DIGITAL LITERACY COMPETENCY AMONG RESEARCH SCHOLARS OF SCHOOL OF PHYSICAL SCIENCES: A COMPARATIVE STUDY OF MIZORAM UNIVERSITY (MZU) AND NORTH EASTERN HILL UNIVERSITY (NEHU)

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CERTIFICATE

This is to certify that **Bhaigyashree Boro**, Ph.D. Scholar of the Department of Library and Information Science, Mizoram University has written her thesis titled **"Digital Literacy Competency Among Research Scholars of School of Physical Sciences: A Comparative Study of Mizoram University (MZU) and North Eastern Hill University (NEHU)"** under my supervision. To the best of my knowledge and belief, the work embodies her 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.

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DECLARATION

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December 2024

I, **Bhaigyashree Boro**, 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.**

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Aizawl, Mizoram (Bhaigyashree Boro)

Dated:

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LIST OF ABBREVIATIONS

Term	Description
AI	Artificial Intelligence
ALA	American Library Association
AR	Augmented Reality
CBCS	Choice Based Credit System
DIKSHA	Digital Infrastructure for Knowledge Dissemination
ICT	Information and Communication Technology
IFLA	International Federation of Library Associations and Institutions
IIRF	Indian Institutional Ranking Framework
MOOCs	Massive Open Online Courses
MZU	Mizoram University
NAAC	National Assessment and Accreditation Council
NCERT	National Council of Educational Research and Training
NDLI	National Digital Library of India
NEHU	North Eastern Hill University
NEP	National Education Policy
NIRF	National Institutional Ranking Framework
NROER	National Repository of Open Educational Resources
SPARC	Scheme for Promoting Academic and Research Collaboration
SWAYAM	Study Webs of Active Learning for Young Aspiring Minds
UGC	University Grants Commission
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
VR	Virtual Reality

CHAPTER – 1
INTRODUCTION

1.1 Introduction

Digital literacy is an important skill in today's society, with profound implications across all facets of modern life. The COVID-19 epidemic accelerated the change to digital platforms, transforming schooling, work, and collaborative creation. Digital literacy includes the competencies required to use technology effectively and appropriately, covering both basic and progressive computing skills. It involves the creation of multimodal content, including audio, video, and other media, enabling individuals to navigate, understand, access, and communicate across various digital platforms. In the present era, digital literacy represents the skills and knowledge necessary to discover, evaluate, create, and convey information through Information and Communication Technologies (ICTs), blending intellectual and technical competencies (Sharma & Singh, 2024).

As technology continues to grow and integrate into social, economic, and political realms, digital literacy opens new avenues for enhancing quality of life. It enables meaningful internet access, fostering critical and confident participation in the online environment. Being digitally literate empowers individuals to engage safely and effectively in democratic, social, and economic processes. The internet presents ethical challenges when used for entertainment, commerce, education, and creativity, highlighting the significance of digital literacy as a tool for growth and social transformation. Technology's advancements have demonstrated benefits for economic opportunity, service delivery to underserved communities, improved management, and social progress.

In a world increasingly driven by technology, digital literacy parallels traditional literacy in its importance, demanding not only technological expertise but also ethical insight, critical thinking, and a discerning approach to consuming and creating digital content (Lee, 2014; Nawazaz & Kundi, 2010). This comprehensive skill set has evolved beyond simply using technology, emphasising a deeper understanding, critical engagement, and leveraging technology for problem-solving and creative expression.

As a critical competency in the 21st century, digital literacy impacts nearly every area of modern life, requiring individuals to effectively navigate digital landscapes, evaluate information critically, communicate in virtual environments, and apply technology innovatively (Knobel & Lankshear, 2006).

1.2 Digital literacy

Digital literacy is now a multi-layered array of competencies involving one's ability to employ various digital platforms effectively in locating, evaluating, and communicating information. Given this, the concept engenders a complex set of trans-disciplinary competencies that extend beyond basic computer skills, essential for navigating the digitized landscape of the present era. Through digital literacy, individuals need to develop competencies in three basic areas: information, technology skills, and media; innovation and learning abilities; and life and profession proficiencies. These collective competencies equip an individual with the ability to trace with the quick pace of technical advancement, enabling them to familiarize to platforms, applications, and latest tools that continuously emerge due to the constant evolution of digital technology.

One scope of digital literacy concerns facilitating and providing more effective ways of engagement with social networking services and the whole range of Web 2.0 platforms from social media to blogs, wikis, and interactive websites. These platforms facilitate connecting with other people, sharing information, and working together on a number of projects. Digital literacy empowers them to be not only passive consumers of content but active contributors who share knowledge and present products or services, apart from interacting meaningfully in digital communities (Ukwoma et al., 2016). In so doing, it nurtures the possibility of being in step with contemporary trends, innovations, and discussions in society, ultimately bridging geographical and cultural divides in ways previously unimagined. These are part of a comprehensive set of programs in India that focus on enhancing the rate of digital literacy among Indians.

Considering the fact that programs such as SWAYAM (Study Webs of Active Learning for Young Aspiring Minds), SWAYAM PRABHA, NDL, or National Digital Library, and e-Pathshala provide easy availability and access to digital learning resources and private platforms like BYJU's App, a remarkable transformation has

already taken place. These initiatives target school students, teachers, and lifelong learners, providing digital content to foster a habit of reading and develop technological skills in a systematic yet flexible manner. For instance, SWAYAM offers online courses ranging from class IX to postgraduate level. E-Pathshala contains digital textbooks, videos, and other resources. These programs provide significantly to the growth of digital literacy in country and underserved parts, where traditional education may have limited reach. These platforms democratize access not only to education itself but also to individuals, empowering them with the ability to build skills required for a digitally driven economy. Therefore, digital literacy encompasses more than just the fundamental technical skills of information management; it also encompasses aspects of digital citizenship, which entail ethical and social responsibilities.

It pertains to comprehending online privacy, ensuring internet safety, and accepting social responsibility when engaging in digital interactions. In that way, digital literacy is not a static skill set but rather one of dynamic skills that necessarily change and evolve in concert with an ever-changing environment of digital technologies. With every step in the development of digital technologies, citizens have to further improve their skills to stay up-to-date of developments that may include such things as how algorithms work, how data privacy works, and the ways artificial intelligence shapes information access (Meyers et al., 2013).

As such, digital literacy is a broad toolkit of skills that allows individuals to find, critically evaluate, and synthesise information in digital formats. It also includes being able to find credible sources, understand biases, and put information in the right context of a greater body of knowledge. Additionally, digital literacy enables responsible content creation and sharing, taking ethics and respect into account when interacting with digital content. These skills will further support collaboration across the online spaces where people can work on joint projects, share knowledge, and develop communities of interest around some common interest or purpose. Beyond collaboration, those with problem-solving skills, equipped with digital literacy, will harness the power of digital tools to make informed decisions at a personal, academic, or professional level. In summary, digital literacy goes beyond mere technical requirements it is a crucial skill for thriving in the contemporary world. This wider

interpretation of digital literacy is respectful to the purpose it plays in modern learning, professional competence, and informed nationality. By fostering confidence and critical engagement with digital tools, digital literacy allows people to contribute meaningfully in the increasingly technical spheres of society, contributing to democratic processes, social innovation, and economic growth.

1.3 Definition of Digital Literacy

According to UNICEF (2020), "Digital literacy is the knowledge, skills, and attitudes that enable children to safely and responsibly navigate digital environments. This includes critical thinking, ethical understanding, and the ability to communicate, collaborate, and create in the digital world."

According to UNESCO (2018), "Digital literacy refers to the knowledge, skills and attitudes that allow individuals to be both safe and empowered in an increasingly digital world. It encompasses skills in finding, evaluating, using, sharing, and creating content using digital devices and the internet, though acknowledging problems associated to privacy, security, and digital rights."

According to IFLA (2017), "Digital literacy involves the ability to effectively and critically navigate, evaluate, and create information using a range of digital technologies. It encompasses not only practical skills but also creativity, analytical thinking, and understanding of digital practices and ethics."

Ribble (2015) defines "Digital literacy includes the ethical and safe use of technology, which aligns with the concept of responsible digital citizenship, where individuals are accountable for their digital behaviour."

According to American Library Association (2013), "Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills."

According to Jones & Hafner (2006), "Digital literacy is defined as the use of analytical thinking skills in digital environments to interpret, create, and responsibly share content, focusing on civic responsibility and information ethics."

According to Martin and Grudziecki (2006), "Digital literacy is the adequacy to create and curate digital content, which involves competencies for both personal and professional digital engagement."

Hague and Payton (2010) defines “Digital literacy encompasses the ability to locate, evaluate, and effectively communicate information through digital platforms. It emphasizes skills for critical analysis, creativity, and ethical considerations.”

Eshet-Alkalai (2004) defines “Digital literacy involves a continuous learning mindset that encourages adaptability to new technologies, fostering lifelong learning essential in dynamic digital environments.”

Gilster (1997) defines “Digital literacy represents a set of competencies required to be proficient in both information and communication technology, integrating technological fluency with critical thinking skills to navigate the digital world.”

1.4 Initiatives by the government for digital India

Some of the initiatives by the Indian Government under the Digital India project focus on the education sector. Each initiative aims to enhance digital literacy, access to informational resources, and skill development all over the country, especially in rural and underserved areas.

- **DigiLocker:** DigiLocker offers a cloud-based platform for the storage, verification, and sharing of documents such as academic certificates. This initiative allows students to retrieve their certificates at any time, minimizing paperwork and enhancing access to vital documents (Ministry of Electronics & Information Technology, 2023). It eliminates administrative burdens for educational institutions and facilitates students’ access to their academic records digitally.

- **SWAYAM (Study Webs of Active Learning for Young Aspiring Minds):** SWAYAM provides complimentary Massive Open Online Courses (MOOCs) for learners across diverse educational tiers. It encompasses various subjects and aims to engage learners lacking access to conventional educational resources (National Digital Library of India, 2023). This initiative facilitates equitable access to high-quality educational resources, addressing the digital divide.

- **E-Pathshala:** It is created by the Ministry of Education, E-Pathshala offers digital textbooks and educational materials from NCERT. Students from diverse regions can access it in various languages (NCERT, 2022). It facilitates digital learning

by offering convenient access to high-quality educational resources, thereby promoting self-directed learning among students.

- **National Digital Library of India (NDLI):** NDLI is a repository of diverse educational resources, encompassing research articles, textbooks, and periodicals. It serves learners at all educational tiers (NDLI, 2023). NDLI promotes self-directed learning and research by providing a centralized digital resource, particularly for higher education students.

- **PM eVidya:** Initiated during the COVID-19 pandemic, PM eVidya integrates television, radio, and digital platforms to deliver high-quality educational content. This initiative encompasses platforms such as DIKSHA and digital educational resources to engage students with restricted internet connectivity (Some of the initiatives by the Indian Government under the Digital India project focus on the education sector. Each initiative aims to enhance digital literacy, access to educational resources, and skill development across the country, especially in rural and underserved areas. (Ministry of Electronics & Information Technology, 2023). It facilitates ongoing education during crises and diminishes reliance on physical classrooms.

- **DIKSHA (Digital Infrastructure for Knowledge Dissemination):** DIKSHA is a digital platform that offers interactive content and educational resources for educators and learners. It comprises e-textbooks, video lessons, and teacher training modules (Ministry of Electronics & Information Technology, 2023). It enhances teacher proficiency and facilitates individualised learning for students, thereby enhancing the educational knowledge.

- **National Repository of Open Educational Resources (NROER):** NROER provides complimentary, high-quality educational materials, encompassing images, audio files, videos, and interactive modules. It offers a collaborative environment for educators and learners to exchange resources (NCERT, 2022). This repository assists educators in developing varied learning experiences that promote creativity and collaboration.

- **SPARC (Scheme for Promoting Academic and Research Collaboration):** SPARC fosters research collaboration between Indian institutions and leading international universities. It seeks to enhance global exposure and research

opportunities for Indian students and researchers (Ministry of Education, 2023). This initiative enhances research standards in India, aligning education with international academic practices.

- **VidyaDaan:** VidyaDaan is an initiative to crowdsource digital content in various languages, enabling individuals and organizations to contribute educational resources. It highlights the accessibility of high-quality educational resources for all students (Ministry of Electronics & Information Technology, 2023). VidyaDaan facilitates the establishment of an extensive repository of digital content, catering to the linguistic diversity of education.
- **E-PG Pathshala:** Designed specifically for postgraduate students, E-PG Pathshala offers electronic content in a variety of subjects, enhancing the quality of postgraduate education with digital resources (University Grants Commission, 2023). It facilitates advanced education for postgraduate students, particularly those with restricted access to superior educational resources.

These initiatives collaboratively advance the vision of a digitally empowered India, ensuring equitable educational opportunities and cultivating a technologically literate society.

1.5 Mizoram University: An overview

Mizoram University founded with an Act of Parliament (No. 8 of 2000), which began operations on 2nd of July, 2001. The university, situated in Aizawl, the capital of Mizoram, encompasses 978.2 acres on the city's periphery. Preceding to the foundation of Mizoram University (MZU), North-Eastern Hill University (NEHU), based in Shillong, had a campus in Mizoram. The campus was overseen by the Pro-Vice Chancellor which housed seven postgraduate departments: English, Education, Public Administration, Forestry, Economics, Psychology, and Mizo. Mizoram University has made substantial progress in facilities, academic programs, faculty, and support services during its 22-year history. The university obtained an 'A' rating from NAAC in both 2014 and 2019 and secured ISO certification in 2018. The Ministry of Education regularly assesses the NIRF rankings from 2016 to 2023, placing it among the highest hundred universities in India. Mizoram University got the top position in the North-East Region of India in the Times Higher Education Impact Rankings 2022.

It attained the first rank among central universities in the North East, securing 13th place in the Top 20 Central Universities category of the Indian Institutional Ranking Framework (IIRF) 2023. The university has 39 academic departments that provide undergraduate, postgraduate, and Ph.D. programs throughout ten schools of learning. It has forty associated institutions and one component college, having pioneered the implementation of the Choice Based Credit System (CBCS) back 2013. In accordance with the New Education Policy 2020 criteria, Mizoram University is enhancing its programs to provide a comprehensive, interdisciplinary, and holistic education at both undergraduate and postgraduate levels. In March-April 2013, the Mizoram State Pollution Control Board granted Mizoram University an 'A' rating for its environmentally sustainable campus in a Green Audit. The university is among the first in India to utilize solar electricity, employing photovoltaic systems to power academic buildings, dorms, administrative blocks, and street lights. The university is inclusive, including amenities for handicapped and visually impaired students and staff, such as wheelchair ramps in all buildings and accessible restrooms in dorms. Faculty and students participate actively in outreach initiatives via organizations such as the SPIC Macay Heritage Club, Red Ribbon Club, NSS, and Techno Club with numerous individuals engaged in social services included in their curricula. Mizoram University has promoted student engagement in sports and cultural activities since its establishment, facilitated by a committed sports department with many trainers. The university, located approximately one hour away from the centre of Aizawl, offers subsidized transportation. It is accessible by air from Kolkata, Imphal, and Guwahati, and by highway from Silchar, Shillong, and Guwahati. The nearest railway station is located at Silchar. The state, Mizoram has a temperate weather, often chilly during the summer and not unduly frigid in the winter, with temperatures fluctuating between 11-degree Celsius and 21-degree Celsius in the winter and 20-degree Celsius and 29-degree Celsius in the summer. Mizoram, renowned for its natural beauty, has a wide diversity of flora and animals. Mizoram University secured the 76th position in the 2023 NIRF rankings. (Source: https://mzu.edu.in/about-the-university/)

The School of Physical Sciences commenced operations in phases during the Tenth Plan period and now has four postgraduate departments. Instruction at the Physics Department began in the academic term 2003-2004, followed by Chemistry

Department in 2006-2007, Mathematics and Computer Science in 2007-2008, and Department of Industrial Chemistry in August 2019. All postgraduate program has been developed in accordance with UGC model curriculum and CBCS norms. The comprehensive Ph.D. program began in the academic session of 2007-08. Dedicated academics, administrative staff, and dedicated students facilitate instruction and research within the school. The school has 21 faculty members, including10 assistant professors, 2 associate professors, and 6 professors. The Physics Department has 30 capacity for Post Graduate admission, the Chemistry Department has 35 capacity, and the Mathematics and Computer Science Department has 35 capacity, while the Industrial Chemistry Department has 20 capacity. From 2007 to 2012, the school got fund under the School Level DST-FIST initiative. The Departmental DST-FIST Programme now funds the Chemistry Department (2016-21) and the Physics Department (2017-22). The School of Physical Sciences is diligently working to enhance students' education via high-quality teaching and research throughout many fields of physical sciences. (Source: https://mzu.edu.in/school-of-physical-sciences/)

The Chemistry Department at Mizoram University began in 2006, August with the objective of offering enhanced Ph.D. degree and postgraduate (PG) programs in chemistry. Since that time, 15 cohorts of M.Sc. students have graduated, and 32 research scholars have received Ph.D. degrees. The PG program, which includes both 2-year and 1-year options, provides all main specialisms in Chemistry, namely inorganic, analytical chemistry, organic, and physical. The New Education Policy (NEP-2020) directives structure the courses. The Department receives substantial assistance from the DST-FIST initiative. The current enrolment of postgraduate students is 33. The Ph.D. degree in chemistry is available in many focus areas aligned with the research interests of the current faculty. The department executed International Memoranda of Understanding with Korean institutions, such as Catholic Kwandong University, Hallym University, and IIT Guwahati, to advance the department's diverse research initiatives. Comprehensive efforts are underway to establish this department as a cutting-edge centre in chemical and physical sciences in the Northeast. (Source: https://mzu.edu.in/department-of-chemistry/)

In 2003, the Chemistry Department established a four-semester M.Sc. degree. Since 2007, the department has maintained a permanent faculty, now including seven

members. The department offers a 4 semester Choice-Based Credit System M.Sc. program with an authorized enrolment of thirty students, ensuring a favourable student-teacher ratio for individualized observation. The department administered pre-Ph.D. coursework for researchers in accordance with the Ph.D. Regulations established in 2009 by the UGC. The department also academically offers the B.Tech. curriculum by the university. The department focuses on theoretical shortened matter theoretical nuclear physics, physics, solid state electronics, and spectroscopy. DST, through FIST, funds the department's teaching and research efforts. The majority of teaching staff own projects financed by organizations like DST, UGC, MoES, CSIR, and DAE, thus enhancing the department's research reputation. Since 2012 August, the department has implemented the CBCS examination system in conjunction with other departments of Mizoram University. (Source: https://mzu.edu.in/department-of-physics/)

Founded in 2006, the Department of Mathematics and Computer Science began its first cohort of postgraduate students in 2007 July. The teaching staff of the department specialize in applied mathematics and pure as well as computer science. The department developed the curriculum in accordance with other universities in the country and in alignment with the UGC model syllabus. In 2012, the Choice-Based Credit System (CBCS) was launched and revised the postgraduate and undergraduate curricula to align with the NEP 2020 requirements. The department has three computer laboratories to serve the requirements of students, research researchers, and faculty members. Various software, including the MATLAB campus license, is accessible for usage. The department has received the NBHM library grant annually. The department has used this grant to construct a library of over 3,344 volumes. The department received a DST-FIST grant of Rs. 40 lakhs in 2021 for the enhancement of infrastructural facilities, including equipment and literature. A considerable number of graduates have successfully qualified for the NET/JRF examinations and have pursued further education and employment opportunities. The Government of Mizoram employs certain individuals who have successfully passed the MPSC examinations. The department aims to promote mathematics and mitigate math anxiety among young pupils by using computer-aided teaching and learning techniques in the classroom. The department has been visiting selected schools in and around Aizawl to provide

GeoGebra software, which facilitates the comprehension and visualization of mathematical ideas. For the benefit of students and educators, the department regularly organizes several conferences, workshops, and seminars on diverse themes in mathematics and computer science. (Source: https://mzu.edu.in/department-of-mathematics-and-computer-science/)

The Industrial Chemistry Department in the School of Physical Science at Mizoram University was established in 2019, with the academic program commencing in the 2019-2020 session as an M.Sc. in Industrial Chemistry. The postgraduate program in Industrial Chemistry aims to offer students with theoretical, industrial training, and practical, especially for those with a scientific background. The postgraduate program comprises a diverse array of courses, including foundation, core, specialization, and open electives. The Core Courses include all essential fields of chemistry, as well as organic, physical, inorganic, pharmaceutical chemistry and analytical, as well as fundamental chemical engineering principles. The courses concentrate on subjects pertinent to burgeoning industries with substantial employment prospects, as well as pharmaceuticals, petrochemicals, petroleum refining, polymers, dyes, paint, cosmetics, fertilizers, perfumery and agrochemicals. The current enrolment capacity for the postgraduate program is twenty-two. The department launched the Ph.D. program in 2021 and is diligently pursuing academic excellence in industrial chemistry and associated fields. (Source: https://mzu.edu.in/department-of-industrial-chemistry/)

1.6 North Eastern Hill University: An overview

The Indian Parliament established the North-Eastern Hill University (NEHU) on July 19, 1973, as a central university. The university is located on the outskirts of Shillong, the capital of Meghalaya. The university's two campuses are at Tura, and Shillong, Meghalaya. After passing both Houses of Parliament, the North-Eastern Hill University Act (24 of 1973) was approved by the President of India on May 26, 1973. The Extraordinary Gazette of India published the Act on May 26, 1973, along with the First Schedule containing the University's Statutes. A vice chancellor supervises the NEHU Tura Campus. The University Grants Commission rated it as a university with outstanding potential in 2006. Established in 1994, it functioned as a regional

university catering to the north-eastern Indian states of Meghalaya, Nagaland, Mizoram and Arunachal Pradesh, and in 2001, it led to the formation of Nagaland University and Mizoram University. The university aims to share and enhance information by offering research and instructional facilities in selected fields of study while prioritizing the development of economic and social circumstances and the wellbeing of hill communities in the north-eastern region, particularly focusing on their intellectual, cultural, and academic development. The university now comprises 53 undergraduate colleges and eight professional institutes. As of March 28, 2022, the University Central Library has an assemblage of over 200,000 volumes, subscribes to 316 international and 366 Indian current journals, and 38,000 bound magazines. The membership comprises college and university educators, undergraduate and postgraduate honours apprentices, and non-teaching staff. (Source: https://nehu.ac.in/About-NEHU)

