their universities are doing anything to bridge the digital divide. At the same time, most students are aware that their universities have taken action to address the digital divide, but a sizable portion are not.
2. **Initiative on internet connectivity:** A majority of respondents, 61%, indicated that their universities have taken steps to improve internet connectivity. **Initiative on digital literacy workshop:** Only 31.4% of students, however, said that their universities have held these kinds of workshops. **Initiative on awareness programme on ICT:** The majority of the respondents, 64%, exhibit low affirmative replies, signalling a need for universities to better communicate or implement ICT awareness campaigns. **Initiative on technology grants:** The majority of 85% of respondents said that their universities do not have any technology grant programs. **Initiative on equitable access:** The majority of university students, 70.4%, think that no initiatives have been commencing, indicating that most institutions are not doing enough to address the issue of equal access to digital resources. **Initiative on technology support service:** According to the majority of respondents, which is 80.4%, there is a severe lack of technical support services that could prevent students from making the most efficient use of the technology they have access to. **Initiative on digital inclusion survey:** The

vast majority, 89.2% of students, indicated that no surveys have been conducted, highlighting a significant gap in data collection and awareness efforts. The overall data shows that academic institutions may not be actively gathering information about the digital gap within their student body, which is necessary for focused interventions and well-informed policymaking.

11.5 The fifth objectives: To find out the areas of strength and weakness of respondent in handling digital assets and give suggestions for enhancement.

1. Majority number of respondents, 54.4%, rated their **digital proficiency in social media management** as good. This implies that the majority of students are proficient users of social media platforms and have a basic understanding of them. 21% of students rated excellent. 17.6% of students' skills are acceptable. Only 6.8% of students reflected their skills were poor. Just 0.2% thought they were very poor. The majority of students have good and excellent social media management skills; just a small number need serious development.
2. A large percentage of respondents with, 43.6% assessed their **data analysis abilities as acceptable**, indicating that although most students have some basic understanding, they might not be very proficient. Only 2.6% of respondents from 5 universities rated their skills as very poor, and 15.8% of respondents as poor. Indicating a need for workshops and specific training to improve students' data management and analytical abilities.
3. A large number of students, which is 39%, rate their skills as good in **proficiency in online ticket booking**, demonstrating a significant ability for handling online ticket booking. This indicates that a sizable percentage of students are extremely skilled at booking tickets online, a prevalent and practical digital ability in the modern world. Overall, while the students performed very well, 3.6% of them assessed their skills as very poor, and 10.6% as poor. This shows that some students have held their entire education within their particular state, and most probably, they don't have a chance for exposure to other states as well, maybe because of family or financial issues.
4. 36% of students said their skills were poor, and 20.4% said they were very poor in terms of **web development**. This suggests that a relatively small

percentage of students have proficient web development skills, skills that are essential for building and maintaining websites in the digital age. Approximately 25% of students rated their abilities as acceptable. This indicates that some students may have a basic knowledge of web programming but lack confidence or greater skills in more complex work. The result thus emphasized a need for workshops and specific training to improve students' web development.

5. A large number of students had an average amount of knowledge in **digital marketing**, as indicated by the percentage of respondents who assessed their skills as acceptable, with 29.4%. This indicates that some students may have a basic knowledge of digital marketing. A percentage of respondents rated their skills as good is, 22.4%, indicating that most students possess a moderate level of proficiency in digital marketing. A notable 13.8% rated their skills as very poor. The overall data shows that even while most students have an average understanding of digital marketing, a sizeable portion of them find it difficult.
6. A large number of respondents, 32.2%, rated their digital proficiency in **Cloud Computing** as acceptable. Even though the concept is popular with them, students might not yet fully understand more advanced cloud computing services and tools. A total of 32+19.4=51.4% of students assessed their skills as poor or very poor, demonstrating a significant deficiency in cloud computing knowledge. This indicates that while advanced skills are still lacking across universities, a smaller percentage of students understand cloud computing better.
7. A significant number of students which is 38.4% rated their proficiency as good in terms of **Accessing Journal/ Book Database**, demonstrating an important understanding of how to use academic databases. 16% from overall respondents said their skills were poor. Moreover, 14.4% of students said they had excellent skills. only 3.6% of students said their skills were very poor.The results highlight the necessity of focused programs to raise digital literacy.
8. Overall, 32.8% of students rated their skills as good. This indicates that a significant portion of students at these institutions have a good understanding