The Physical Sciences School consists of 4 departments: The Department of Chemistry, the Department of Mathematics, the Department of Physics, and the Department of Statistics. The institution serves as a major hub for postgraduate education and research in advanced domains of physical sciences. It has secured monetary support for external research from national funding bodies such as the Department of Science and Technology, the Department of Atomic Energy, the Indian Council of Medical Research, and the Council of Scientific and Industrial Research. Additionally, some of the departments have conventional monetary assistance under the UGC-CAS and DST-FIST programs. The institution has advanced equipment such as single-crystal XRD, time-resolved fluorescence spectrophotometer, GC, HPLC, and HRMS, together with top-notch computing tools to facilitate pioneering research in leading-edge domains. The departments have recruited exceptionally teaching staff, many of whom have been awarded fellowships both domestically and abroad for their notable academic achievements and for engaging in joint research initiatives domestically and internationally. A significant number of pupils from the school succeed annually for several eligibility tests, including NET, SLET, and GATE. Graduates and research students from the school successfully secure employment in academic and research organizations both domestically and internationally. The students, research scientists, and professors enjoy convenient Wi-Fi access with

expeditious internet connection. The institution has a conference room and seminar hall to facilitate research and academic endeavours. (Source: https://nehu.ac.in/school/4/School-of-Physical-Sciences)

The Department of Chemistry was founded in 1976, has been educating students in the field through its ongoing MSc and PhD programs. The department's instructional and research programs aim to enhance students' understanding of chemistry at the molecular level. The department has already established a robust interdisciplinary nature. The department's research activities focus on the systematic application of knowledge in organic, inorganic, physical, and computational chemistry, spectroscopy, and advanced oxidation for synthesis, characterisation, and applications in medicinal chemistry, advanced materials, sensing, atmospheric reactions, and wastewater treatment. Several national financial bodies, including DST, DBT, CSIR, ICMR, DAE-BRNS, UGC, and NEC, among others, finance the research endeavours of the department's academic members. The UGC has recognized the Department as a Centre for Advanced Studies (CAS). (Source: https:// nehu. ac. In /department /display/ Chemistry-Department)

The Department offers exceptional and demanding Ph.D. and M.Sc. programs in several fields of mathematics, including analysis, algebra, differential equations, geometry, graph theory and topology. The department has been doing basic research and has prioritized the eminence of its productivity. It has also adjusted to the current context of supporting fundamental research using computers. Two computer courses are being in the M.Sc. program and conducts research in computer-aided methodologies for mathematical enquiries in group theory, fluid dynamics, numerical analysis, and graph theory. (Source: https://nehu .ac.in/ department/display /Mathematics- Department)

In accordance with the NEHU Act, the Physics Department was founded in 1976 to develop scientific expertise in this region. Over several years, the department has successfully attracted a diverse array of accomplished teaching staff and has designated High Energy/Particle Physics (theoretical), Nuclear Physics (experimental and theoretical), Solid State Physics (experimental and theoretical), and Laser Physics (experimental) as its primary focus areas in research and teaching initiatives. Eminent national and worldwide organizations have solicited faculty members to present their

research achievements, additionally administering Ph.D. and M.Sc. programs. The university has granted associateships and senior associateships to certain members for their joint research endeavours. (Source: https:// nehu. ac. in/ department /display / Physics -Department)

The Department of Statistics, established in 2005, is part of the School of Physical Sciences and is situated at the Permanent Campus of North Eastern Hill University in Shillong. The primary objective of the department has been to provide high-quality education and training while advancing theoretical, computational, and practical understanding in statistical science. From the Department of Science and Technology, Indian Government, the Department has successfully enhanced its computational labs with financial support to address the computer skill issues faced by students in this north-eastern area of the nation. (Source: https:// nehu. ac. in/ department/display/Statistics-Department)

1.7 Significance and scope of the study

Digital literacy is to efficiently understand the ICT tools and techniques and use them efficiently for searching and acquiring digital information for academic and research purpose. Students, research scholars and employees of any professionals in present era are constantly being asked to connect, communicate, access resources and network using their conceptual talents, therefore the necessity for a digitally literate is very important. In 21st century importance, dependency and requirement of digital literacy is increasing due to use of ICT and social media tools in all sectors including LIS. Digital literacy is of crucial significance; research scholars must independently uncover information, locate necessary data, and use it to substantiate their research. It is essential for universities to certify that all scholars develop skills in learning how to acquire, formulating queries, accessing probable information sources, evaluating accuracy, organising data, and ultimately utilising the information effectively. NEHU, established in 1973, is the oldest central university in the North East region and it has a prestigious position with its NRF ranking under 100. On the other hand, MZU, which was formerly a part of NEHU, became an autonomous institution in 2001. Despite its relatively recent establishment as an independent university, MZU has remarkable progress in research and academic performance, proving itself to be a significant

contributor to higher education in the region. This comparison is particularly relevant because it highlights the dynamics of institutional development and the impact of autonomy on academic and research excellence. As a result, comparing Mizoram University (MZU) and North Eastern Hill University (NEHU) in this study lies in their shared geographical and historical context, as well as their distinct routes in institutional growth and academic development. Both universities are located in the region of North-East India, a region marked by its rich cultural diversity and unique geographical challenges, which influence the academic and research ecosystem. The study also focuses on digital literacy competency among research scholars in the physical sciences, a field recognized for its foundational role in pure science. Both MZU and NEHU have made significant contributions in this area, making them ideal universities for comparison. Digital literacy is increasingly critical in academic research, and understanding its prevalence and proficiency among scholars in these universities provides insights into how they equip students to meet contemporary research and technological challenges. By investigating these aspects, the study pursues to offer a framework for evaluating the interplay between institutional development, regional challenges, and educational outcomes in the North-East region. Thus, this research is planned to compare the digital literacy competency among the research scholars of Mizoram University (MZU) and North Eastern Hill University (NEHU). Although the phrase "Digital Literacy Competency" is more a recent occurrence it refers only to the ability to use digital devices practically.

The scope of the present research is to know the digital literacy competency among the Research Scholars of Physical Sciences of Mizoram University (MZU) and North Eastern Hill University (NEHU). At present in both the Universities there are four departments. The scope of the study will cover all the four departments of both the Universities. The list of the departments is listed in table No. 1.1.

Table 1.1: List of selected Central Universities

Name of the University	Schools of Physical Sciences					
	Phys	**Chem**	**Math & CS**	**Ind. Chem**	**Stats**	**Total**
MZU	42	31	26	10	-	**109**
NEHU	6	45	12	-	10	**73**
TOTAL						**182**

1.8 Research Design

1.8.1 Statement of the problem

Digital literacy proficiency is essential not only for individuals but also for institutions and the nation collectively. The Indian context situates this study, which aims to assess the digital literacy competencies of research scholars. The study seeks to explain the creation of instruments for digital literacy skills and investigate the obstacles researchers face in obtaining, scrutinizing, and interpreting resources as well as employing technology to achieve their research goals. Digital literacy serves as a potent instrument for development, as technological advancements can enhance economic opportunities for the poor, broaden service delivery to marginalized populations, optimize management, and facilitate social transformation. Students and educators require current data for diverse educational endeavours. Universities in affluent nations are perpetually updating their digital literacy curricula to align with swift technological progressions. Librarians proficiently oversee computers and a diverse array of digital devices in their offices to guarantee users receive sufficient service. Proficiency with digital technologies will limit the scholar's ability to access, disseminate, and evaluate knowledge at the appropriate time and place. By giving them the proper information at the appropriate moment and place, digital literacy competence may be able to assist academics in overcoming their obstacles.

The study aims to investigate how researchers from Mizoram University (MZU) and North Eastern Hill University (NEHU) utilize digital literacy competency to access resources, connect, communicate, evaluate, organise, and analyze information. Due to a lack of research in this area, the study is attempt to fill the gap.

1.8.2 Objectives of the study

The objectives of the study are:

i. To identify and compare the level of digital literacy awareness among respondents of Mizoram University (MZU) and North Eastern Hill University (NEHU).
ii. To compare the awareness on digital tools and techniques among the research scholars of both universities.
iii. To find out the research scholars' capability to retrieve, examine, evaluate and use authentic digital information for their academic purposes in both universities.
iv. To know the respondents' satisfaction with digital literacy initiatives and its impact on their digital literacy competency.
v. To find out the area of strength and weakness of digital literacy competency among the research scholars of both universities.

1.8.3 Hypothesis

The current study's hypotheses are:

i. **H1:** There is no significant difference between research scholars of NEHU and MZU in awareness of the digital literacy.
ii. **H2:** There is no significant difference between research scholars of NEHU and MZU in contributing to the overall efficiency and quality of digital literacy skills in their research work.
iii. **H3:** There is no significant difference between research scholars of NEHU and MZU in actively seeking new digital tools for improving their skills and efficiency.

1.8.4 Research Methodology

The study primarily focuses on digital literacy competency, which encompasses a range of skills crucial for researchers to effectively identify, search, locate, retrieve, access, and utilize information from the web to meet their diverse informational needs. These competencies are particularly significant in the context of Mizoram University

and North Eastern Hill University, where researchers rely on digital resources for academic and scholarly purposes. To collect primary data from the respondents, various instruments and methods were employed to ensure comprehensive and accurate data collection. These included:

i. Survey of Respondents

The survey method was adapted to collect primary data from respondents using a structured questionnaire comprising thirty-three questions on Digital Literacy. The questionnaire was distributed to 109 research scholars at Mizoram University (MZU) and 73 research scholars at North Eastern Hill University (NEHU). Of these, 93 completed questionnaires were returned from MZU, and 58 were received from NEHU.

ii. Sample Selection

The sample for the study was selected using a census sampling technique, ensuring that each individual from the population had an equal chance of being chosen. This approach is used to gather information about the entire population, providing a comprehensive understanding of the group's characteristics. This method helped to minimize bias and enhance the representativeness of the sample. Data collection was specifically focused on the research scholars affiliated with the School of Physical Sciences from two distinct universities. The approach aimed to gather diverse perspectives and insights from scholars actively engaged in research, thereby enriching the overall quality and reliability of the data collected.

iii. Data analysis and interpretation

The data collected were analysed with the help of appropriate statistical tools and techniques using MS-Excel Version 2019 and SPSS Version 26 to draw inferences. The Chi-Square Test is used as a statistical technique to figure out if a significant link exists between two variables that are categorical or whether the distribution of observed data deviates from a theoretical distribution. The Chi-Square statistic (χ^2) is calculated as:

$$\chi^2 = \sum \frac{(Oi-Ei)^2}{Ei}$$

1.9 Chapterization

Chapter 1: Introduction

A brief overview of the research topic, digital literacy, its definition, government initiatives for digital India, the importance and scope of the study, statement of the problem, the study's objectives, methodology, hypothesis, and chapter organisation are all provided in the first chapter.

Chapter 2: Review of Literature

The second chapter offers a glimpse of the current research as well as views into the many forms of digital literacy and digital literacy skills associated domains. The research is further arranged chronologically in decreasing order. This chapter discusses the research on digital literacy in order to provide the researcher a better grasp of the earlier studies conducted on the subject and how this study may be enhanced.

Chapter 3: Digital Literacy: Concepts and Models

The concepts of digital literacy, historical context and evolution of digital literacy, and theoretical frameworks and models on digital literacy, such as the Digital Competence Framework (Digcomp), New Literacies Theory, Association of College and Research Libraries (ACRL) Framework for Information Literacy, and Critical Digital Literacy is discussed in this third chapter. This chapter also highlights the significance of digital literacy, as well as contemporary trends and future directions.

Chapter 4: Analysis and Interpretation of Data

Using the proper statistical tools and procedures, the data and interpretations gathered from the structured questionnaire are analysed in the fourth chapter. The data is presented in tables and graphs in an appropriate manner. There are seven parts, the first component includes demographic data, with two questions about respondents' personal information. The second component deals with respondents' use of the library and its services, consisting of seven questions. The third part, which consists of five questions, assesses the respondents' proficiency in digital literacy. The fourth part evaluates familiarity with digital tools and techniques and includes five questions. The fifth part investigates respondents' capacity to obtain, analyze, assess, and use authentic digital information for academic objectives, with five questions focused on this dimension. The sixth part evaluates satisfaction with the digital literacy program and its impact on respondents' digital literacy abilities, including four questions. The

seventh part assesses the strengths and weaknesses of respondents' digital literacy ability and includes five questions. With the use of SPSS and MS Excel software, the information gathered from the respondents is thoroughly reviewed and evaluated.

Chapter 5: Findings, Conclusion and Suggestion

The fifth chapter provides instant of the major findings and conclusions, and it recommends enhancing the digital literacy skills of the Research Scholars in Physical Sciences at both universities. The chapter finishes the analysis by making ideas for future research topics. The chapter discusses the most significant conclusions from the data analysis. The researcher provided conclusions based on observations made during the data analysis. This chapter also contains ideas made by respondents for further research/study.

The thesis concludes with a bibliography and appendices. The bibliography is provided according to the guidelines set by the APA style manual, 7th edition (American Psychological Association, 2019).

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CHAPTER - 2
REVIEW OF LITERATURE

2.1 Introduction

A literature review is an important precursor toward any research in that by a proper understanding of the actual and lacuna in a specific field, it lays the foundation for embarking on any undertaking. In analyzing the available studies, a literature review provides an overall description of what has been achieved, patterns identified, and issues that have not yet been resolved by further study. This is a crucial process because it helps in the establishment that new investigations take off from previous ones and are not merely duplicated. This enables the researcher to crystallize the question and take preliminary steps toward the formulation of the research methodology and a theoretical framework for advancing the study. A well-conducted literature review adds weight to research by locating it within the wider academic environment, guides the researcher in articulating their contribution to the field, and makes the knowledge advance.

In the current-day perspective, digital literacy competency has emerged as a prime skill of working and manipulating digital mechanism well in individual and professional life. Digital literacy incorporates a variety of capabilities involving accessing information, communicating online, creating content, and critically evaluating online resources. As digital platforms continue to become important in education, work, and social life, proficiency in digital literacy allows one to use digital tools and digital content in engaging and responsible ways. This ability is required for techniques that are rapidly changing and for information management; thus, becoming an enabler for analytical thinking, addressing, and lifelong learning skills in the digital world.

2.2 International journals

Alduwayghiri and Aljebreen (2024) investigated the perspectives of Saudi EFL learners on digital literacy and its potential for developing listening skills. The authors distributed a modified questionnaire to undergraduate students, drawing on an earlier study on digital literacy and language knowledge. Their findings revealed that students generally viewed their digital literacy skills positively and recognized the aids of innovation for enhancing listening comprehension. Specifically, students reported improvements in vocabulary acquisition and pronunciation through digital tools and resources. The research emphasized the importance of integrating digital literacy into EFL classrooms to foster engaging and active learning experiences, especially in the development of listening skills.

Arigidi and Sanni (2024) evaluated the consequences of skill-enhancing programs on the digital literacy of educators at public secondary schools in Rivers State, Nigeria. The authors used a survey research proposal that included multiple stages to gather the data from 2240 teachers. The findings revealed a moderately optimistic correlation between teachers' participation in skills enhancement programs and their digital literacy levels. The research highlights the significance of providing teachers with constant professional development opportunities that emphasize developing digital skills and assimilating technology into their teaching pattern. These findings emphasized the necessity for sustainable and well-supported professional development programs to bond the digital divide in education and guarantee that teachers are prepared to effectively prepare students for a technology-dependent future.

Ban, Kim, and Seomun (2024) explored the evolving notion of digital health literacy, using Rodgers's conceptual analysis methodology to evaluate 32 articles. The study identifies four critical attributes of digital health literacy: goal-oriented enforcement, processing data, communication, and utilization. The study identifies factors such as functioning literacy, prior medical understanding, and exposure to technological advances as precursors, and presents positive well-being results, higher perceived control, and improved quality of life as outcomes. The authors emphasize the dynamic nature of digital health literacy, highlighting its continuous growth alongside technological advancements in health information creation, sharing, and

utilization. They conclude by advocating for standardized terminology and further research into the interplay between antecedents, consequences, and contextual factors to improve understanding and application of digital health literacy.

Bahcivan, Yavuzalp, and Kilic (2024) examined the correlations among university students' self-esteem views, philosophical beliefs, and digital literacy abilities in the environment of online learning throughout the COVID-19 epidemic. Utilizing Rokeach's system of beliefs, the authors suggested a relational framework to elucidate the interaction of these components. Their study, involving a large sample of Turkish undergraduate students, found significant connections between students' confidence in learning in virtual environments, their beliefs about knowledge acquisition in online settings, and their overall digital literacy levels. The findings suggest that fostering students' confidence and positive epistemological beliefs is crucial for promoting effective digital literacy development in online learning contexts.

Budi and Putri (2024) investigated the advancement of digital literacy to improve the abilities, expertise, and self-assurance of pupils, specifically in the realm of patient admittance applications in healthcare services. The research highlights the importance of digital literacy in equipping learners with essential skills and emphasizes the necessity for improved educational resources to further develop their abilities. The study used a qualitative research technique, which involved conducting interviews, making observations, and reviewing documents to collect data. The results emphasize the need to create digital literacy apps that contain system instructions, exercises for simulations, and effective communication tools. The study emphasizes the need for a simple and engaging user interface for these applications and uses multimedia elements to improve the learning knowledge. To summarize, the research offers critical insights into the significance of digital literacy in learning, particularly within the healthcare sector. Additionally, it presents practical suggestions for creating efficient digital literacy resources.

Dewi, Utami, and Santosa (2024) conducted a methodical investigation to assess the importance of digital literacy abilities within the framework of English for particular purposes. The authors argued that in the contemporary digital world, ESP learners need robust digital literacy skills to proficiently access and use resources on

the internet, collaborate with peers, and engage in authentic language learning experiences. Their review highlights the necessity for ESP curricula to integrate technological literacy training, equipping learners with essential abilities to excel in their respective domains. The authors emphasize that fostering digital literacy in ESP not only improves language competency but also learners' ability to become effective communicators and problem solvers in their chosen professions.

Herawati, et al. (2024) investigated the link between kindergarten teachers' ICT competency and their students' online literacy abilities in Surabaya, Indonesia. Recognizing the growing significance of online literacy in early childhood education, the researchers conducted a quantitative correlational study using surveys to collect data from kindergarten teachers. Their findings emphasized the importance of teachers' ICT skills for successfully incorporating technologies into primary learning environments and fostering students' digital literacy development. This research emphasizes the need for adequate instructor training and support in ICT to provide educators with the essential skills to prepare young learners for a technology-driven world.

Kaankandikar et al. (2024) investigated how integrating digital literacy training with MBA principles impacts rural business skills development in India. The study highlighted the challenges rural communities face in accessing digital resources and the capacity of online literacy to foster entrepreneurship and economic growth. The authors used a combination of methods, including quantitative research and interviews with participants, to evaluate a program that integrates digital literacy training with MBA aspects. The research sought to evaluate the program's efficacy in enhancing digital capabilities, understand the obstacles encountered by rural individuals when using technological advances, and explore the impact on participants' confidence in utilizing electronic devices for business purposes.

Lutfiana, Sujarwo, and Dita (2024) conducted a comprehensive review of the impact of technological advances on education, focusing specifically on the digital literacy of teaching staff. Their research, entitled "The Enactment of Educators' Digital Literacy to Enhance Learning Capabilities in Era 4.0," examined the influence of digital literacy on enhancing education within the framework of the fourth wave of industrialization. The study emphasizes the significant impact of digitalization in

education, highlighting the requirement for constant training programs to progress instructors' digital literacy capabilities. The research highlights a notable disparity in digital literacy among educators, especially in rural regions, and emphasizes the crucial role of government and policymakers in resolving these inequalities. The results indicate that instructors must possess digital literacy to successfully incorporate technology into their teaching methods, resulting in enhanced learning achievements. The report emphasizes the importance of online literacy competency for learners to navigate the digital environment effectively and successfully. The findings suggest that educators must engage in ongoing professional growth and training in digital technologies to stay contemporary with the rapid progress in the world of technology.

Naamati-Schneider and Alt (2024) investigated the developing site of technology knowledge in the present era of artificial intelligence assistants, specifically focusing on the competencies necessary for learners using these tools in higher education. The researchers did a study that was kind of like an experiment to see how well problem-driven learning activities using ChatGPT worked compared to traditional problem-driven instruction based on lectures. Contrary to expectations, the study found that while problem-based learning enhanced students perceived digital skills, the inclusion of ChatGPT did not yield significant improvements. This suggests a potential shift in focus from conventional digital literacy to an advanced form of artificial intelligence literacy, requiring further exploration to redefine relevant competencies for the evolving digital landscape.

Nalaila and Elia (2024) examined the proficiency levels of digital literacy abilities among learners at selected public institutions in Tanzania. Their study, utilising a combination of methods, revealed that while students possessed basic digital literacy skills, they often struggled with advanced skills such as critical assessment of information on the internet, academic integrity in technological environments, and effective utilisation of digital tools for learning. The authors highlight the implications of these findings, emphasising the need for higher education institutions to provide comprehensive digital literacy training that goes beyond basic technical proficiency and equips students with the critical thinking and ethical decision-making skills necessary for success in the digital era.

Oktarin and Hastomo (2024) explored the potential of Critical Discourse Analysis (CDA) as an educational instrument for enhancing digital proficiency skills among English as a Foreign Language students. The authors argue that CDA, with its focus on the relationship between language, power, and ideology, can empower students to critically evaluate online information, identify biases, and engage in more informed and responsible digital citizenship. Their study highlights the need for incorporating CDA principles into EFL classrooms to equip learners with the ability to think critically, which is essential for navigating the intricacies of the digital environment.

Panerio et al. (2024) investigated the correlation between research skills and digital proficiency among Filipino nursing students. The researchers conducted a study with nursing students from various levels at a private university in the Philippines, using a combination of methods and techniques that included surveys as well as data evaluation. Their findings indicated a substantial association between research abilities and digital proficiency, highlighting the significance of the usage of innovation in developing nursing students' research capabilities. The study emphasizes the necessity for nursing education initiative to emphasize and improve the use of digital proficiency to properly equip students for research tasks and evidence-based practice.

Pranata (2024) examined the impact of digital knowledge, social media proficiency, and digital safety in digital leadership among university learners. The application of a quantitative methodology found that literacy understanding and social media skills directly and positively impact leadership in the digital age. However, there was no evidence to support the hypothesised mitigating effect of electronic safety. The research underscored the crucial necessity of equipping individuals with strong online literacy and social media skills to excel as technology leaders. The study also suggests a need for further exploration of the complex interplay among digital safety, proficiency, and leadership in institutions of higher learning.

Santos and Gomes (2024) explored the progressive notions of "Computer Proficiency," "Online Proficiency," and "Digital Proficiency" to present a comprehensive model for comprehending digital abilities. The study highlights the interconnectedness of these notions, indicating that digital skills are not fixed but rather develop and change with technological progress. The methodology employed a

comprehensive examination of extensively referenced publications from the Web of Science database, utilising ascending hierarchical classification to classify the results. The results highlighted the significance of having a detailed understanding of digital skills, suggesting a framework that combines technical, cognitive, and ethical elements. This paradigm is especially beneficial for teachers and professionals who want to improve digital literacy and proficiency in diverse settings. The research's novelty lies in its systematic approach to precisely defining and implementing digital skills, making it a substantial addition to the area of digital learning.

Sari (2024) conducted a desk study to explore the association between achievement and digital literacy abilities among students taking online scientific courses in Indonesia. Using a secondary data collection approach, the study analyzed existing research and reports to acknowledge the influence of digital proficiency on academic achievement in online learning environments. Findings indicated a robust correlation amid proficient digital literacy competency and student success, highlighting the significance of information comprehension and online collaboration for improved academic performance and engagement. The study recommends integrating instruction in digital literacy into the scientific curriculum, from beginning education to further education, to bridge the digital skills gap and foster student success in online science courses.

Saputra et al. (2024) investigated the impact of internet-based educational resources on the literary proficiency abilities of 5th-grade learners in Indonesia. The study, employing an approach that is quasi-experimental in both control and experimental groups, reveals that students exposed to digital materials demonstrate significantly improved literary literacy scores, heightened enthusiasm, and increased motivation compared to those using conventional methods. Classroom observations further support these findings, highlighting that digital materials foster active participation, dynamic interactions, and enhanced collaboration among students. The authors concluded that the integration of digital teaching materials in primary education can effectively enhance literary literacy skills and advocate for wider adoption in line with Indonesia's National Literacy Movement.

Amin, Adiansyah, and Hujjatusnaini (2023) investigated the important impact of communication and digital literacy abilities on the improvement of conceptual thinking skills in biology learners. The study used the correlational analysis method to identify communication and digital literacy as prediction factors, with critical thinking being the criterion variable. The study, which included fourth-semester students from IAIN Ternate's Tadris Biology department, shows that speaking skills and digital literacy both have a big effect on critical thinking, with 34.93% and 29.67% of the total effect, respectively. The results emphasize the necessity for teachers to include communication and digital competence elements in their instructional methods to promote critical thinking. The study's findings indicate that improving these abilities may result in improved academic performance and more critical evaluation of scientific material, therefore equipping students to face the problems of the twenty-first century.

Putra and Rullyanti (2023) explored the essential significance of digital literacy in enhancing English language acquisition in Indonesia's online education system. The authors argued that digital literacy is essential for learners to proficiently explore online resources, engage in digital communication, and overcome challenges related to finding and comprehending English content online. They highlighted that insufficient digital literacy among both instructors and learners hinders the effectiveness of online learning. The article emphasized the necessity of addressing a lack of digital competencies and fostering digital literacy as a key factor in improving students' English language proficiency in the digital age.

Reddy, Chaudhary, and Hussein (2023) proposed a specialised digital literacy strategy to tackle the ongoing competencies breach in the South Pacific region in digital literacy. The authors critically evaluate well-known educational frameworks, including the OECD Learning Framework, E3 TPACK, Learning Model, and SAMR, emphasizing their shortcomings in successfully addressing the digital ability gap. Despite several attempts, the problem of high dropout rates in online learning continues, highlighting the need for improved digital literacy instruction. The Six Major Literacies or SPDLF for the current age, contains six fundamental literacies. On the other hand, digilitFJ comprises a digital literacy assessment instrument and a web-based interference program. The exploratory component evaluation validates the

research and confirms the validity of the SPDLF, while the survey findings show that students have optimistic point of view and opinions towards the digital literacy instrument. The authors contend that incorporating this paradigm into current educational frameworks may reduce the disparity in digital abilities, thereby improving graduates' readiness for technology-driven industries.

Sukma, Purwianingsih, and Amprasto (2023) examined the digital literacy abilities of 10th grade learners in Bandung, Indonesia. The research highlights the significance of digital literacy in effectively using the internet, traversing hypertext, assessing information, and integrating knowledge. The results indicate that pupils exhibit a moderate amount of digital literacy, as seen by an average score of 44%. More precisely, the tasks of searching online and analyzing information achieved a score of 47% and 40.32%, respectively. In contrast, hypertext navigation had a considerably lower score of 27%. However, the process of synthesising knowledge demonstrated a significantly higher level of proficiency at 60.48%, earning a "good" classification. These findings emphasize the need for enhanced digital literacy instruction to increase students' proficiency in using digital resources efficiently for educational purposes. The report recommends that stakeholders should enact policies to enhance digital literacy, thereby facilitating the cultivation of 21st century abilities that are crucial for achieving professional and academic excellence in the age of technology.

Li and Yu (2022) studied teachers' digital literacy, function, and satisfaction during COVID-19. The PICO mnemonic delineates the four elements of a clinical inquiry: relevant patients or demographic cohorts, the treatment (either exposure or diagnosis procedure), and the comparator that evaluates and finds the intervention suitable. The study showed that instructors' responsibilities changed significantly. Instructors were less satisfied since online instruction increased their workload. After the COVID-19 epidemic, schools must adopt an integrated teaching paradigm. They've addressed the changing educational model's need for digital literacy among instructors. The research also establishes a connection between teacher job satisfaction, digital literacy, and their professional role. They also measured how much the three factors affected online learning and teaching.

Lukitasari et al. (2022) explored college student learning and digital literacy instrument design. This project creates and assesses digital literacy tools to boost student learning. This mixed-methods investigation employs both survey and pre-experimental methodologies. The quantitative survey employed a numerical questionnaire. The survey selected 318 Indonesian university students using a cluster random selection method. A pre-experimental design evaluated the instrument on 103 students. Confirmatory factor analysis shows that the model contains three factors: transmitting digital material, exploring digital content, and developing and consuming digital content. A confirmatory factor study indicates that the model has three factors: conveying digital material, discovering digital content, and generating and consuming online materials. The instrument's current findings may measure students' digital literacy.

Ricoy and Sanchez-Martinez (2022) examined the correlation between ecological consciousness and digital literacy in kids in primary schools using gamification. This investigation aimed to assess the effects of an educational program that was developed for students in primary schools to improve their digital literacy and ecological consciousness by leveraging gamification tools. They collected data from 156 participants, including instructors, learners, and families, using a qualitative methodology. The findings suggest that the kids have incorporated new behaviours to promote the more efficient use of water and electricity, as well as the recycling of paper and plastic. Furthermore, they used electronic devices to create content and employed more effective strategies for online information retrieval, such as applications. The gaming elements and materials significantly influenced students' learning, and the tablet played a critical role in enhancing their interest, communication, and problem-solving skills.

Yu and Zadorozhnyy (2022) examined how multimedia presentations improve students' digital literacy and language skills. They wanted to determine if video presentations in an autonomous learning environment could improve digital literacy and English language proficiency and create an evaluation device for personal as well as organizational performance. The Hong Kong higher education school conducted the program as a component of its English-speaking curriculum for bachelor students majoring in English. Video creation may replace in-class presentations and improve

students' linguistic, collaborative, digital literacy, and learning autonomy, according to the results. According to video analysis, students in Video Production (VPR) use multidimensional semiotic tools to interact with spectators and alter their expressive personalities. The distinction between VPR and non-VPR-group presentations shows that collaborative multimedia resource production has a higher influence on several elements. Impacts on foreign language education, instruction design, and oral assessment task digitalisation research are discussed.

A and Sinha (2021) examined the electronic learning patterns and related competencies of university learners, as well as their favourite root of learning, if they were traditional or electronic resources. Researchers and students from the Central University of Tamil Nadu, located in India, participated in a survey study. The results show that a significant number of students possess a solid understanding of digital tools and their use, with the majority demonstrating exceptional abilities in digital literacy. Regardless of the technological gadgets produced, the results indicate that students have increased their level of technical understanding. In terms of reading instruction, the results show that students and readers prefer physical books over digital versions.

Egeli and Sagdinc (2021) conducted a research on the need and significance of digital literacy in the COVID-19 pandemic. The study's literature review served as the basis for the research and was conducted within the purview of document analysis. Therefore, having digital literacy competencies is crucial for successfully navigating the constantly evolving world and acquiring information. It includes the whole procedure of managing, evaluating, integrating, and analysing digital resources, also conceiving new information, interacting with media, taking productive social act, and interacting with others about specific life situations. The COVID-19 epidemic and the migration of education to digital environments have revealed the necessity of digital literacy.

Esh and Ghosh (2021) studied the digital literacy of LIS learners at the University of North Bengal in India. The main objectives of the study were to evaluate the three factors of advanced studies, digital literacy (i.e., aptitudes, level, and learning) among the library and information science (LIS) learners at the University of North Bengal. For the investigation, the review was used as an exploration

instrument to investigate the survey's philosophy. The survey was created, formulated, and sent to sixty students who were enrolled in the LIS program. Among sixty learners, forty-nine (81.66%) responded to the questionnaire. As a result of this study, it seems that the DL level is sensitive to gender preference and living, and it differentiates among various DLs among learners, also making decisions DL (Computer) capacities via gender and societal.

Saripudin et al. (2021) examined the digital literacy skills of career center educators in Kota Cimahi, West Java, to examine the level of digital technology literacy. The study included 371 responses from 23 vocational educators in Kota Cimahi. The study employed a descriptive quantitative method, collecting data through a survey. Thus, the survey findings indicate that tutors should have a digital literacy level of three out of the possible six levels. The research findings also show that educators have advanced skills and comprehension of the necessary knowledge and technological advancements, and they regularly use these standards as a guide for their activities. Age and tenure are two factors that could potentially hinder a teacher's digital literacy, as they significantly influence their proficiency with digital tools. Elderly educators have lesser levels of digital literacy in comparison to their younger colleagues, whereas younger educators demonstrate higher digital skills.

Tohara et al. (2021) investigated how students with Special Needs Students (SNS) employ digital literacy strategies in the digital age, as well as how they use technology instruments and techniques to offer instruction and education strategies for learners with SNS. Research indicates that students' inadequate digital literacy skills present a challenge in the digital learning environment, hindering their ability to complete their training. This article seeks to examine, from the view of educators, the concept of digital literacy skills that enhance SNS methods of instruction and learning practices in Malaysia. They conducted preliminary research by interviewing five instructors who taught desktop publishing to SNS students to explore this idea. The results suggested that the digital literacy skills model could improve the pedagogical methods required for SNS in the digital realm.

Mulat and Natarajan (2020) investigated the digital literacy competencies of library professionals in Ethiopia at Jimma University. The findings reveal that librarians possess essential digital competencies like email, internet usage, and social

networking, which are primarily acquired through workshops, formal education, and online resources like YouTube. Despite the moderate proficiency levels, the study highlights significant constraints, including electricity supply and internet availability, which hinder the effective use of digital literacy competencies. The research emphasizes the significance of continuous practice and institutional support to improve the digital literacy of librarians, aligning with the broader goal of improving service delivery and supporting lifelong learning in higher education.

Radovanovic et al. (2020) studied the key performance indicators of digital literacy for sustainable development. The primary aim of the article was to determine the essential indicators, known as Key Performance Indicators (KPIs), in relation to digital literacy skills, which are crucial for achieving digital inclusion. Analysed case studies focused on populations in India and sub-Saharan Africa that use digital literacy programs to enhance health literacy and information, address social issues, and encourage growth. India prioritizes significant efforts in the field of digital literacy for rural communities. Kenya initiated an initiative in Sub-Saharan Africa to enhance computer literacy among economically disadvantaged youths. Specific attention has Researchers have focused specifically on Burkina Faso, Senegal, Tanzania, and Mali, investigating how individuals with low proficiency levels use technological devices.

Okeji et al. (2020) evaluated digital literacy competencies among present day librarians in Anambra at private university libraries. The study used a survey approach to evaluate 21st century librarians' digital literacy. The research reveals that academic librarians in Anambra State possess digital literacy competencies, independently pursue digital literacy training biannually, and deal with power outages and inadequate internet connectivity. The study recommends that the administration of private universities in Anambra State should offer training for academic librarians to enhance their digital literacy skills and enhance their overall career development. It also suggests that librarians should participate in more courses on digital literacy skills, and libraries should have a backup power source and fast internet bandwidth.

Ouahidi (2020) examined the limitations associated with the acquisition of digital literacy competencies in organizations of higher learning. The paper examines and evaluates the influence of incorporating digital skills on achieving academic performance, fostering lifelong learning, and enhancing future employability. The

document aims to answer the following inquiries: How can digital literacy, a potent technical instrument, enhance the method of instruction and learning in higher educational institutions? What are the potential barriers that could impede the application of various technological capabilities? The study concludes with several barriers that students face, including the digital divide, poor self-worth, anxiousness, and overconfidence. The finding highlights the instructors' lack of confidence, lack of appropriate training, and aversion to change as factors contributing to their students' digital literacy. Moreover, it's crucial to acknowledge the institutions' inadequacies in effectively promoting digital literacy, potentially due to restricted accessibility and inadequate technological assistance.

Tejedor et al. (2020) investigated the association between higher education and digital literacy in Italy, Ecuador, and Spain during the COVID-19 closure. The goal of the research was to conduct a comparative examination across higher education institutions in three countries (Ecuador, Italy, and Spain), specifically focusing on the advancement of digital literacy within the context of the global shutdown situation. The research employed a quantitative methodology with an exploratory-correlational focus, applying a specifically designed question to a sample of 376 participants. The findings indicate the importance of improving the primary components, including the teacher's digital abilities, adaptable learning sources, collaboration among universities and students, and instructional techniques that are suitable for the current environment.

Zulkarnain, Heleni, and Thahir (2020) conducted an examination of the digital literacy of mathematics learners at universities in Riau during COVID-19, with a focus on e-learning. The Industrial Revolution 4.0's rapid technological improvements have led students to usage digital platforms and social media more, according to a study. The findings show that digital literacy improves students' digital media knowledge, comprehension, and abilities. Digital literacy includes fundamental reading, scientific abilities, information attachment, technical skills, and visual skills, according to the survey. Students have strong digital literacy, with technical and visual constructions being the highest. The report recommends that institutions should improve learners' digital literacy to prepare them for the technological age. This research enhances our understanding of digital literacy in mathematics and highlights

the significance of incorporating it into the course to foster insightful analysis, creativity, and effective communication.

Alagu and Thanuskodi (2019) provided a comprehensive review of studies on digital literacy from 1992 to 2011. The authors evaluate authorship, cooperation, and country distribution of digital literacy papers through Histcite and Web of Science database software. The survey shows that digital literacy research grew rapidly in 2011, with the US dominating in productivity. Researcher cooperation is high, although single-author papers dominate. The Journal of Adolescent & Adult Literacy is the most productive journal and institution, according to the report. The results emphasize digital literacy in the present day and suggest additional studies. The study's methodology and data analysis provide a solid foundation for evaluating digital literacy research trends.

Hamutoglu, Savasci, and Sezen-Gultekin (2019) studied the correlation between e-learning and digital literacy attitudes among Turkish prospective teachers. The study uses Edmodo to examine participants' digital literacy and attitudes after a five-week e-learning session. A quasi-experimental preposttest method is used. The findings show that the intervention improved participants' e-learning attitudes. It had little effect on their digital literacy. The study additionally evaluates gender and e-learning experience effects on these factors. It indicates that gender gaps in digital literacy are large, but previous experience does not affect either metric. Based on the Technology Adoption Model (TAM), the research emphasizes the importance of attitude in predicting technology adoption behaviour. Although the intervention was brief, the study shows that e-learning platforms may improve attitudes toward digital learning. To promote digital literacy, longer and more concentrated treatments may be required.

Leaning (2019) investigated the amalgamation of information literacy and media literacy to suggest a future course of action for digital literacy. The research examines the historical progression of information literacy, highlighting its transformation from bibliographic instruction to a critical practice in education. In contrast, the researcher examined the three historical strands of media literacy-protectionist, demystification, and creative participation models. Leaning contends that media literacy frequently fails to provide a thorough understanding of digital

affordances, even though it facilitates essential interaction with technological advances. In contrast, information literacy, despite its technological proficiency, occasionally overlooks the critical approach that is inherent in media literacy. The study concludes that the strategic incorporation of both literacies can foster a critically complex and digitally conscious populace.

Rahmi and Cerya (2019) assessed the digital literacy competencies of learners currently enrolled in an entrepreneurship program at Universitas Negeri Padang. The research emphasizes the significance of digital literacy in the current informational environment, specifically in the field of entrepreneurship education. The results of the research suggest that learners have sufficient digital literacy capabilities overall, but there is a noticeable lack in their ability to create digital material. This disparity indicates that pupils are more inclined toward consuming digital information than producing it. The research emphasizes the need for educators to prioritize the development of students' abilities to create content in order to effectively equip them for entrepreneurial endeavours. A cross-sectional survey of 421 students, adhering to the worldwide outline of implication on digital literacy competencies, was part of the study approach. The result highlights the need for colleges to proactively enhance the proficiency of learners as well as faculties in digital literacy to address global concerns. According to the survey, students need to have digital content production abilities to successfully market their entrepreneurial operations.

Rizal, Setiawan, and Rusdiana (2019) examined preservice science teachers' digital literacy, stressing the robust development of digital innovation and its influence on educational opportunities. The frameworks of teacher competence and academic qualification require professional instructors to have digital literacy skills, as shown by the study. The research assesses digital literacy in communication, information, content production, problem-solving, and safety using a Likert-scaled questionnaire and guided interviews. Preservice science teachers demonstrate modest digital literacy, with results varying across the five domains. The report highlights the need for digital literacy programs to help instructors create scientific learning activities using technology. The research found that preservice teachers are relatively proficient in knowledge, communication, content development, and safety but struggle with

problem-solving. This suggests focused training initiatives to strengthen these abilities to prepare future teachers to use digital technologies successfully.

Zahorec, Haskova, and Munk (2019) examined on the proficiency of professional digital literacy abilities amongst secondary school and primary educators in Slovakia, specifically focusing on their didactic technological capabilities. The study emphasizes the advantageous impacts of technological advances on several educational facets, including the improvement of learners' motivation, participation, and creativity. It emphasizes the requirement that instructors properly use electronic resources to enhance the learning environment and the significance of ongoing skilful improvement for educators to stay up-to-date with technological progress. The results indicate that instructors acknowledge the advantages of digital technologies, but their successful use depends on receiving sufficient training and support. The findings suggest a clear need for focused training programs to enhance teachers' digital skills, specifically in using interactive educational activities and digital tools to cultivate a positive classroom environment and promote disciplined conduct. The research asserts that enhancing teachers' digital literacy is crucial to fully leveraging the educational benefits of digital technology.

Kaeophanuek, Na-Songkhla, and Nilsook (2018) examined the digital literacy abilities of Thai university students and the educational environments that facilitate these abilities. In the age of the internet, pupils must proficiently access and use technology efficiently, according to the study. The survey finds three major areas of digital literacy: information skills, digital tool use, and digital transformation. It shows that students are good at using digital technologies for communication and everyday life but struggle with critical thinking and content production. The study also emphasizes teachers' participation in digital literacy via appropriate educational settings and instructional strategies. The results imply that adding digital literacy to the educational system and using student-centre learning may improve students' digital skills. This research sheds light on higher education's digital literacy concerns and solutions.

Adeoye and Adeoye (2017) conducted a study that emphasized the critical role of digital literacy in the academic success of undergraduate learners. The investigation emphasises the need to have digital literacy abilities, like media literacy, ICT literacy,

and information literacy, to properly use electronic assets. The research employed a descriptive study methodology, selecting a group of 595 learners from three prominent colleges in Southwest Nigeria. The results suggest that learners had a strong level of confidence in their digital literacy abilities, especially in the areas of plagiarism prevention and the use of media-capture equipment. Nevertheless, there is a necessity for improved Information and Communication Technology (ICT) abilities and the encouragement of scholarly investigation using digital resources. The research suggests that lecturers should use electronic media in their lectures to enhance students' confidence and proficiency in digital settings. This study highlights the consequence of digital literacy in academic institutions and proposes methods for enhancing these abilities among undergraduate students.

Komlayut and Srivatanakul (2017) conducted an evaluation of the digital literacy of professors and graduate students at Sukhothai Thammathirat Open University (STOU) in Thailand. The researchers created a self-administered questionnaire to reproduce, assess photo-visual, branching, socio-emotional, data, and real-world online abilities using Eshet-Alkalai's digital literacy paradigm. The researchers found that most participants could recognize browser symbols and copy material across applications, but they lacked copyright knowledge and critical thinking. Many participants had trouble navigating non-linear digital settings and identifying online risks. These findings emphasise the necessity for professional digital literacy instruction in reproductive, data, and socio-emotional skills. The research advises creating online, self-guided digital literacy assessment courses to fill these gaps and improve student and instructor digital skills.

Marsh (2016) examined pre-schoolers' tablet-based digital literacy. Through a survey of 2000 parents and case studies of six children, the study found that youngsters learn to swipe screens, trace shapes, and use applications. The data show that most talents include text reception, design, and production, with distribution being the least developed. The researchers use New Literacy Studies (NLS) to conceptualize literacy as a social activity shaped by cultural, economic, and political factors. The studies also emphasize operational, social-cultural, and critical digital literacy. Despite their operational and cultural abilities, youngsters struggle to critically connect with texts. The research finds that young children have well-developed digital literacy abilities in

various areas, but they need more chances to improve, notably in digital text distribution.

Phuapan, Pimdee, and Viriyavejakul (2016) investigated the digital literacy competencies of senior learners enrolled in Thai institutions of higher education. The study emphasizes the significance of digital literacy in the contemporary era, stressing its influence on improving students' academic achievements and job prospects. The authors used an extensive survey to evaluate many characteristics of digital literacy, including ICT literacy, media literacy, and information literacy. The results indicate that while students have fundamental digital skills, there are notable deficiencies in their more advanced abilities, namely in the areas of critical assessment and ethical utilization of electronic data. The research highlights the necessity for educational institutions to incorporate digital literacy training into their curricula to adequately prepare learners for the challenges of the digital era. The investigation contributes to the broader discussion on digital literacy by presenting empirical data from a developing country setting, providing valuable perceptions for teachers and representatives seeking to improve digital literacy instruction.