of **AI concepts and tools**, which is essential as AI becomes more integrated into various sectors. 32.2 % of respondents from different universities rated their proficiency as acceptable. Meanwhile, 15.2% of students rated their skills as excellent. The findings indicate that colleges should concentrate more on enhancing students' digital AI skills, especially in those where a significant proportion of students still struggle.

9. A significant number of respondents with 38.8% rated their skills as good in terms of digital proficiency in **updating software**, making it the most common proficiency level. A smaller but significant number of students, 29.6%, rated their proficiency as acceptable. The study shows that certain institutions need to concentrate on strengthening this crucial digital skill, especially considering its importance in ensuring digital literacy and device functionality, even though the majority of students show a good ability to update software.
10. The majority of the total number of respondents rated their level in the somewhat category with 60%. This implies that even if the majority of students are aware of **current digital developments**, their understanding may only be slightly deep. The results indicate a significant proportion of respondents are well aware of and involved in digital advances, indicating a strong foundation of technology knowledge among institutions. Only 13% of the respondents reported having very little experience with new technologies. 0.8% said they had no knowledge of them at all.
11. The barriers faced by the students across five universities are due to **a lack of ICT background in the family**. The findings reveal that the majority of the respondents, 58.2%, indicated that this barrier is moderate. This implies that most students find it challenging to deal with digital environments when they don't have family support for ICT. 29.8% stated that not having an ICT background in the family is not a significant barrier. At the same time, a smaller group, with 12%, said the barrier was extreme.
12. The barriers faced by the students across five universities are due to **poor or no connection to the internet at home**. Findings reveal that the majority of the respondents, 50.6% of the respondents stated that this problem was not a barrier. This indicates that a majority of the participants possess reliable or

sufficient internet connectivity at their residences, enabling them to interact with digital information without experiencing significant problems. However, 38.4% of the respondents classified this issue as moderate, suggesting that although not totally obstructive, unstable internet does impact a significant percentage of students. 11% of respondents said that internet connection was an extreme barrier.

13. Barriers faced by the students across five universities due to **lack of ICT infrastructure at university**. Findings reveal that half of the respondents with 50.4% stated that the lack of ICT infrastructure was not a barrier, indicating that every university has sufficient equipment. 43.4% viewed the absence of ICT infrastructure as moderate, indicating possibilities for improvement; this highlighted problems in their digital infrastructure that prevent students from accessing digital resources. 6.2% of respondents overall said this was an extreme barrier.
14. The barriers caused by **poor network coverage on the campuses** of five universities. 47.2% of respondents, a significant number, rated this problem as moderate. This implies that many of their students have some trouble accessing the campus network. 31.4% of respondents stated that network coverage created no barrier. In the meantime, poor network coverage was highlighted as an extreme barrier by 21.4% of respondents. Thus, a significant portion of students' access to digital resources and the opportunity for efficient campus communication are adversely affected by network problems.
15. The barriers by **lack of skills to access required information** among respondents from five universities. Findings reveal that the majority of the respondents, 60.6%, rated this issue as a moderate barrier. This shows that even if students have some fundamental knowledge of computers, many still struggle to find the information they need efficiently. In the meantime, 32.4% of respondents said that this was not a barrier. Although there are still skill gaps at many schools, these findings show that a significant number of students are confident in their ability to obtain knowledge. A lower number, with 7%, considered this lack of abilities to be an extreme barrier.