Ukwoma, Iwundu, and Iwundu (2016) examined the digital literacy abilities of students in Nsukka at the University of Nigeria and how these skills affect their educational performance. The research emphasizes that, although certain learners have fundamental digital literacy abilities, substantial obstacles such as power outages, limited internet capacity, and insufficient ICT resources impede the successful development and use of these skills. The research illustrates the consequence of digital literacy in improving learners' academic achievement and advocates for enhanced infrastructure and training initiatives. Furthermore, it highlights the significance of public-private partnerships, such as the MTN Foundation's effort, to deliver essential resources and training to narrow the gap in digital access. The results indicate that providing students with digital literacy skills is crucial for their educational achievement and potential job opportunities, in line with worldwide patterns in education and employment advancement.

Lankshear and Knobel (2015) examined the idea of digital literacy with a critical eye and made the case for a wider view of digital skills. The authors emphasize that conventional definitions sometimes oversimplify digital literacy as a collection of

technical abilities or competencies, which they contend is an incorrect approach. Instead, they propose interpreting digital literacy as a spectrum of actions influenced by social, cultural, and environmental factors. The analysis examines traditional definitions that emphasize the legitimacy and validity of information, referred to as the "truthcentric" perspective, and suggests that digital literacy should encompass a diverse array of activities, such as blogging and fan fiction writing. These actions demonstrate that digital literacy is not a single ability but rather a set of diverse social practices. The paper continues by examining the consequences of this wider viewpoint on educational policy, education, and research, promoting a more comprehensive and contextually aware approach to digital literacy instruction.

Phuapan, Viriyavejakul, and Pimdee (2015) conducted a research on the digital literacy of public higher education learners. The qualitative research uses focus group interviews with six digital learning, education science, and teaching technique experts. The study outlines six digital literacy skills: access, handle, incorporate, assess, develop, and communicate. These include the capacity to discover and access data, efficiently utilize resources, connect and analyze information, evaluate relevance and usefulness, produce content using appropriate mediums, and communicate efficiently in digital contexts. According to the research, learners must be competent at handling large volumes of data and leveraging technological advances to improve their knowledge, communication, and collaboration skills. The results support the Thai Qualifications Framework for Higher Education, which requires graduates to master ethics, knowledge, cognitive abilities, interpersonal skills, and ICT skills. This study presents a complete framework for recognizing and developing digital literacy abilities and emphasizing their importance in current schooling.

Rahmah (2015) emphasised the necessity for digital literacy education in Indonesia, particularly in light of the growing use of ICT and the 2020 Free Trade Area of the Asia-Pacific (FTAAP) economic concerns. The study shows that ICT developments enhance learning and economic progress but can cause information overload, harmful content, and device addiction. He suggested a digital literacy learning method to prepare Indonesians for the global workforce. The study recommends teaching digital literacy in schools to foster responsible and effective use of technology; it also emphasizes the importance of parent, educator, and community

support for digital literacy instruction. To provide complete digital literacy instruction, the approach contains a knowledge base, information transfer systems, and assessment procedures. This research provides to the ongoing discussion on digital literacy by providing a systematic approach to addressing the digital divide and promoting it in developing countries.

Meyers, Erickson, and Small (2013) examined the progressive notion of digital literacy in informal education settings. The authors contend that digital literacy encompasses a diverse range of abilities and behaviours that are essential for active engagement in modern digital society and go beyond conventional school-based competencies. The significance of informal settings such as libraries, museums, and online communities in promoting digital literacy is emphasized. The research categorizes digital literacy into three main discourses: learning abilities relevant to the information age, fostering cognitive behaviours, and engaging actively in digital traditions and procedures. Every discussion provides a distinct viewpoint on the methods and evaluation of digital literacy. They stressed the necessity to adopt an inclusive strategy that combines different viewpoints, acknowledging the interrelatedness of formal and informal learning settings. This comprehensive perspective on digital literacy highlights its importance in cultural, civic, and economic engagement; it argues for the continuous enhancement of digital literacy abilities in all educational environments.

Shopova (2014) investigated the digital literacy levels of university learners at South-West University, with a focus on the significance of digital skills in the contemporary educational system. The study emphasizes the necessity for students to efficiently use Information and Communication Technology (ICT) to enhance their academic results and adjust to the ever-changing job market. The findings indicate that, despite possessing basic computer skills, students significantly lack the ability to critically assess and efficiently leverage digital resources. The study highlights the significance of integrating digital literacy teaching into university courses to cultivate learners' skills, such as the capability to think critically, solve issues, and exercise information oversight. Moreover, the study is in line with the European Union's focus on digital competence as a crucial aspect of lifelong learning, urging educational institutions to promote the cultivation of these abilities. The results indicate that

colleges should implement comprehensive initiatives to assist students in developing advanced digital literacy proficiency, ensuring they are well-equipped for the demands of the digital age.

Arsad et al. (2012) examined the extent of digital age literacy skills in Malaysian middle school biology learners and its correlation with their perception of the process of learning and teaching. The investigation, involving 745 learners, reveals that while digital literacy is present, it remains at a moderate level, with significant differences observed between genders. Notably, female students exhibit higher digital literacy skills. The research identifies an important link between data and communication technology literacy and positive student perceptions of biology learning. The authors stressed the necessity for educators to integrate advanced tutoring methods and real-world tools to further cultivate digital-age literacy skills, ultimately enhancing students' learning experiences and preparing them for a technology-driven world.

Koltay (2011) investigated the intricate relationships among Information Architecture (IA), Information Overload (IO), and digital literacy. Koltay highlights that Information Overload (IO) is a notable societal phenomenon that has been intensified by the widespread usage of Web 2.0 technologies. These tools have transferred the task of managing material from conventional authorities to the users themselves. This transition requires users to possess a more advanced degree of digital literacy to efficiently sort and control information. The research emphasizes the two-fold function of DLi in IA: information architects need to possess digital literacy, and users must acquire knowledge about IA to navigate the digital information world proficiently. While folksonomies and user-generated material provide value, Koltay asserts that professional categorization systems must supplement them to guarantee the quality of information. The research asserts that to reduce IO, it is essential to have a thorough understanding of human information behaviour and to prioritize digital literacy (DLi). Additionally, information architecture (IA) plays an important role in organizing the information space and avoiding overwhelming amounts of information.

2.3 National journals

Ghare and Kastikar (2024) explored the importance of digital literacy and developing abilities in the contemporary, swiftly changing technology environment. They contended that digital literacy, which includes technological abilities, critical thinking, and ethical online conduct, is essential for people to succeed in personal as well as professional domains. The authors emphasize that skill development in the digital realm requires continuous learning and adaptation to remain aligned with technology's progress. They emphasise the significance of bridging the digital divide and enhancing digital competence across different groups to cultivate an inclusive and resilient society in the digital era.

Varghese (2024) explored the digital literacy skills of prospective teachers, emphasizing the significance of these abilities for holistic learning in the present day. The study highlights the need for educators to move beyond basic technological proficiency and enhance their ability to think critically, collaborate, and solve problems in digital contexts. The researcher argues that by fostering these competencies, educators may proficiently incorporate technology into their pedagogical methods and equip students for the difficulties and possibilities presented by the digital era.

Kulkarni and Ramesha (2021) evaluated the proportion of digital literacy abilities of secondary school learners in the Belgaum area of Karnataka. The main goal of their research was to assess the digital literacy abilities of secondary school children. The researchers used a survey approach and a questionnaire instrument for gathering data. They casually distributed the questionnaires to a group of 160 children. The students from the two designated schools in Belgaum District returned 145 survey responses. The researchers investigated to gather data from children about their competence and awareness of digital literacy abilities, the challenges they encounter in acquiring these skills, and their desire for training to enhance their proficiency and skills. The suggestions highlighted the need to motivate and encourage children to participate in additional training, online tutorials, and other activities to enhance their digital abilities and keep up with the demands of the current era.

Panchamia (2019) highlighted that digital literacy goes beyond the basic operation of digital devices. It entails the capability to assess and make data across different online mediums. The research emphasizes the significance of digital literacy for enhancing media, communication, cooperation, and information literacy. Young people often use digital gadgets, yet they still lack substantial knowledge about their efficient and responsible usage. The research underscores the necessity for targeted educational initiatives to improve digital literacy by enabling young individuals to utilize digital technology for learning and personal development without succumbing to distractions or potential risks. The research also highlights the need for parental and educational guidance in directing young people towards the advantageous use of digital gadgets, therefore averting misuse and fostering a generation that is well-informed and empowered.

Sarman, Bansal, and Singh (2018) conducted an examination of the digital literacy abilities of researchers at Punjab Agricultural University (PAU), which is situated in Ludhiana. The authors underscore the significance of digital literacy in the age of information, stressing the need for researchers to possess proficiency in by means of digital tools and resources. The survey reveals that the majority of research researchers at PAU have a high level of proficiency in using laptops, desktop PCs, mobile phones, and USB drives. Most scholars find online databases and e-thesis and dissertations quite valuable. The survey furthermore reveals that academics mostly use ICT tools to enhance their knowledge and engage in the composition of research papers. The research highlights other obstacles, such as concerns around plagiarism, the veracity of online content, and the arduousness of prolonged studying on digital devices. The authors suggest implementing frequent training sessions and seminars to enhance the digital literacy abilities of research scholars.

Singh (2018) highlighted the essential role of digital literacy in empowering people to properly explore the digital world. Integrating digital technologies in education improves teaching and learning by allowing instructors to transmit information more efficiently and enabling students to engage with the curriculum interactively. The research emphasizes the necessity of instructors having digital literacy to fulfil the requirements of contemporary educational settings. Moreover, digital literacy promotes the growth of essential abilities such as conceptualization,

innovation, and the capacity to critically assess information-all of which are crucial in the current era of information. The research also recognizes the possible adverse effects of digital learning, including diversion and susceptibility to physical and psychological health problems. Notwithstanding these difficulties, the general agreement is that digital literacy is essential for both professional and personal advancement in the modern world. The research emphasises the significance of ongoing learning and adjustment to emerging technologies to stay significant and competitive in a swiftly changing digital environment.

Sumi (2018) examined the perception of digital literacy and its importance for scholars intricate in investigation. In the current landscape shaped by technology, digital literacy is essential. Digital literacy refers to the proficiency in using technology for communication and information to convey information, search, generate, and assess. The investigation underscores the need for researchers to have digital literacy competencies in order to effectively utilize technology in their research. The research used a descriptive survey approach to research the awareness and utilisation of digital literacy abilities among 50 research academics from various departments at universities located in Hyderabad. The results suggest that researchers have an average level of awareness regarding digital literacy, with significant variations between male and female academics. The study indicates that more exposure to digital technology and specialised training may strengthen research scholars' digital literacy skills, enhancing their research skills and results. The investigation highlights the importance of incorporating digital literacy in the educational curriculum to prepare pupils for the obstacles that arise in the digital age.

Anjaiah (2016) investigated the state of digital literacy in Dravidian University teaching staff. The research highlights the significance of digital literacy in contemporary learning and the necessity for students and researchers to use digital tools and resources effectively. The survey found that 81.60% of the respondents were aware of digital information. It also notes that respondents use cell phones, tablets, and computers to access online resources. According to the study, the respondents experienced frequent power outages, limited computer terminals, and problems with hostel Wi-Fi. The results highlight the need for internet infrastructure improvements

and digital literacy training. The report recommends that university administrators address these issues and improve academic use of digital resources.

Emiri (2015) observed the changing importance of digital literacy in university libraries. The research underscores the influence of technological progress, globalization, and digitization on library services, highlighting the necessity for librarians to obtain and use Digital Literacy Skills (DLS). The research outlines crucial digital literacy skills, such as electronic mailing, social networking, and internet browsing, that are necessary for contemporary librarianship. Additionally, it investigates the many approaches by which librarians get these abilities, including formal schooling, IT programs, and help from colleagues. Despite acknowledging the significance of DLS, the research reveals a limited level of skill and application among librarians in this area. The results emphasize the need for continuous professional growth and institutional assistance to improve the digital competence of librarians. The research contributes to the wider conversation on digital literacy in poor nations, emphasising the difficulties and possibilities of incorporating digital competencies into library services.

2.4 Books

Sharma and Singh (2024) highlighted the crucial significance of technological proficiency in contemporary education. According to the authors, digital competence is crucial for learners since it allows them to proficiently communicate, do research, and interact with digital media. They emphasize that digital literacy includes a spectrum of competencies, such as the ability to seek, assess, and communicate information across various digital platforms. To prosper in the contemporary educational environment, the chapter emphasizes the significance of technology knowledge for both learners and instructors. Additionally, it explores the wider consequences of digital literacy, including its contribution to the development of innovative thinking, critical thinking, and well-informed decision-making. In addition, they acknowledge the difficulties associated with digital literacy in India, specifically highlighting the digital gap and the need for enhanced infrastructure and training. In summary, the chapter offers a thorough examination of the importance of digital literacy as a vital ability in present educational circumstances.

Spires, Paul, and Kerkhoff (2017) investigated the developing notion of digital literacy and its consequences for modern educational institutions. Their findings emphasize the significance of critical assessment abilities when navigating digital settings. They stress that successful digital literacy encompasses not just technical competency but also the ability to evaluate the legitimacy and authenticity of data. The chapter also explores the significance of digital literacy in encouraging digital citizenship, including conscientious and principled use of technology. In addition, the authors discuss the digital divide, highlighting that socioeconomic issues often impact individuals' access to and proficiency with ICTs. They contend that closing this gap is essential for attaining educational fairness. The chapter finishes by proposing ideas for integrating digital literacy into educational courses, emphasising the necessity for instructors to have the necessary abilities to assist students in successfully and ethically engaging with digital information.

2.5 Conference proceeding

Techataweewan and Prasertsin (2016) examined the digital literacy abilities of Thai students in college, highlighting the importance of these skills for achieving success in academics and careers. The study categorizes 12 digital literacy markers into four primary factors: operational skills, cognitive skills, collaborative skills, and comprehension skills. The study conducted informal discussions with 42 students from both public and private universities. It found that, although students excel in certain areas like presentation and teamwork, they lack proficiency in skills such as creation, innovation, evaluation, legal literacy, and self-protection. The results emphasize the significance of a holistic strategy toward digital literacy instruction, which includes assistance from peers, instructors, IT personnel, and librarians. The results indicate that enhancing digital literacy necessitates targeted interventions and continuous adaptation to emerging technologies, thereby reinforcing the role of educational institutions in equipping learners for the demands of the internet-based economy.

2.6 Research gap

Although numerous studies have investigated digital literacy at various educational levels, including secondary, college, and university settings, there is a major gap in research focusing on digital literacy among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU). This research seeks to fill this gap by analyzing current literature and undertaking a specific examination of digital literacy abilities within this distinct academic cohort; therefore, it adds new insights to the field and enables more comprehensive instructional initiatives in these institutions.

2.7 Conclusion

This chapter gives a thorough discussion of the idea of digital literacy while contextualizing literature on the issue. The study scrutinizes a wide spectrum of research across national and international journals, conference proceedings, and books emphasizing its definition, creation, and application in these settings. The review aims to address the current gap in the area of digital literacy among research scholars at MZU and NEHU from this perspective. We evaluate many studies to offer a fair perspective on the current state of digital literacy, providing sufficient context for the study's focus on specific aspects and aims.

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CHAPTER-3
DIGITAL LITERACY: CONCEPTS AND MODELS

3.1 Introduction

In contemporary society, digital literacy is essential in several fields. In education, digital literacy cultivates interactive and accessible learning environments, promoting students to be discerning consumers and creators of digital material. According to Buckingham (2007), students with digital literacy abilities are more adept at critically and ethically navigating information, which facilitates their full participation in digital learning settings. Moreover, digital literacy enables educators to adopt digital pedagogies, which are becoming increasingly integral to contemporary educational frameworks (Selwyn, 2012). Digital literacy in education enhances classroom innovation and student engagement, harmonising with the demands of a swiftly digitizing environment.

Digital literacy, as articulated by Ng (2012), is the capacity to proficiently seek, comprehend, assess, generate, and convey information using digital platforms and technologies. It includes a variety of talents beyond fundamental technological skills, such as critical thinking, ethical comprehension, and the capacity for meaningful engagement in digital contexts. The 21st century universally acknowledges digital literacy as a crucial competency, given the pervasive influence of technology on learning, employment, and interpersonal interactions (Eshet-Alkalai, 2004). The rapid progression of digital technology has rendered digital literacy essential for both personal empowerment and social and economic participation.

Digital literacy is crucial in the professional domain, facilitating better communication, cooperation, and creativity. In sectors including healthcare, business, and media, experts use digital technologies to analyze data, disseminate insights, and make informed choices instantaneously (Jenkins et al., 2006). Digital literacy in healthcare allows practitioners to easily handle patient information, use telemedicine services, and remain updated on the most recent medical research. Digital literacy in business enhances digital marketing, e-commerce, and data-driven decision-making, all of which are essential for maintaining competitiveness in a globalized market

(Schwab, 2016). Digital literacy is an essential competency required for active engagement in modern society, education, and many occupational domains. With ongoing technology improvements, the need for digital literacy will increase, establishing it as a crucial competency for both people and organizations.

3.2 Historical context and evolution

The term of digital literacy has undergone substantial evolution in recent decades, influenced by technical progress and cultural transformations. In the beginning, digital literacy was defined in a limited manner, concentrating mostly on fundamental computer skills and practical understanding of hardware and software. As digital technologies increasingly permeated daily life, education, and employment, the description of digital literacy expanded to encompass a broader variety of competencies, including media literacy, information literacy, and technology literacy (Bawden, 2001). Currently, digital literacy encompasses a diverse array of competencies vital for proficient communication, analytical reasoning, and ethical participation in the digital realm.

The late 20th century saw the development of digital literacy, coinciding with the growing significance of computers in both private and professional domains. The phrase “computer literacy” originated in the 1980s, when computers were broadly available to the general populace. At this juncture, computer literacy mostly denotes fundamental operational competencies, including typing, file management, and the use of basic programs (Gilster, 1997). The appearance of the internet in the 1990s revealed the inadequacies of a restricted definition of digital literacy. The internet has facilitated novel methods for obtaining and disseminating information, necessitating enhanced abilities for navigating and assessing digital material. In his influential work Digital Literacy (1997), Paul Gilster was one of the pioneers to expand the term, highlighting the significance of both technical proficiency and critical thinking in digital environments. Gilster contended that digital literacy extends beyond mere computer use and requires comprehension of the complex information environment enabled by digital technology (Gilster, 1997). This initial groundwork enabled a more sophisticated comprehension of digital literacy, including not just technical capabilities but also cognitive and evaluative abilities.

In the past few years, there has been an enormous evolution in digital literacy, which reflects the robust breakthroughs in innovative and the growing integration of digital tools into everyday life. A series of phases characterize this progression, beginning with fundamental computer skills and progressing towards more complex competencies such as critical thinking, digital ethics, and adaptability in an information-rich world. According to Eshet-Alkalai (2004), the narrative associated with the development of digital literacy places an emphasis on the role that it plays in moulding persons' capabilities to engage meaningfully with technology in the context of education, work, and personal life.

3.2.1 Early beginnings: Computer literacy and operational skills

The first indications of digital literacy, often termed "computer literacy," surfaced in the 1980s with the introduction of personal computers. During this age, computer literacy generally included comprehension of fundamental computer operations, including powering the device on and off, navigating operating systems, using word processors, and managing files. This first framework was mostly technical, aimed at equipping users to manage the operational facets of computers during a period when access to these devices was generally restricted to enterprises and educational institutions (Bawden, 2001). The emphasis on operational abilities indicated the restricted use of computers in everyday life at that period; digital literacy was seen as a pragmatic skill set, essential primarily for certain job functions.

Computer literacy programs emerged due to the increasing significance of technology in professional environments. The introduction of computers into workplaces required a workforce that was proficient in basic computer operations. Educators and officials began advocating computer instruction in schools, recognizing that these abilities were increasingly crucial for economic production (Gilster, 1997). Consequently, the first definitions of computer literacy emphasized certain technical abilities associated with computer operation rather than including wider digital or critical competencies.

3.2.2 The rise of the Internet: Expanding the scope of Digital Literacy

The rapid proliferation of the internet in the 1990s dramatically transformed the notion of digital literacy. The extensive accessibility of internet resources exposed the limitations of a narrow focus on technology. The internet has provided an abundance of information while also presenting users with problems, including the need to explore extensive digital material, evaluate the authenticity of information, and manage online relationships. Paul Gilster's book, Digital Literacy (1997), significantly expanded the notion by defining digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (Gilster, 1997, p.1). Gilster's concept emphasizes the significance of critical thinking and information assessment, elevating digital literacy above mere technical competence.

Gilster's work initiated a transition from "computer literacy" to "digital literacy," including abilities essential for users to navigate online environments efficiently. This development included the capacity to seek information online, assess the quality of sources, and comprehend the novel modes of communication and engagement arising via digital platforms (Bawden, 2008). With the internet emerging as a primary information source, digital literacy began to prioritize cognitive abilities, critical analysis, and evaluative skills, mirroring the increasing complexity of digital landscapes.

3.2.3 Early 2000s: Integration of Information Literacy

By the early 2000s, information literacy had emerged as a fundamental element of digital literacy, particularly within educational systems. Eshet-Alkalai (2004) describes information literacy as the capacity to discover, assess, and use information effectively - a skill set that has become increasingly vital with the expansion of digital platforms containing extensive and varied material. The notion of information literacy emphasizes the need for critical assessment, enabling users to differentiate between legitimate sources and disinformation or biased material - a competency particularly pertinent in the era of digital misinformation (Bawden & Robinson, 2002).

The American Library Association (ALA) was instrumental in defining information literacy as an educational norm, characterising it as "the set of abilities

required to recognise when information is needed and to locate, evaluate, and use effectively the needed information" (ALA, 2000). Incorporating information literacy into digital literacy frameworks acknowledges that it necessitates not just technical skills but also cognitive capabilities to effectively manage and critically analyze information. This integration was especially pertinent in academia, where students were required to traverse digital libraries, research databases, and online resources.

3.2.4 The addition of Media Literacy and ethical awareness

The rapid expansion of digital media, including social media, online news, and multimedia material, has made media literacy an essential aspect of it. Media literacy, defined as the capacity to evaluate, analyze, assess, and produce media, became crucial as digital media started to influence public opinion, cultural norms, and personal identities (Potter, 2010). By the mid-2000s, academics and educators had acknowledged the need to incorporate media literacy within digital literacy frameworks to address the social and cultural dimensions of digital participation (Livingstone, 2004).

Media literacy highlights the need for critically engaging with media messages, instructing consumers to interrogate the intentions behind information, identify possible biases, and comprehend the ways in which media may shape perception. The Center for Media Literacy characterizes media literacy as an essential skill that empowers people to analyze and comprehend media information, especially in an environment saturated with media messages (Thoman & Jolls, 2005). In digital literacy frameworks, media literacy enhances information literacy, enabling users to critically analyze both factual and persuasive materials.

With the proliferation of digital involvement, the notion of digital literacy has changed to include ethical awareness. Ethical literacy emphasizes the comprehension of the social and moral ramifications of digital conduct, including the respect for privacy, the engagement in responsible online relationships, and the awareness of copyright laws (Ribble, 2015). This component highlights the need for digital citizens to traverse the internet with social responsibility and ethical accountability, which is crucial for mitigating detrimental behaviours such as cyberbullying, plagiarism, and privacy infringements.

3.2.5 Technological Literacy and the rise of advanced Digital Skills

The advent of new digital technologies, including cloud computing, mobile devices, and artificial intelligence, has added a new dimension to digital literacy: technical literacy. Technological literacy encompasses the comprehension, utilization, and evaluation of the ramifications of diverse digital instruments, extending beyond fundamental operational proficiency to include adaptability, problem solving, and the capacity to acquire new technologies (Ritzhaupt et al., 2013). In a time of swift technological advancement, professionals proficient in technology are anticipated to possess fundamental understanding of emerging tools and platforms, along with the flexibility to acquire and implement new digital talents as required.

Technological literacy enhances information and media literacy by equipping people to interact effectively with sophisticated digital technologies that are becoming more common in professional environments. The healthcare, engineering, and education industries today need workers proficient in specialized technologies for data analysis, communication, and resource management. Technological literacy highlights the need for a lifelong learning and adaptability mentality, equipping people to traverse an evolving digital environment (Ng, 2012).

3.3 Theoretical frameworks and models on Digital Literacy

Digital literacy is an essential element of contemporary culture, including the skills, knowledge, and skills need for people to proficiently explore, comprehend, and use digital technology. The rapid incorporation of digital media and technology in many fields, such as education, business, and social interactions, has required a more profound comprehension of digital literacy. This theoretical framework will analyze significant ideas and models that enhance digital literacy, including the Digital Competence Framework and the New Literacies Theory. The present study is an examination to illustrate how these ideas have shaped our understanding of digital literacy, along with pertinent frameworks directly associated with the discipline.

3.3.1 Digital Competence Framework (DIGCOMP)

The European Commission's Joint Research Centre created the Digital Competence Framework for Citizens (DigComp) to provide a thorough methodology for digital literacy (Ferrari, 2013). DigComp delineates five area of skill: digital content safety, production, problem-solving, communication and cooperation, information and data literacy. Each domain contains certain abilities that enhance an individual's total digital proficiency, including online information navigation, efficient communication in digital environments, and cybersecurity awareness maintenance.

The DigComp framework has profoundly impacted educational institutions and organizations by offering a systematic method to evaluate and improve digital competencies. It transcends a basic comprehension of technology to include critical thinking, safety, and ethical issues (Vuorikari et al., 2016). Material and data literacy highlight the competencies required for discovering, assessing, and managing online material, which is an essential aspect of digital literacy in research settings. This methodology is advantageous in research and academic settings where the assessment of sources is essential for genuine scholarly work (Ilomaki et al., 2016). The image below depicts the Digital Competence Framework, highlighting the five principal domains and their interrelations within digital literacy.

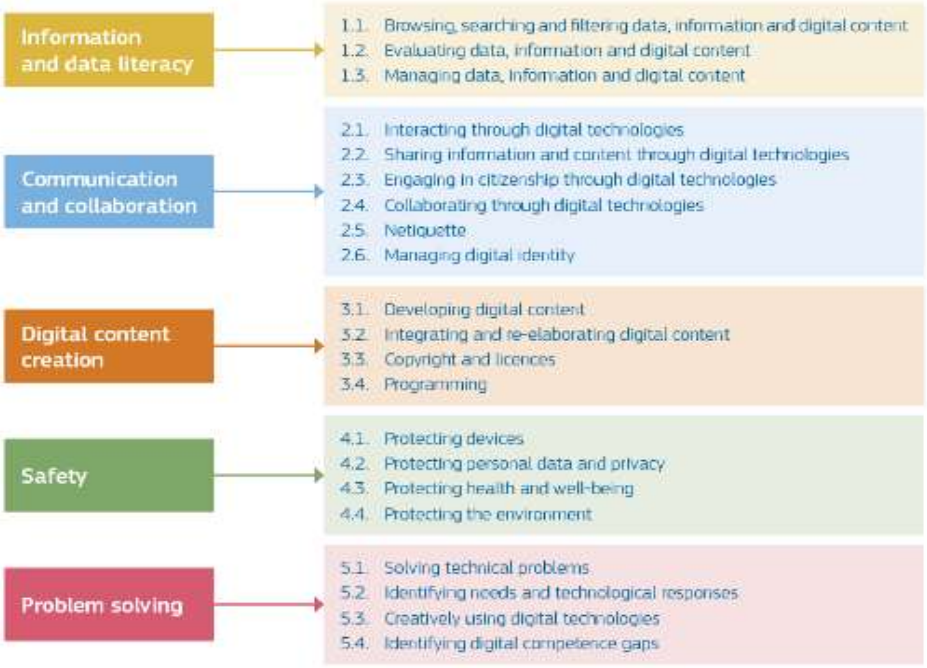

Figure 3.1: DigComp Diagram
Source: *https://joint-research-centre.ec.europa.eu/scientific-activities-z/education-and-training/digital-transformation-education/digital-competence-framework-citizens-digcomp/digcomp-framework_en*

3.3.2 New Literacies Theory (NLT)

The New Literacies Theory (NLT) emphasizes the complex dimensions of digital literacy, asserting that literacy encompasses not just traditional writing and reading but also digital, media, and informational literacies (Coiro, Knobel, Lankshear, & Leu, 2008). NLT posits that literacy is no longer limited to a certain form but is dynamic, ever developing with new technology. The idea highlights the participatory and collaborative aspects of digital literacy, whereby users actively generate and disseminate material within a networked context (Leu et al., 2013).

NLT redefines digital literacy as socially relevant actions rather than only individual abilities. Leu et al. (2013) assert that digital literacy is cultivated via engagement and cooperation in online environments, which is crucial in a networked world. This viewpoint has influenced educational methodologies, promoting collaborative learning settings and critical analysis of media material (Rowsell, 2017).

This approach enables researchers to analyse the significance of digital literacy in constructing knowledge networks and promoting global cooperation.

The image below illustrates the New Literacies Theory, highlighting the interaction of digital, media, and information literacies within a collaborative and interactive digital context.

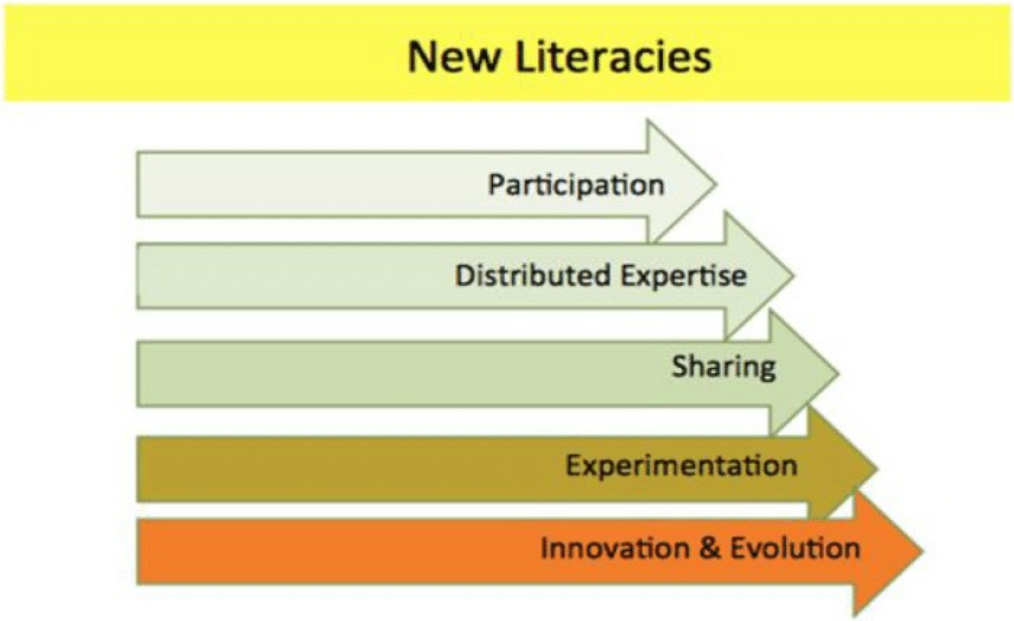

Figure 3.2: *New literacies theory emphasizes the participatory culture that digital technology affords (image by Dredger, 2011)*

3.3.3 Association of College and Research Libraries (ACRL) Framework for Information Literacy

There are six main ideas in the Association of College and Research Libraries (ACRL) Framework for Information Literacy that show important parts of information literacy. These frameworks are essential for comprehending the generation, valuation, and use of information in digital contexts.

The ACRL framework offers a vital viewpoint on information literacy, correlating it with digital literacy by highlighting the significance of contextual comprehension and ethical information use. It has impacted digital literacy by promoting critical assessment of sources, understanding of intellectual property, and the formulation of information-seeking methods (Julien et al., 2020). This

methodology is especially beneficial for researchers in fostering meticulous information assessment and ethical concerns in scholarly writing.

The image below illustrates the six frames of the ACRL model, highlighting their interrelated functions in fostering complete information literacy.

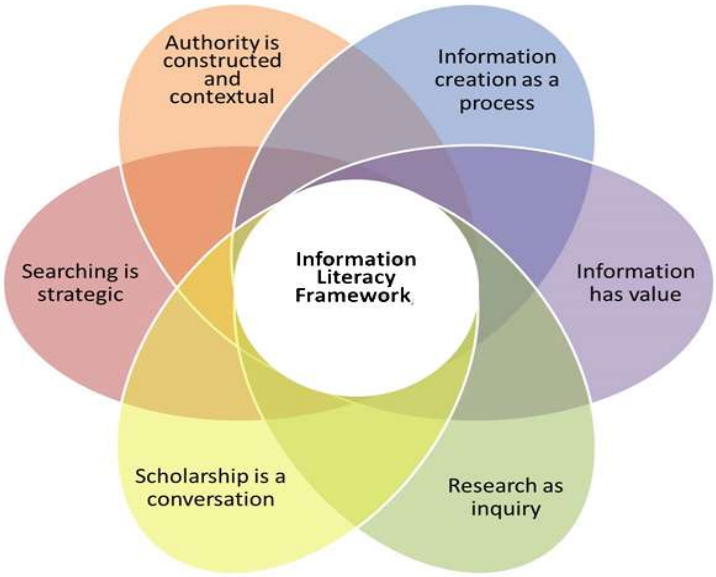

Figure 3.3: *ACRL Framework for Information Literacy and the Six Major Frames (image by Raymond John Uzwyshyn, 2018)*

3.3.4 Critical Digital Literacy

Critical Digital Literacy enhances conventional digital literacy by integrating critical theory into the examination of digital technologies, information, and media (Kellner & Share, 2007). It challenges users to interrogate the power dynamics and ideologies inherent in digital media, cultivating a more profound comprehension of how digital platforms shape social and cultural narratives.

This concept has impacted the methodology for digital literacy by promoting a critical analysis of digital technology. It posits that people need not just technical abilities but also a critical comprehension of how digital media influences perceptions, identities, and relationships (Martin, 2008). In academic contexts can utilize critical digital literacy to assess research methodologies and identify inherent biases in digital resources.

The image below represents the Critical Digital Literacy framework, highlighting the focus on technological competencies and critical evaluation of media material.

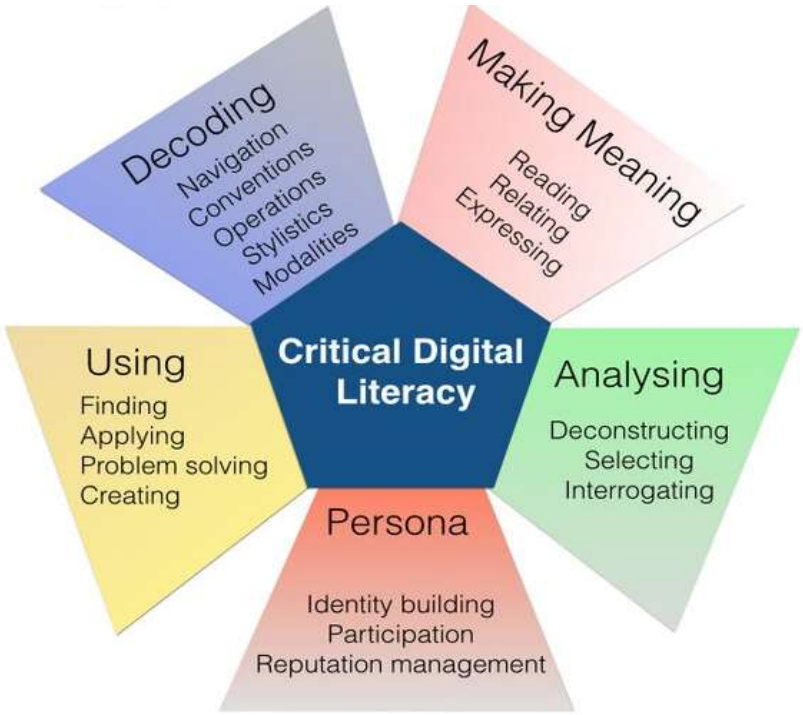

Figure 3.4: *Critical Digital Literacy framework (image by Walker & Kerrigan, 2014)*

The theories and concepts presented provide a comprehensive perspective on digital literacy. The Digital Competence Framework and New Literacies Theory underscore vital competences and collaborative practices, whereas the ACRL Framework focuses on information literacy within educational settings. Critical Digital Literacy provides a comprehensive analysis of the social impact of digital media. These approaches emphasize the need for a comprehensive grasp of digital literacy, which provides people with essential skills, critical awareness, and flexibility to successfully navigate digital settings.

3.4 Importance of Digital Literacy

People widely view digital literacy as a crucial competency in the 21st century, as it directly influences their engagement, knowledge acquisition, and performance in a digital society. Digital literacy, in a wide sense, includes the skills, knowledge, and competences required to proficiently use digital devices, networks for accessing, and communication apps, evaluating, and generating data (Ferrari, 2013). Digital literacy is significant not just for technical abilities but also for the capacity to critically assess digital material and comprehend the wider ethical, social, and cultural ramifications of digital interactions (Ilomaki et al., 2016).

A principal reason digital literacy is essential in the contemporary digital era is the rapid expansion of digital technology in all facets of life, including education, employment, and social interaction. The emergence of online learning platforms and digital classrooms has made digital literacy a crucial element of contemporary education. Digitally literate students can navigate, critically evaluate, and synthesise digital material, resulting in enhanced academic performance and increased access to global knowledge networks (Ng, 2012). Furthermore, in a time characterized by the spread of misinformation, digital literacy enables consumers to distinguish between reliable and dubious sources, a crucial skill for making informed decisions (Pangrazio, 2016).

Digital literacy is essential for employment and career progression in the professional sphere. Numerous contemporary occupations need proficiency in digital technologies and platforms for purposes such as data analysis, virtual collaboration, or digital content production (Van Laar et al., 2020). Employers like individuals with digital literacy, since they tend to be more adaptive and proficient in using new technology to enhance creativity and production. In fields including healthcare, finance, and education, digital literacy skills are essential for optimal work performance (Vuorikari et al., 2016).

In addition to education and employment, digital literacy is crucial for engaged citizenship in a digital democracy. Digitally literate individuals may actively participate in civic activities, including engaging in online debates, accessing governmental resources, and campaigning for social concerns on digital platforms (Mihailidis & Thevenin, 2013). Moreover, digital literacy includes comprehension of

digital rights and obligations, including privacy, security, and ethical conduct, which are essential for responsible digital participation. As digital monitoring and data gathering increase, individuals must recognize their digital footprints and data privacy rights to protect themselves online (Livingstone, 2014).

Digital literacy significantly contributes to fostering social inclusion. For marginalized populations, including low-income communities and the elderly, cultivating digital literacy skills helps mitigate digital inequalities by enhancing access to information, education, and economic opportunities (Park & Burford, 2013). Addressing this disparity is essential, as those without digital literacy skills face heightened risks of social and economic marginalization in an increasingly technology-dependent society.

In summary, digital literacy is an essential competency that fosters personal development, career advancement, and informed participation in the digital world. As digital technologies advance, the capacity to critically and adeptly traverse digital settings will become more vital, emphasizing the need for continuous education and awareness of digital literacy (Ferrari, 2013).

3.5 Contemporary trends and future directions

Digital literacy is swiftly advancing due to high-tech innovations such as Virtual Reality (VR), Artificial Intelligence (AI), and Advanced Data Literacy. These changes are transforming the abilities necessary for navigating digital settings and broadening the definition of digital literacy. Emerging technologies need advanced digital skills, prompting educators, politicians, and professionals to reassess conventional literacy frameworks and prepare for the future requirements of a digital society.

A major trend influencing digital literacy is the use of artificial intelligence across several industries. Artificial intelligence technologies, including machine learning algorithms, chatbots, and natural language processing, are becoming more prominent in education, healthcare, business, and everyday digital interactions (Luckin et al., 2016). Digital literacy now necessitates humans comprehending the principles of AI, including the decision-making processes of algorithms and successful interaction with AI-powered products (Nguyen et al., 2019). This AI literacy

empowers users to critically evaluate AI-generated material, comprehend algorithmic bias, and make educated choices in an AI-enhanced environment.

A major trend shaping digital literacy is the increasing adoption of Virtual Reality (VR) and Augmented Reality (AR). These has substantial educational and professional applications, ranging from immersive learning experiences to virtual simulations in area particularly medicine and engineering (Merchant et al., 2014). Users must acquire a new skill set to interact successfully with these technologies, including spatial awareness in virtual settings, ethical solicitude around information and confidentiality, and the capacity to differentiate between actual and virtual information. Augmented Reality (AR) and Virtual Reality (VR) broaden the definition of digital literacy, highlighting immersive and experiential learning that transcends conventional screen-based interactions (Makransky & Lilleholt, 2018).

Advanced data literacy is an essential element of current digital literacy developments. With the integration of big data and data-driven decision-making across several sectors, the ability to read, analyze, and use data efficiently is becoming more essential (Shah, 2020). Data literacy includes comprehension of fundamental statistical principles; assessment of data sources; and identification of trends in data visualization. Data literacy enables people to critically evaluate information, make educated choices based on data, and engage substantively in data-orientated debates. Data literacy is vital in countering disinformation, since it empowers individuals to critically assess data sources and identify biases in digital content (Prado & Marzal, 2013).

The future of digital literacy will be influenced by developing trends and the growing confluence of digital, media, and information literacy. As artificial intelligence, virtual reality, and big data advance, digital literacy will probably include a wider array of competencies, integrating technical, cognitive, and critical-thinking abilities (Martin, 2018). People are increasingly recognising the notion of multiliteracies, which promotes a comprehensive understanding of various types of literacy within digital, media, and cultural frameworks (Rowsell & Walsh, 2011). With ongoing technology breakthroughs, the future of digital literacy will need adaptation, ethical consciousness, and comprehension of intricate digital ecosystems.

In conclusion, the domain of digital literacy is broadening to include skills in artificial intelligence, virtual reality, and data literacy. This evolution signifies the need for people to possess not just digital proficiency but also critical and ethical awareness about the societal implications of digital technology. Preparing for future paths requires ongoing learning and flexibility in a constantly changing digital landscape.

3.6 Conclusion

In conclusion, digital literacy has become an essential skill in contemporary society, intricately woven into educational, professional, and social frameworks. In education, digital literacy enables students to engage actively and critically with digital content, creating an environment where learners are not merely consumers of information but active participants in digital realms. Educators also gain advantages by incorporating digital tools, which enhance education and pupil participation through unique teaching methods that align with modern standards.

In professional environments, digital literacy is crucial for efficient communication, collaboration, and adaptation to swift technological advancements. Industries such as healthcare, business, and media increasingly depend on digital skills to handle information, make informed decisions, and maintain competitiveness. Healthcare professionals employ digital tools to optimize patient care and stay abreast of advancements, whereas businesses harness digital literacy to improve e-commerce, marketing, and data-driven strategies essential for global success.

The progression of digital literacy evolves with technological advancements, encompassing not only foundational skills but also media literacy, ethical considerations, and intricate technological understanding. This continuous advancement highlights the significance of digital literacy as an essential skill, enabling individuals to engage effectively in a technology-reliant society and to address the challenges of a tech-driven environment.

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CHAPTER 4
ANALYSIS AND INTERPRETATION OF DATA

4.1 Overview of the chapter

This chapter organizes its primary discussion into seven divisions. The first component includes demographic data, with two questions about respondents' personal information. The second component deals with respondents' use of the library and its services, consisting of seven questions. The third part, which consists of five questions, assesses the respondents' proficiency in digital literacy. The fourth part evaluates familiarity with digital tools and techniques and includes five questions. The fifth part investigates respondents' capacity to obtain, analyze, assess, and use authentic digital information for academic objectives, with five questions focused on this dimension. The sixth part evaluates satisfaction with the digital literacy program and its impact on respondents' digital literacy abilities, including four questions. The seventh part assesses the strengths and weaknesses of respondents' digital literacy ability and includes five questions.