16. The barriers faced by respondents due to a **lack of proficiency in the English language**. Findings stated that the majority overall rated 54.6%, indicating that this issue was not a barrier. This indicated that most students across these institutions feel confident in their English proficiency, which is essential for accessing digital content and academic resources. However, 40.4% of the respondents observed this as a moderate barrier. This indicates that even with their moderate knowledge of English, they still face difficulties. Only 5% of the overall total of respondents thought that this was an extreme barrier.

11.6 The sixth objectives: To identify the awareness of copyright among the respondents.

1. A majority 61.2%, have a moderate understanding of copyright protection. This implies that even while the majority of students **understand copyright** in general, their understanding can be basic or inadequate. Only 19.8% of respondents reported an extreme understanding of copyright protection. At the same time, 19% of the respondents stated they had no awareness of copyright protection. This indicates there is still an awareness gap on the ongoing effects of the digital divide, which is probably driven by different access levels to materials and programs promoting digital literacy.
2. Findings reveal that the majority, 57.6%, have a somewhat **understanding of copyright**. This indicates that while most students understand the fundamentals of copyright, they might not completely understand their application. At the same time, 21.6% of students said they knew very little about copyright. The percentage of respondents who strongly understand copyright to a great extent is only 15.4%. This shows that fewer students have a thorough understanding of copyright laws and their implications. A smaller number of respondents from all universities, with 5.4%, reported having no awareness at all.
3. Overall, 48.4% of the respondents have a moderate understanding of copyright concepts. This indicates that most students are aware of copyright and **how to cite someone's ideas,** which is necessary for research and other purposes, and gives a good sign in order to prevent copyright violation. 40.4% of respondents show an extreme understanding, which indicates that they are well aware of

appropriate academic and ethical behaviour. A smaller number of respondents, 11.2%, reported having no awareness of citation requirements to prevent copyright issues.

4. 94% of respondents have never been charged with **copyright infringement**, demonstrating that the majority of students are either complying with copyright laws or are not aware that they could be violated. Only 6% of the overall respondents, a very low proportion of students, have been accused of copyright violations. The information indicates that while there is a general awareness of copyright compliance, there is little reporting of violations. However, with a small number of reporting violations, students may not be fully aware of copyright regulations, which can be the result of the impact of the digital divide.

12. CONCLUSION

Since the digital divide is all about unequal access and unequal proficiency in information communication technology, the findings collectively illustrate that while progress has been made in fostering digital literacy and access to resources, significant gaps remain. Variability in students' proficiency levels across institutions highlights the unequal access to digital tools, training, and infrastructure. Universities with higher rates of good or excellent skills, such as Tezpur University and Mizoram University, likely benefit from better resource availability and targeted interventions. However, institutions like NEHU, where a higher proportion of students reported low proficiency, demonstrate the pressing need for improvement.

To address these challenges, universities must implement focused efforts such as mandatory digital literacy programs, increased access to digital tools, and enhanced faculty training to support students in building these essential skills. Special attention should be given to proficiency in several skills like cloud computing, web development, online ticket booking, digital marketing, AI literacy, copyright awareness, and database access training to bridge existing gaps. Collaborative efforts between universities, government bodies, and private organizations can further enhance resource availability and skill development, ensuring that students at all universities have the same opportunity to prosper in a world that is becoming more and more digital.

To conclude, there are various barriers affecting students' access to digital resources across five universities. A lack of ICT background in families (58.2%) and poor network coverage on campuses (47.2%) emerged as moderate barriers, reflecting challenges in foundational support and campus infrastructure. While poor internet connectivity at home, with 50.6%, and insufficient ICT infrastructure at universities, with 50.4%, were not major obstacles for most, a significant minority still faces issues. The skills to access information are 60.6%, and moderate English proficiency is 40.4%, which also hindered some students. While progress in digital access is evident, targeted interventions are needed to address persistent barriers for specific student groups.