These are the abbreviations used to identify the departments and - Physics ***(Phys)***, Chemistry ***(Chem)***, Mathematics ***(Math)***, Computer Science ***(CS)***, Industrial Chemistry ***(Ind. Chem),*** and Statistics ***(Stats).*** The Likert scale used comprises the terms - Strongly Agree ***(SA),*** Agree ***(A),*** Undecided ***(UD),*** Disagree ***(DA),*** Very Familiar ***(VF),*** Familiar ***(F),*** Somewhat Familiar ***(SF),*** Unfamiliar ***(UF).***

4.2 Data analysis and interpretation

4.2.1 Questionnaire distributed and received from the respondents

Table 4.1 displays the distribution and received questionnaires from research scholars in the Physical Sciences departments of the two Universities i.e., Mizoram University (MZU) and North Eastern Hill University (NEHU). The table presents a comprehensive analysis of responds categorized by department. A total of 182 questionnaires were distributed throughout both campuses and received 151 completed responses. A total of 109 questionnaires were distributed at MZU,

received 93 responses. At NEHU, 73 questionnaires were distributed and 58 completed questionnaires were received.

Table 4.1: Questionnaire distributed and received from the respondents

Dept.	MZU		NEHU		Total Questionnaire	
	Questionnaire				Distributed	Received
	Distributed (%)	Received (%)	Distributed (%)	Received (%)		
Phys	42	39 (38.53)	6	1 (8.21)	48	40
Chem	31	25 (28.44)	45	40 (61.65)	76	65
Math & CS	26	22 (23.85)	12	9 (16.44)	38	31
Ind. Chem	10	7 (9.18)	-	-	10	7
Stats	-	-	10	8 (13.70)	10	8
Total	**109**	**93**	**73**	**58**	**182**	**151**

Abbreviation of departments: Physics ***(Phys)***, Chemistry ***(Chem)***, Mathematics ***(Math)***, Computer Science ***(CS)***, Industrial Chemistry ***(Ind. Chem)*** and Statistics ***(Stats)***

4.3 Demographic information

4.3.1 Gender-wise respondence

Table 4.2 and figure 4.1 presents the gender-wise classification of responses from research scholars in the Physical Sciences departments across both universities, along with department-specific data. Upon reviewing the table, it is evident that in the Physics department at MZU, out of 39 total respondents, 26 (66.67%) were "female", while the remaining 13 (33.33%) were male. In contrast, in the Physics department at NEHU, only one female respondent participated in the survey. In the Chemistry department at MZU, 25 responses were collected, with 13 (52%) male and 12 (48%) female respondents. At NEHU, the Chemistry department received 40 responses, with 21 (52.5%) from males and 19 (47.5%) from females. For the Mathematics and Computer Science department at MZU, out of 22 respondents, 14 (63.64%) were male, and 8 (36.36%) were female. At NEHU, the same department had 9 respondents, with 7 (77.8%) male and 2 (22.2%) female. In MZU, Industrial Chemistry department, 7 responses were received, with 4 (57.14%) male and 3 (42.86%) female respondents. However, the Industrial Chemistry subject is not included in the School of Physical Sciences at NEHU. In the Statistics department at NEHU, there were 8 respondents,

equally divided between males and females, with 4 (50%) each. At MZU, the School of Physical Sciences does not offer a Statistics department.

Overall, the data shows that male respondents outnumbered females in the departments of Physics, Chemistry, Mathematics and Computer Science, and Industrial Chemistry at MZU. At NEHU, male respondents were also in the majority across most departments, except for the Statistics department, where male and female respondents were equal. In the Physics department at NEHU, only one response was received, from a female respondent.

Table 4.2: Gender-wise respondence

Univ.	Options	Departments					Total (%)
		Phys (%)	**Chem (%)**	**Math & CS (%)**	**Ind. Chem (%)**	**Stats (%)**	
MZU	**Male**	26 (66.67)	13 (52)	14 (63.63)	4 (57.14)	-	**57 (61.30)**
	Female	13 (33.33)	12 (48)	8 (36.37)	3 (42.86)	-	**36 (38.70)**
Total		**39 (100)**	**25 (100)**	**22 (100)**	**7 (100)**	-	**93 (100)**
NEHU	**Male**	0 (0)	21 (52.5)	7 (77.8)	-	4 (50)	**32 (55.18)**
	Female	1 (1)	19 (47.5)	2 (22.2)	-	4 (50)	**26 (44.82)**
Total		**1 (100)**	**40 (100)**	**9 (100)**	-	**8 (100)**	**58 (100)**

Abbreviation of departments: Physics ***(Phys)***, Chemistry ***(Chem)***, Mathematics ***(Math)***, Computer Science ***(CS)***, Industrial Chemistry ***(Ind. Chem)*** and Statistics ***(Stats)***

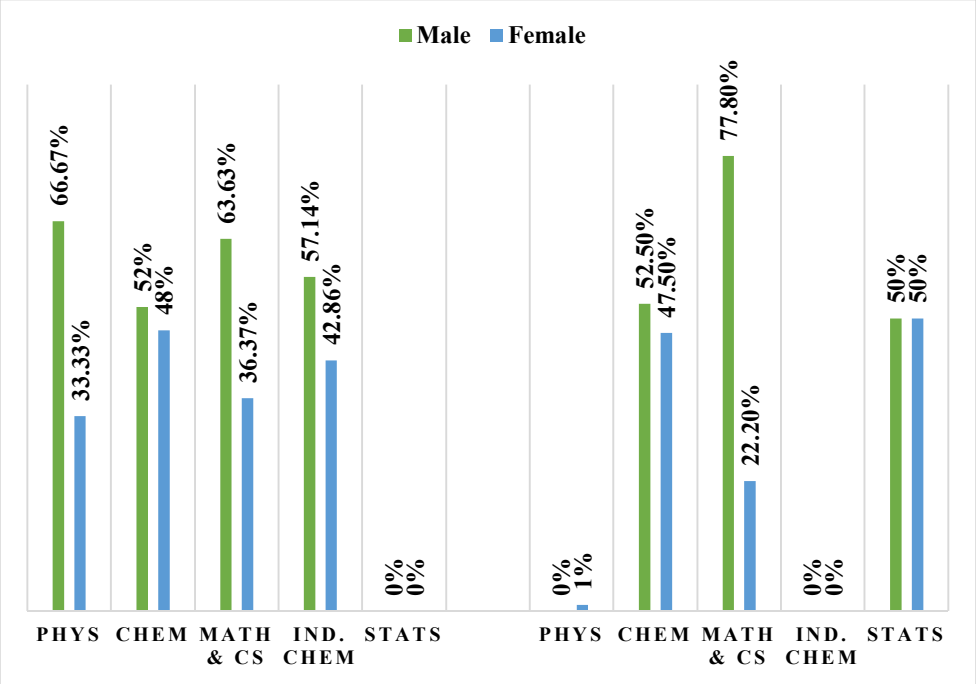


Figure 4.1: Gender-wise respondence

4.3.2 Age-wise respondence

Table 4.3 and figure 4.2 presents the age-wise classification of research scholars from the Physical Sciences departments at Mizoram University (MZU) and North Eastern Hill University (NEHU), with a detailed breakdown by department. In the Physics department at Mizoram University, out of 39 respondents, the majority 32 (82.06%) were aged between 26-30 years, while the remaining 7 (17.94%) respondents were below 25 years. No respondents fell within the 31-35 or above 36 age groups. At North Eastern Hill University, only 1 respondent from the Physics department was in the 26-30 age group. In the Chemistry department at Mizoram University, out of 25 respondents, 17 (68%) were between 26-30 years, while 5 (20%) were under 25. There were no respondents in the 31-35 or above 36 age groups. At North Eastern Hill University, out of 40 respondents, 39 (97.5%) were aged between 26-30 years, with only 1 (2.5%) respondent below 25 years, and none in the 31-35 or above 36 age groups. In the Mathematics and Computer Science department at Mizoram University, all 22 (100%) respondents were between 26-30 years, with no respondents below 25, or in the 31-35 or above 36 age groups. Similarly, in the same department at North Eastern Hill University, out of 9 respondents, 8 (88.89%) were aged 26-30, while 1

(11.11%) respondent was below 25, with no respondents in the older age groups. In the Industrial Chemistry department at Mizoram University, all 7 (100%) respondents were in the 26-30 age group, with no respondents below 25 or in the 31-35 and above 36 age categories. However, the Industrial Chemistry department is not offered in the School of Physical Sciences at North Eastern Hill University. In the Statistics department at North Eastern Hill University, out of 8 respondents, 7 (87.5%) were aged between 26-30 years, and 1 (12.5%) respondent was below 25. There were no respondents in the 31-35 or above 36 age groups. The Statistics department is not included in the School of Physical Sciences at Mizoram University.

Overall, the data shows that the majority of respondents in both universities fall within the 26-30 age group, with very few respondents under 25 and none in the older age categories across most departments.

Table 4.3: Age-wise respondence

Univ.	Age Group	Departments					Total (%)
		Phys (%)	Chem (%)	Math & CS (%)	Ind. Chem (%)	Stats (%)	
MZU	Below 25 Years	**7** (17.94)	5 (20)	0 (0)	0 (0)	**-**	**12 (12.90)**
	Between 26-30 Years	32 (82.06)	17 (68)	22 (100)	7 (100)	**-**	**78 (83.88)**
	Between 31-35 Years	0 (0)	3 (12)	0 (0)	0 (0)	**-**	**3 (3.22)**
	Above 36 Years	0 (0)	0 (0)	0 (0)	0 (0)	**-**	**0 (0)**
	Total	**39 (100)**	**25 (100)**	**22 (100)**	**7 (100)**	**-**	**93 (100)**
NEHU	Below 25 Years	0 (0)	1 (2.5)	1 (11.11)	-	1 (12.5)	**3 (5.18)**
	Between 26-30 Years	1 (100)	39 (97.5)	8 (88.89)	-	7 (87.5)	**55 (94.82)**
	Between 31-35 Years	0 (0)	0 (0)	0 (0)	-	0 (0)	**0 (0)**
	Above 36 Years	0 (0)	0 (0)	0 (0)	-	0 (0)	**0 (0)**
	Total	**1 (100)**	**40 (100)**	**9 (100)**	**-**	**8 (100)**	**58 (100)**

Abbreviation of departments: Physics ***(Phys)***, Chemistry ***(Chem)***, Mathematics ***(Math)***, Computer Science ***(CS)***, Industrial Chemistry ***(Ind. Chem)*** and Statistics ***(Stats)***

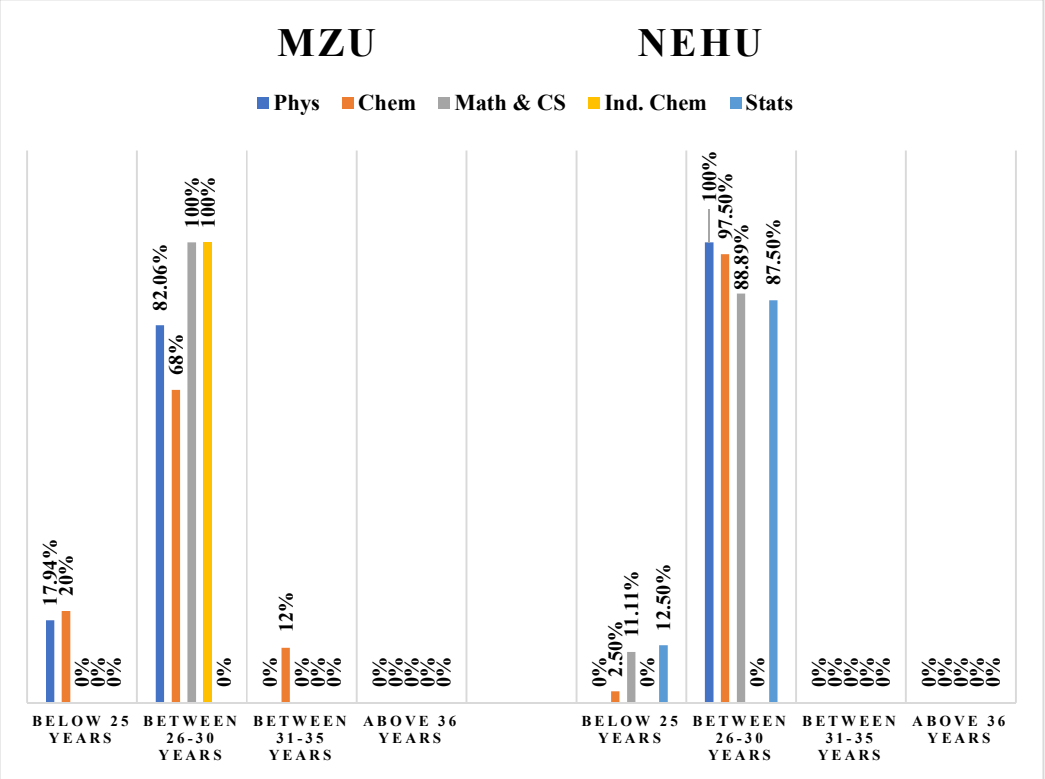


Figure 4.2: Age-wise respondence

4.4 Library usages and its services

4.4.1 Library visit by the respondents

Table 4.4 and figure 4.3 presents the frequency of library visits among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU). At MZU, the majority of research scholars 71 (76.3%) visited the library occasionally, while smaller percentages visited on a weekly 9 (9.7%) and monthly 7 (7.5%) basis. Only 3 (3.2%) respondents visited the library daily, and 3 (3.2%) respondents visit the library never. In contrast, at NEHU, 35 (60.3%) respondents visited the library occasionally, with a slightly higher percentage 8 (13.8%) visited monthly and weekly 7 (12.1%). Only 5 (8.6%) respondents indicated that they never visited the library, while 3 (5.2%) respondents visited daily.

Overall, the data indicates that the majority of research scholars at both universities tend to visit the library on an occasional basis, with relatively few making daily visits. A notable difference is that some NEHU respondents report never visiting the library, a pattern absents among MZU respondents.

Table 4.4: Library visit by the respondents

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Daily	3	3.2	3	5.2
Weekly	9	9.8	7	12.1
Monthly	7	7.5	8	13.8
Occasionally	71	76.3	35	60.3
Never	3	3.2	5	8.6
Total	**93**	**100**	**58**	**100**

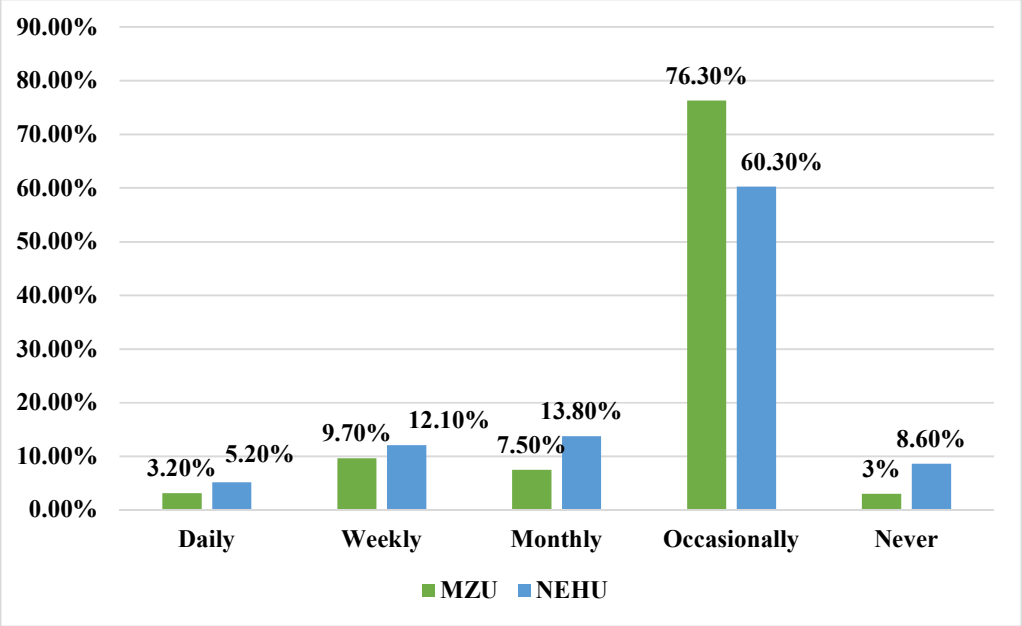


Figure 4.3: Library visit by the respondents

4.4.2 Adequacy of resources

Table 4.5 and figure 4.4 shows the perceptions of research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) regarding the adequacy of library resources. At MZU, a significant majority of respondents, 75 out of 93 (80.6%), believed that the library provides adequate resources for their research needs. However, 18 (19.4%) respondents responded that the resources are insufficient. Similarly, at NEHU, the majority of research scholars, out of 58, 45 (77.6%), considered the library's resources to be adequate. Meanwhile, 13 (22.4%) respondents believed that the library lacks sufficient resources to support their research.

Overall, the data indicates that most research scholars at both universities are satisfied with the library resources available, although a notable minority at each institution expresses concerns about the adequacy of these resources.

Table 4.5: Adequate resources

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes	75	80.6	45	77.6
No	18	19.4	13	22.4
Total	**93**	**100**	**58**	**100**

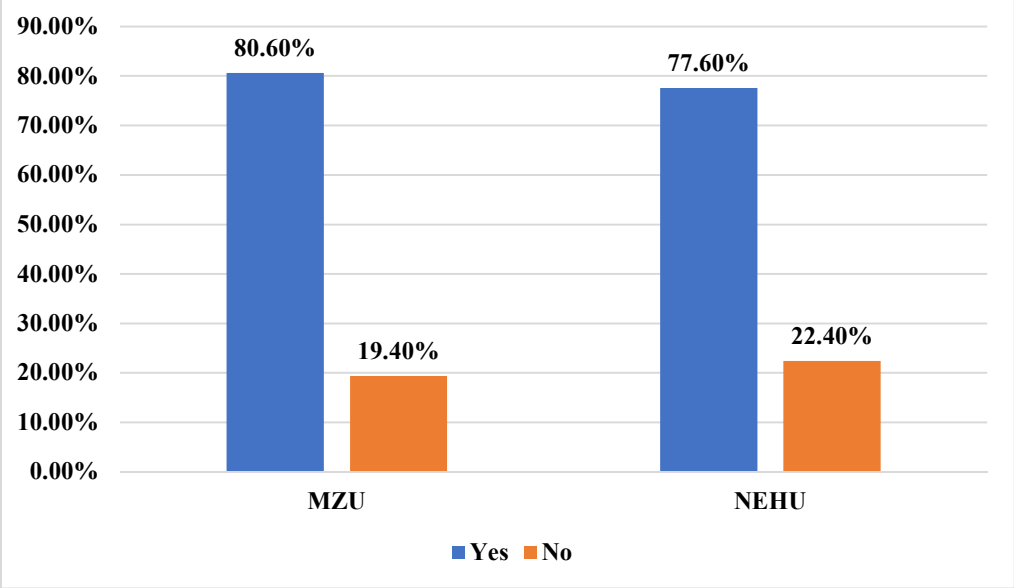


Figure 4.4: Adequate resources

4.4.3 Usefulness of library

Table 4.6 and figure 4.5 illustrates how research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) perceive the usefulness of their respective libraries. At MZU, a large majority of respondents, out of 93, 69 (74.2%) respondents find the library "useful" for their academic and research needs. An additional 21 (22.6%) respondents considered the library to be "very useful." Only a small number, 3 (3.2%) respondents, fell that the library is "not at all" useful. Similarly, at NEHU, most research scholars have a positive perception of the library's usefulness. Out of 58 respondents, 33 (56.9%) respondents find the library "useful," while 20 (34.5%) respondents rated it as "very useful." However, 5 (8.6%) respondents viewed the library as "not at all" useful.

Overall, the data suggests that the majority of research scholars at both universities consider the library to be a valuable resource, with only a small percentage at each institution expressing dissatisfaction with its utility.

Table 4.6: Usefulness of library

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Very Useful	21	22.6	20	34.5
Useful	69	74.2	33	56.9
Not at all	3	3.2	5	8.6
Total	**93**	**100**	**58**	**100**

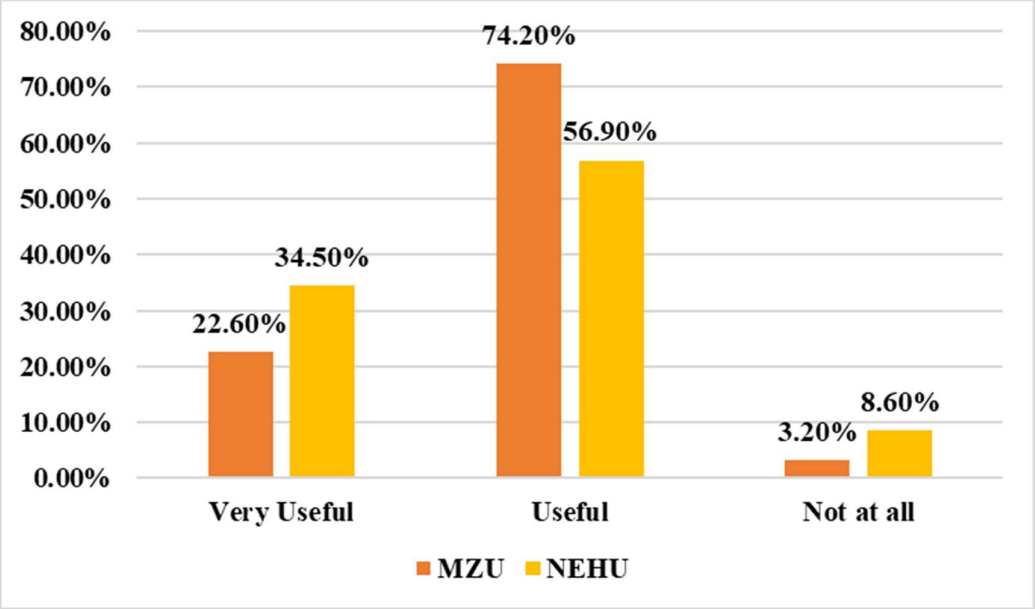


Figure 4.5: Usefulness of library

4.4.4 Purpose of using library resources

Table 4.7 and figure 4.6 outlines the various purposes for which research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) use library resources. The most common purpose across both universities is "writing a research paper," with 57 (34.5%) respondents at MZU and 42 (37.5%) respondents at NEHU, making up a total of 99 out of 151 respondents (65.6%). "Preparing notes" is also a significant activity, reported by 47 (28.5%) respondents at MZU and 30 (26.8%) respondents at NEHU, totalling 77 (51%) respondents. Using the library for "project work" is reported by 35 (21.2%) respondents at MZU and 15 (13.4%)

respondents at NEHU, with a combined total of 50 (33.1%) respondents. Additionally, 19 (11.5%) respondents at MZU and 22 (19.6%) respondents at NEHU used the library for "preparing assignments", totalling 41 (27.2%) respondents. The least common purpose is "preparing a bibliography", cited by only 7 (4.2%) respondents at MZU and 3 (2.7%) respondents at NEHU, making up a total of 10 (6.6%) respondents.

Overall, the data indicates that "writing research papers" is the primary purpose for using library resources among research scholars at both universities, followed by note preparation and project work. "Preparing assignments" and "bibliographies" are fewer common reasons for library use.

Table 4.7: Purpose of using library resources

Options	MZU (N=93)		NEHU (N=58)		Total (N=151)
	Frequency	Percentage	Frequency	Percentage	
Preparing Notes	47	28.5	30	26.8	**77**
Writing a research paper	57	34.5	42	37.5	**99**
Preparing a bibliography	7	4.2	3	2.7	**10**
Preparing an assignment	19	11.5	22	19.6	**41**
For a project work	35	21.2	15	13.4	**50**

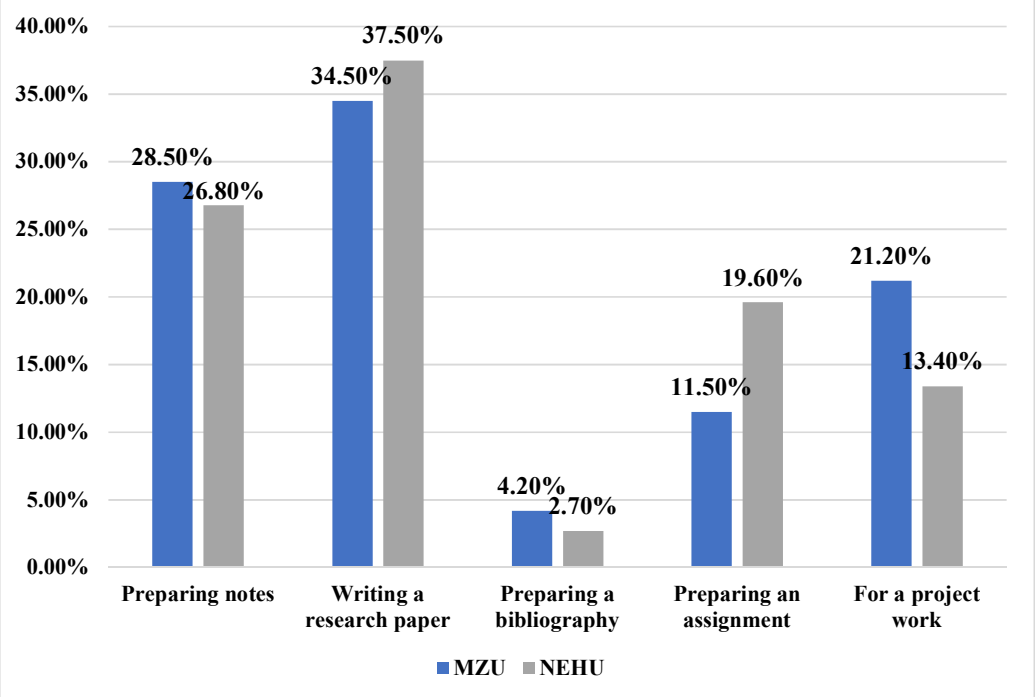


Figure 4.6: Purpose of using library resources

4.4.5 Methods of searching documents in the library

Table 4.8 and figure 4.7 illustrates the various methods research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) use to search for documents in the library. The most common approach at both universities is searching the bookshelves directly, with 72 (77.4%) respondents at MZU and 34 (58.6%) respondents at NEHU adopting this method. A notable difference is observed in the use of the Online Public Access Catalogue (OPAC); only 6 (6.5%) respondents at MZU utilize OPAC compared to 14 (24.1%) respondents at NEHU. Additionally, 12 (12.9%) respondents at MZU and 7 (12.1%) respondents at NEHU seek assistance from library staff when searching for documents. A small number of respondents at both universities, 3 (3.2%) at MZU and 3 (5.2%) at NEHU, rely on help from friends.

Overall, the data shows that direct browsing of bookshelves is the predominant method used by research scholars, with OPAC and assistance from library staff being less commonly used, and peer assistance being the least preferred method.

Table 4.8: Methods of searching documents in the library

Options	MZU		NEHU	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Search bookshelves directly	72	77.4	34	58.6
Use OPAC	6	6.5	14	24.1
Taking assistance from library staff	12	12.9	7	12.1
Taking assistance from friends	3	3.2	3	5.2
Total	**93**	**100**	**58**	**100**

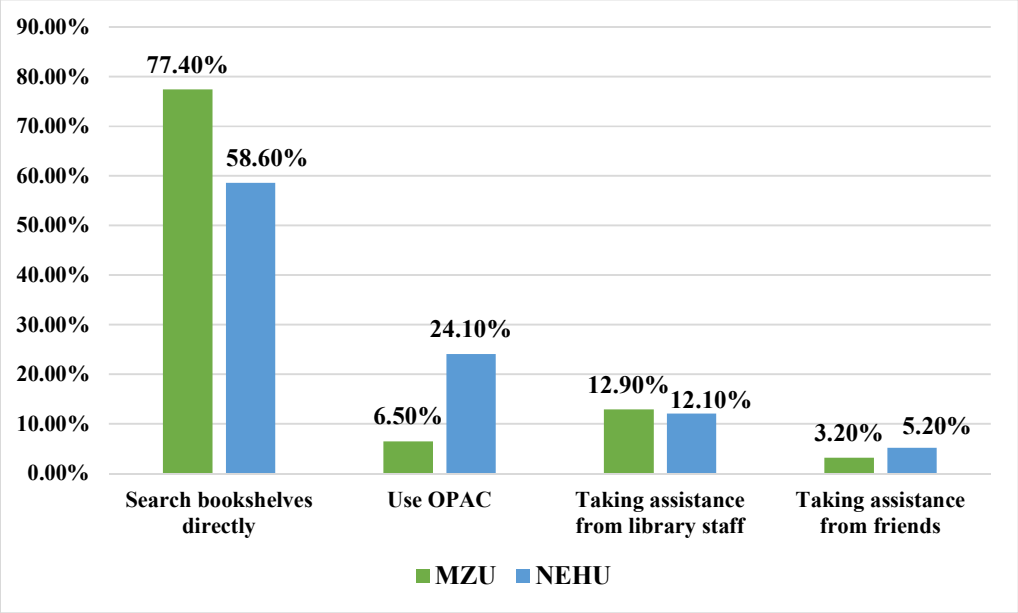


Figure 4.7: Methods of searching documents in the library

4.4.6 Usage of electronic resources of the library

Table 4.9 and figure 4.8 presents data on the usage of electronic resources by research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU). A significant majority of respondents at both universities reported using electronic resources, with 78 (83.9%) scholars at MZU indicating they utilize these resources, while 42 (72.4%) scholars at NEHU also affirmed their usage. Conversely, a smaller number of respondents do not use electronic resources, with 15 (16.1%) at MZU and 16 (16%) at NEHU expressing this viewpoint.

Overall, the data indicates that a substantial proportion of research scholars at both universities actively engage with the electronic resources available in their libraries, highlighting the importance of these resources in supporting their academic research.

Table 4.9: Usage of electronic resources of the library

Usage	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes	78	83.9	42	72.4
No	15	16.1	16	27.6
Total	**93**	**100**	**58**	**100**

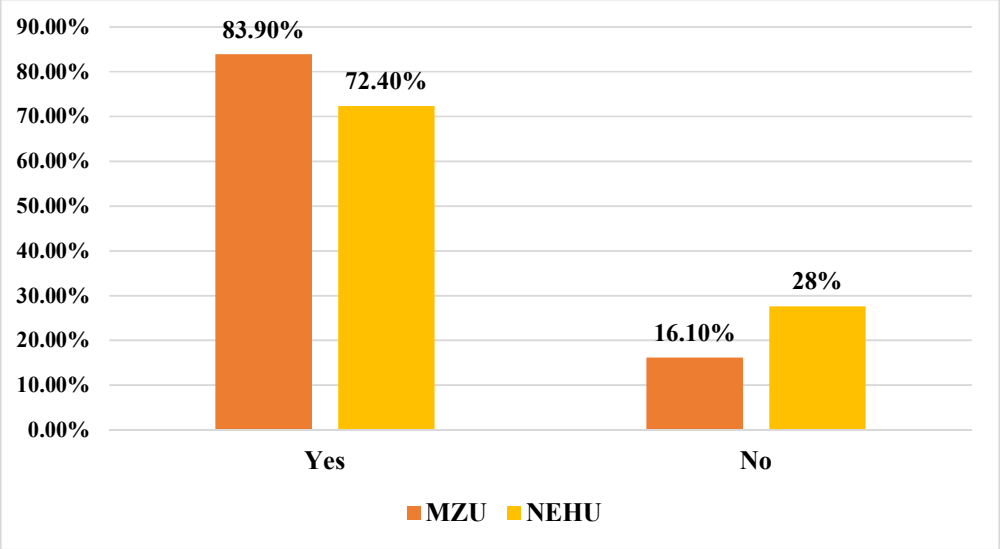


Figure 4.8: Usage of electronic resources of the library

4.4.7 Awareness of services provided by library

Table 4.10 and figure 4.9 provides insights into the awareness of research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) regarding various library services. At MZU, the majority of scholars are aware of the circulation (issue/return) service, with 87 (93.5%) respondents affirming they are aware and 6 (6.5%) respondents are not aware. This is closely followed by the shelf issue and return (RFID) service, 84 (90.3%) respondents are aware with RFID and 9 (9.7%) are not aware with RFID, and followed by photocopy service, 84 (90.3%) respondents are aware and 9 (9.7%) not aware. In the OPAC service, 75 (80.6%) respondents are aware with OPAC and 18 (19.4%) are not aware. In database searching service, 66 (71.0%) respondents are aware of database searching and 27 (29.0%) are not aware. In Brail services, 23 (24.7%) are aware of brail service and 70 (75.3%) are not aware. In Inter Library Loan service, 11 (11.8%) respondents are aware with inter library loan and 82 (88.2%) are not aware.

In contrast, awareness levels vary at NEHU. While 54 (93.1%) respondents are aware of circulation services and 4 (6.9%) respondents are not aware. In the OPAC service, 39 (67.2%) respondents are aware of OPAC and 19 (32.8%) are not aware. Similarly, in database searching service, 52 (89.7%) respondents are aware of database searching and 6 (10.3%) are not aware. In Current Awareness Service/SDI, 24 (41.4%)

respondents are aware of Current Awareness Service/SDI and 34 (58.6%) respondents are not aware. In Brail services, 12 (20.7%) are aware of brail service and 46 (79.3%) are not aware. In Inter Library Loan service, 10 (17.2%) respondents are aware with inter library loan and 48 (82.8%) are not aware.

Overall, while research scholars at both universities demonstrate a good understanding of several key library services, there are significant gaps in awareness regarding specialized services such as inter-library loans and support for visually impaired students.

Table 4.10 Awareness of services provided by library

Services	MZU			NEHU		
	Yes (%)	No (%)	Total (%)	Yes (%)	No (%)	Total (%)
Reference service	51 (54.8)	42 (45.2)	93 (100)	50 (86.2)	8 (13.8)	58 (100)
Circulation (Issue/Return)	87 (93.5)	6 (6.5)	93 (100)	54 (93.1)	4 (6.9)	58 (100)
OPAC	75 (80.6)	18 (19.4)	93 (100)	39 (67.2)	19 (32.8)	58 (100)
Current Awareness Service/SDI	42 (45.2)	51 (54.8)	93 (100)	24 (41.4)	34 (58.6)	58 (100)
Shelf issue and return (RFID)	84 (90.3)	9 (9.7)	93 (100)	42 (72.4)	16 (27.6)	58 (100)
Databases searching	66 (71.0)	27 (29.0)	93 (100)	52 (89.7)	6 (10.3)	58 (100)
Photocopy service	84 (90.3)	9 (9.7)	93 (100)	30 (51.7)	28 (48.3)	58 (100)
Brail service	23 (24.7)	70 (75.3)	93 (100)	12 (20.7)	46 (79.3)	58 (100)
Inter library loan	11 (11.8)	82 (88.2)	93 (100)	10 (17.2)	48 (82.8)	58 (100)

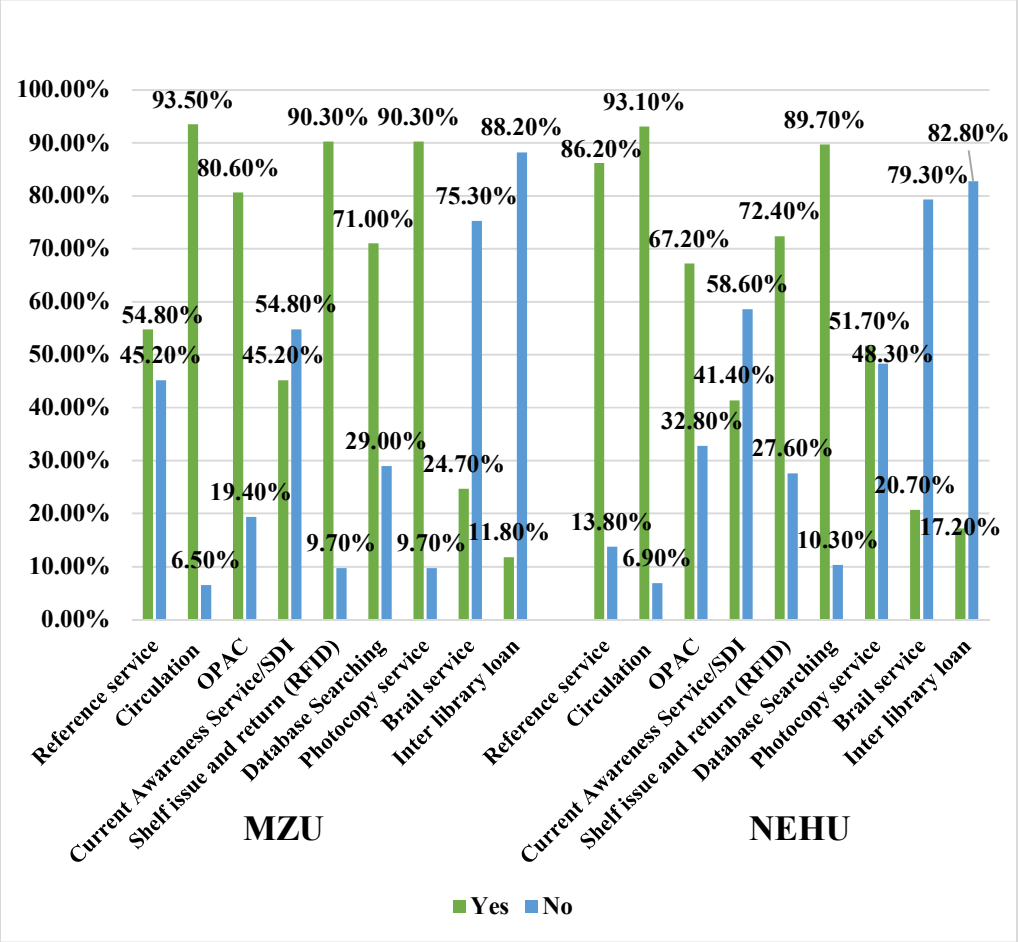


Figure 4.9: Awareness of services provided by library

4.5 Awareness and level of Digital Literacy

4.5.1 Awareness of the term Digital Literacy

Table 4.11 and figure 4.10 presents data on the awareness of the term "digital literacy" among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU). A significant majority of scholars are aware of this term, with 84 (90.30%) respondents at MZU responded they are aware with the term digital literacy and only 9 (9.70%) respondents were not aware. Similarly, 54 (93.10%) respondents at NEHU also expressed awareness of the concept and 4 (6.90%) respondents at NEHU responded they are not familiar with the term. Overall, the data suggests that research scholars at both universities have a strong understanding of digital literacy, highlighting its importance in their academic and research activities.

Table 4.11: Awareness of the term digital literacy

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes	84	90.30	54	93.10
No	9	9.70	4	6.90
Total	93	100	58	100

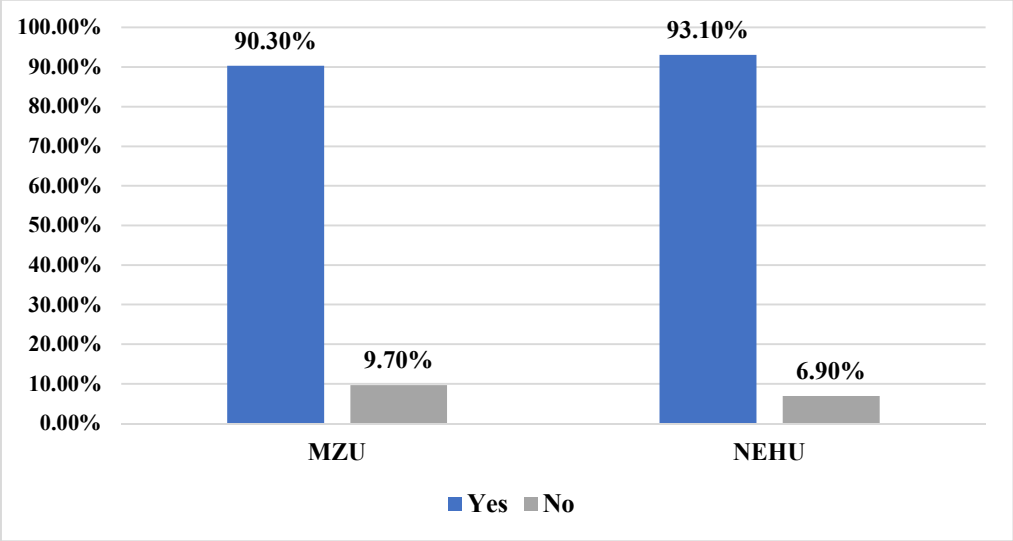


Figure 4.10: Awareness of the term digital literacy

4.5.2 Level of Digital Literacy

Table 4.12 and figure 4.11 outlines the levels of digital literacy among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU). At MZU, the majority of scholars, 63 (67.70%) respondents, reported a moderate level of digital literacy. This is followed by 15 (16.10%) respondents who considered their digital literacy to be high. Only 9 (9.70%) respondents at MZU assess their skills as very high, while a small number, 6 (6.50%) respondents, identified their digital literacy as low. In contrast, NEHU shows a slightly different distribution. A total of 36 (62.10%) respondents classified their digital literacy as moderate, while 14 (24.10%) respondents rate it as high. Only 2 (3.40%) respondents at NEHU perceived their digital literacy as very high, and 6 (10.30%) respondents indicated a low level of digital literacy.

Overall, the data indicates that the predominant level of digital literacy among research scholars at both universities is moderate, with relatively few scholars rating

their skills as very high. This suggests that while scholars possess a basic understanding of digital tools and resources, there may be opportunities for further development and training in this area.

Table 4.12: Level of Digital Literacy

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Very High	9	9.70	2	3.40
High	15	16.10	14	24.10
Moderate	63	67.70	36	62.10
Low	6	6.50	6	10.30
Total	**93**	**100**	**58**	**100**

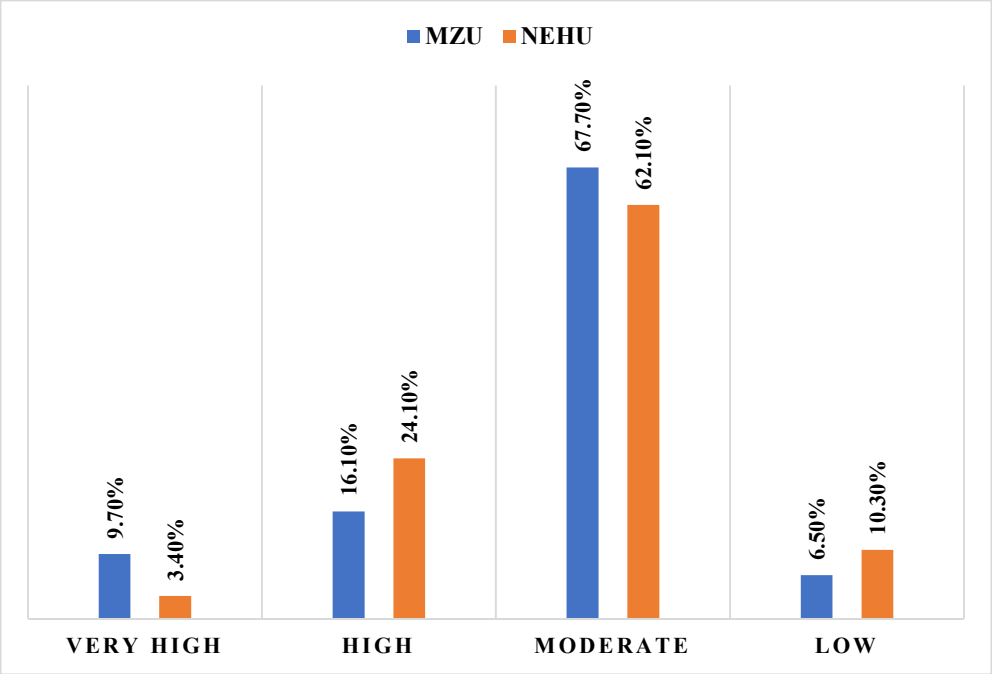


Figure 4.11: Level of Digital Literacy

4.5.3 Familiarity with the Digital Literacy Skills

Table 4.13 and figure 4.12 provides an overview of the digital skills that research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) are familiar with. In Mizoram University all the respondents i.e., 93 (100%) respondents are familiar with internet browsing, social media usage, and email. In terms of online security practices, 57 (61.3%) are familiar and 36 (38.7%) are not familiar. Similarly, regarding basic computer troubleshooting, 60 (64.5%) respondents are familiar and 33

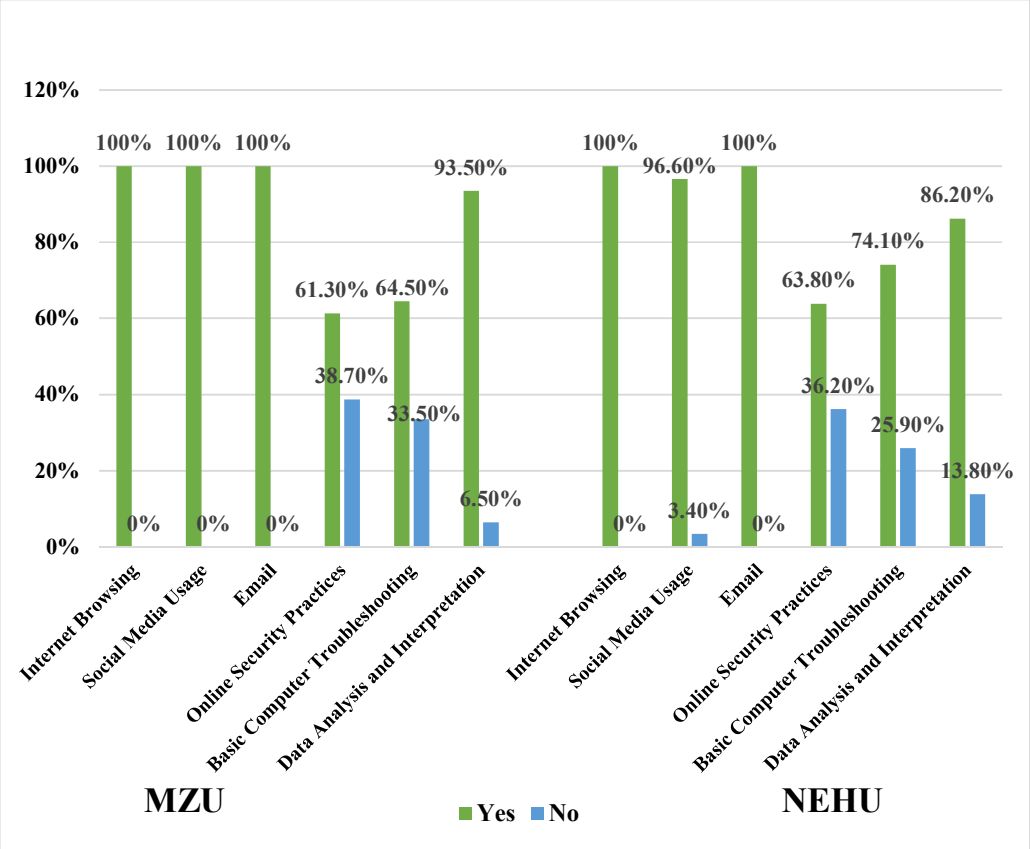
(33.5%) respondents are not familiar. Lastly, data analysis and interpretation, 87 (93.5%) respondents are familiar and 6 (6.5%) respondents are not familiar.