The majority of students, 59.2%, which is 296 students, answered positively in terms of whether universities take the initiative or not, demonstrating that most think their universities are doing anything to bridge the digital divide. At the same time, most students are aware that their universities have taken action to address the digital divide, a sizable portion are not. The data emphasizes how important it is for all universities to raise the profile and effectiveness of their programs in addressing digital inequality. Thus, to reduce the digital divide, universities should implement targeted initiatives. These include providing widespread access to ICT infrastructure, such as high-speed internet, modern devices, and well-equipped digital libraries. Regular workshops and training programs on ICT skills and digital literacy, including copyright awareness, should be organized to enhance students' competence. Universities should also offer online resources and user-friendly platforms, ensuring inclusivity for all students. Collaborating with government and private organizations to improve campus network coverage and connectivity can further bridge gaps. Additionally, mentorship and support systems should be established to assist students from underprivileged backgrounds in adapting to digital learning environments. Also, if the initiative was already taken by the university, the institution should take the initiative in such a way that students can be easily noticed and publicize the information regarding the same.

The digital divide may grow if students without dependable internet access or digital devices are unable to access online materials, workshops, or digital learning platforms that teach copyright. Some students find it more difficult to understand the copyright rules, license terms, and intellectual property rights necessary for academic and creative work because of the digital gap, which is frequently associated with lower levels of digital literacy. Among the five Universities, 61.2% are aware of what can be protected and 57.6% understand the basics. However, only 15.4%-19.8% demonstrate a thorough grasp of copyright laws, and gaps remain, as 19%-21.6% report little to no awareness. Awareness of citation practices is fair, with 48.4% moderately and 40.4% highly understanding its importance. Though 94% have never faced copyright infringement charges, limited reporting suggests insufficient awareness of copyright laws, likely influenced by the digital divide.

13. SUGGESTION

Based on the analysed data and study results, some suggestions are made to enhance the digital divide among students at five Central Universities in North-East India, which are the NIRF ranking 2021 top 5 Central University i.e Tezpur University, NEHU, Assam University, Manipur University and Mizoram University-

1. Governments and universities should advocate for better internet infrastructure in rural areas to ensure reliable and high-speed connectivity, reducing geographical disparities.
2. Universities should collaborate with good service providers to address network issues especially for students in rural and remote areas and to increase campus network reliability and reduce interruptions.
3. Develop mobile friendly learning platforms and offline resources for students in areas with unreliable connectivity to bridge the digital divide in online learning.
4. Improve ICT infrastructure to reduce barriers brought on by insufficient infrastructure; universities should make investments in cutting-edge ICT facilities and guarantee that all students have access to them as well.

5. Encourage ICT skill development within the University. Regular workshops, training sessions, and digital literacy initiatives should be conducted. Ensuring access to computers and fostering a technology-friendly environment can enhance students' exposure and confidence in using digital tools effectively.
6. Increase copyright awareness in order to help students better understand and comply with copyright laws, ethical standards, and citation requirements, universities can incorporate these topics into their curricula.
7. Since majority of respondents have experience of self-learning, University should encourage Self-Learning. University should offer access to user-friendly e-learning platforms and digital libraries to promote individual learning and resource usage.
8. To ensure the success of strategies aimed at reducing the digital divide, universities must establish strong mechanisms for monitoring and evaluation. This involves systematically assessing the effectiveness of implemented initiatives to identify strengths, weaknesses, and areas for improvement.

14. AREAS FOR FUTURE RESEARCH

The following areas of research are recommended for more investigation so as to bridge the digital divide in higher educational settings. The following areas of topics provide a wide range for further study with the goal of resolving continuing disparities and maximizing digital inclusion in the area.

1. The study based on gendered dimensions of the digital divide. Investigate whether and how gender plays a role in access to ICT tools, skills acquisition, and digital literacy in higher education settings in North East India.
2. Studies can be conducted based on the digital divide among experts in handling digital devices and software.
3. A comparative study of the digital divide among different university students of North East India can also be conducted.
4. Analyze the disparities in digital access and competency between Northeastern urban students and those from isolated rural areas.

5. Digital divide based on the role of language for digital access. Evaluate how English language proficiency affects students' use of digital tools and online learning materials.