In North Eastern Hill University (NEHU), all the 58 (100%) respondents are fully familiar with internet browsing and email. In terms of social media usage, 56 (96.6%) respondents are familiar and 2 (3.4%) respondents are not familiar. Similarly, regarding online security practices, 37 (63.8%) respondents are familiar and 21 (36.2%) are not familiar. However, 43 (74.1%) are familiar with basic computer troubleshooting and 15 (25.9%) are not familiar. Lastly, data analysis and interpretation, 50 (86.2%) respondents are familiar and 8 (13.8%) are not familiar.

Overall, while research scholars demonstrate a strong understanding of essential digital skills, there are notable gaps in knowledge regarding online security practices and basic troubleshooting, indicating potential areas for further training and development.

Table 4.13: Familiarity with the digital literacy skills

Options	Familiarity					
	MZU			NEHU		
	Yes (%)	No (%)	Total (%)	Yes (%)	No (%)	Total (%)
Internet Browsing	93 (100)	0 (0)	93 (100)	58 (100)	0 (0)	58 (100)
Social Media Usage	93 (100)	0 (0)	93 (100)	56 (96.6)	2 (3.4)	58 (100)
Email	93 (100)	0 (0)	93 (100)	58 (100)	0 (0)	58 (100)
Online Security Practices	57 (61.3)	36 (38.7)	93 (100)	37 (63.8)	21 (36.2)	58 (100)
Basic Computer Troubleshooting	60 (64.5)	33 (33.5)	93 (100)	43 (74.1)	15 (25.9)	58 (100)
Data Analysis and Interpretation	87 (93.5)	6 (6.5)	93 (100)	50 (86.2)	8 (13.8)	58 (100)



4.12 Familiarity with the digital literacy skills

4.5.4 Frequency of encountered terms

Table 4.14 and figure 4.13 illustrates the frequency with which research scholars encounter terms related to digital literacy in their daily lives at Mizoram University (MZU) and North Eastern Hill University (NEHU). At MZU, the majority of scholars, 55 (59.1%) respondents, reported encountering these terms often, indicating a strong familiarity with digital literacy concepts. In contrast, only 35 (37.6%) respondents responded they sometimes come across such terms, while a minimal number, just 3 (3.2%) respondents, claimed to do so rarely. Notably, no respondents from MZU report encountering digital literacy terms always. At NEHU, the distribution varies significantly. A considerable portion, 21 (36.2%) respondents, reported rarely encountering these terms, which is the highest percentage in this category across both universities. Additionally, 18 (31.0%) respondents responded they sometimes encounter related terms, while 12 (20.7%) respondents indicated they often come

across them. A small number, 7 (12.1%) respondents, claimed to encounter digital literacy terms always.

Overall, while scholars at MZU generally have more frequent exposure to digital literacy terminology, NEHU scholars demonstrate a wider range of responses, particularly with a significant number reporting rare encounters with such terms. This suggests a potential difference in the emphasis on digital literacy awareness and its integration into daily academic life between the two institutions.

Table 4.14: Frequency of encountered terms or concepts

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Rarely	3	3.2	21	36.2
Sometimes	35	37.6	18	31.0
Often	55	59.1	12	20.7
Always	0	0	7	12.1
Total	**93**	**100**	**58**	**100**

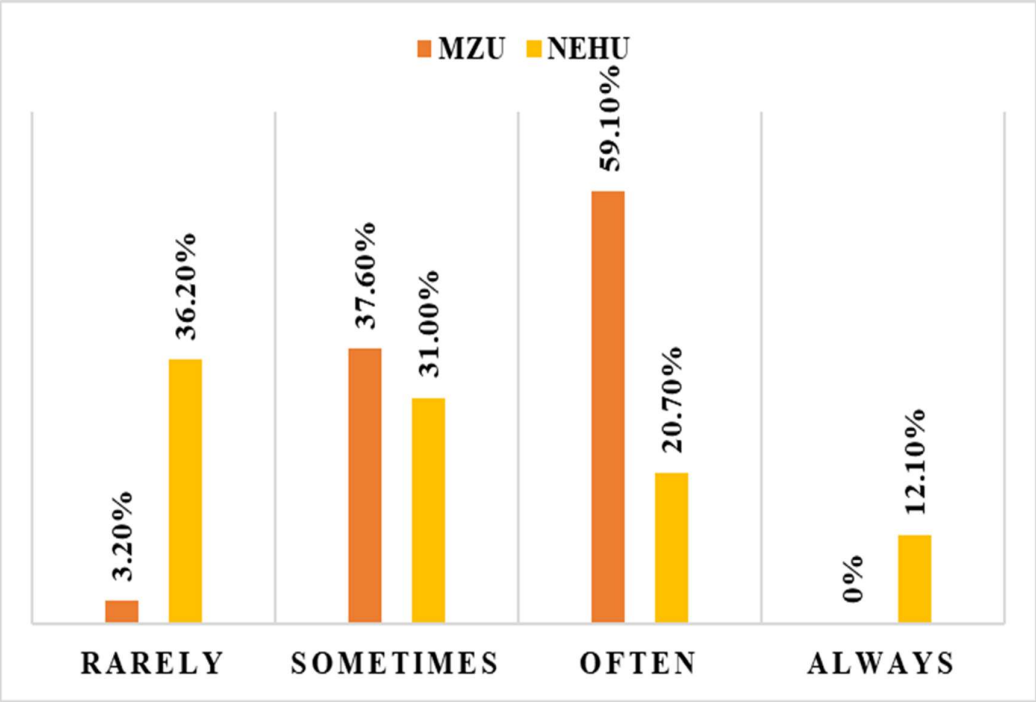


Figure 4.13: Frequency of encountered terms or concepts

4.5.5 Improvement due to Digital Literacy

Table 4.15 and figure 4.14 presents the extent to which research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU) agree that various aspects of their daily lives have improved due to digital literacy. At MZU, a significant majority of respondents agreed that digital literacy has enhanced communication and information access, with 28 (30.1%) respondents strongly agreed and 59 (63.4%) respondents agreed, while only 6 (6.5%) respondents remain undecided. Similarly, 33 (35.5%) respondents strongly agree, 57 (61.3%) respondents agree, and 3 (3.2%) respondents undecided that it has enhanced professional and educational opportunities. When it comes to the critical evaluation of online content, 15 (16.1%) respondents strongly agree, 64 (68.8%) respondents agree, and 14 (15.1%) respondents are undecided, indicating a general consensus on this improvement. Regarding digital security and privacy understanding, 15 (16.1%) respondents strongly agreed, while 59 (63.4%) respondents agreed, 12 (12.9%) respondents were undecided, and 7 (7.5%) respondents disagreed. Competence in various digital platforms sees a similar trend, with 15 (16.1%) respondents strongly agreeing, 65 (69.9%) respondents agreeing, 9 (9.7%) respondents were undecided, and 4 (4.3%) respondents disagreeing. Lastly, awareness of digital information reliability shows 9 (9.7%) respondents strongly agreeing, 67 (72.0%) respondents agreeing, 10 (10.8%) respondents undecided, and 7 (7.5%) respondents disagreeing.

At NEHU, for improved communication and information access, 26 (44.8%) respondents strongly agree, 28 (48.3%) respondents agree, and 4 (6.9%) respondents were undecided. Enhanced professional and educational opportunities show similar patterns, with 25 (43.1%) respondents strongly agreed and 33 (56.9%) respondents agreed. 21 (36.2%) respondents strongly agreed, 29 (50.0%) respondents agreed, and 8 (13.8%) respondents were undecided about critical evaluation skills. Regarding the understanding of digital security and privacy gains, 17 (29.3%) respondents strongly agreed, 37 (63.8%) respondents agreed, and 4 (6.9%) respondents were undecided. Competence in digital platforms was demonstrated by 20 (34.5%) respondents who strongly agreed, 28 (48.3%) respondents who agreed, and 10 (17.2%) respondents who were undecided. While awareness of digital information reliability shows 21 (36.2%)

respondents strongly agreeing, 29 (50.0%) respondents agreeing, and 8 (13.8%) respondents undecided.

Overall, both universities exhibit a strong belief that digital literacy has led to substantial improvements in various aspects of research scholars' lives, with the data reflecting a consensus on its positive impact.

Table 4.15: Improvement due to digital literacy

Options	MZU					NEHU				
	SA (%)	A (%)	UD (%)	DA (%)	Total (%)	SA (%)	A (%)	UD (%)	DA (%)	Total (%)
Improved communication and information access	28 (30.1)	59 (63.4)	6 (6.5)	0 (0)	**93 (100)**	26 (44.8)	28 (48.3)	4 (6.9)	0 (0)	**58 (100)**
Enhanced professional and educational opportunities	33 (35.5)	57 (61.3)	3 (3.2)	0 (0)	**93 (100)**	25 (43.1)	33 (56.9)	0 (0)	0 (0)	**58 (100)**
Enabled critical evaluation of online content	15 (16.1)	64 (68.8)	14 (15.1)	0 (0)	**93 (100)**	21 (36.2)	29 (50.0)	8 (13.8)	0 (0)	**58 (100)**
Understand digital security and privacy	15 (16.1)	59 (63.4)	12 (12.9)	7 (7.5)	**93 (100)**	17 (29.3)	37 (63.8)	4 (6.9)	0 (0)	**58 (100)**
Competence in various digital platforms	15 (16.1)	65 (69.9)	9 (9.7)	4 (4.3)	**93 (100)**	20 (34.5)	28 (48.3)	10 (17.2)	0 (0)	**58 (100)**
Awareness of digital information reliability	9 (9.7)	67 (72.0)	10 (10.8)	7 (7.5)	**93 (100)**	21 (36.2)	29 (50.0)	8 (13.8)	0 (0)	**58 (100)**

*Abbreviation: Strongly Agree **(SA),** Agree **(A),** Undecided **(UD),** Disagree **(DA)***

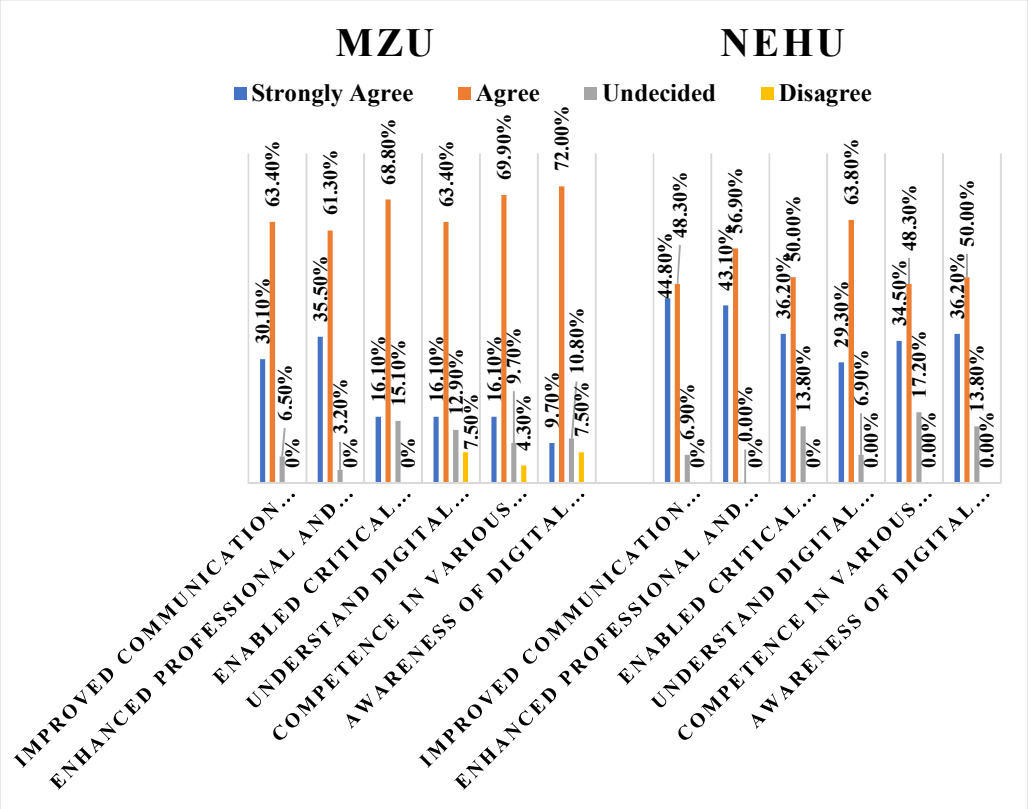


Figure 4.14: Improvement due to digital literacy

4.6 Awareness on digital tools and techniques

4.6.1 Participation in online courses

Table 4.16 and figure 4.15 presents data on the participation in online courses or workshops related to digital tools and techniques at Mizoram University (MZU) and North Eastern Hill University (NEHU). At MZU, out of 93 respondents, 68 (73.1%) reported participating in online courses, while 25 (26.9%) had not. Similarly, at NEHU, 37 (63.8%) out of 58 respondents indicated they had participated in such courses, whereas 21 (36.2%) had not. This data suggests a higher level of participation in online courses at MZU compared to NEHU, with both institutions showing a majority of engagement in digital learning.

Table 4.16: Participation in online courses

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes	68	73.1	37	63.8
No	25	26.9	21	36.2
Total	**93**	**100**	**58**	**100**

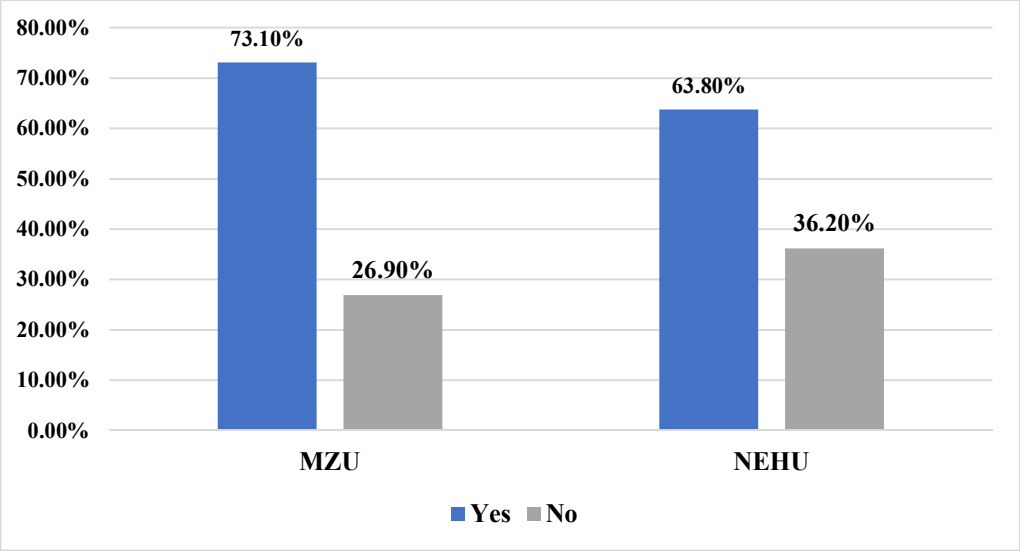


Figure 4.15: Participation in online courses

4.6.2 Frequency of seeking new digital tools

Table 4.17 and figure 4.16 shows how often individuals from Mizoram University (MZU) and North-Eastern Hill University (NEHU) seek out new digital tools and techniques to improve their skills or work efficiently. At MZU, 15 (16.1%) respondents reported doing so frequently, 66 (71.0%) respondents said they do it sometimes, and 12 (12.9%) respondents stated they rarely seek out new tools. No respondents from MZU said they never seek digital tools. At NEHU, 17 (29.3%) respondents frequently seek new tools, 36 (62.1%) respondents sometimes do, and 5 (8.6%) respondents rarely do so, with no one reporting they never seek tools.

Overall, most respondents from both institutions seek out digital tools at least sometimes, with a slightly higher percentage of frequent seekers at NEHU than at MZU.

Table 4.17: Frequency of seeking new digital tools

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Frequently	15	16.1	17	29.3
Sometimes	66	71.0	36	62.1
Rarely	12	12.9	5	8.6
Never	0	0	0	0
Total	**93**	**100**	**58**	**100**

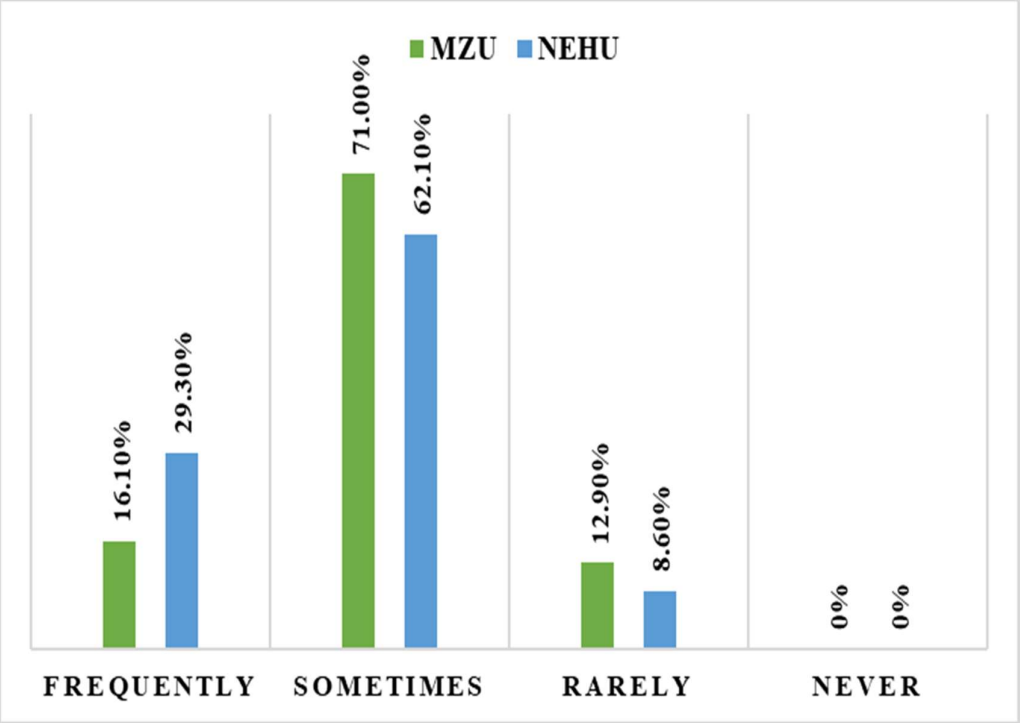


Figure 4.16: Frequency of seeking new digital tools

4.6.3 Familiarity with digital tools and software applications

Table 4.18 and figure 4.17 provides insights into the familiarity with digital tools and software applications at Mizoram University (MZU) and North-Eastern Hill University (NEHU).

At MZU, all 93 respondents demonstrated varying levels of proficiency in several tools. For Microsoft Office Suite, out of 93 (100%) respondents, 27 (29.0%) respondents are very familiar, while the remaining 66 (71.0%) respondents are familiar. Adobe Creative Cloud shows a lower proficiency, out of 93 (100%) respondents, (6.5%) respondents being very familiar, 56 (60.2%) respondents are familiar, while 16 (17.2%) respondents are somewhat familiar and 15 (16.1%) unfamiliar. Regarding Google Workspace, out of 93 (100%) respondents, 6 (6.5%) respondents are very familiar, 72 (77.4%) respondents familiar, 6 (6.5%) respondents are somewhat familiar, while 9 (9.7%) respondents are unfamiliar. Social media platforms show the highest familiarity, out of 93 (100%) respondents, 69 (74.2%) respondents are very familiar, 21 (22.6%) respondents are familiar and 3 (3.2%) respondents are somewhat familiar. Conversely, content management systems (CMS)

are largely unfamiliar, out of 93 (100%) respondents, 61 (65.6%) respondents are unfamiliar, while 22 (23.7%) respondents are familiar and only 10 (10.8%) very familiar. Data analysis tools also show moderate familiarity, out of 93 (100%) respondents, 3 (3.2%) respondents are very familiar, 52 (55.9%) respondents are familiar, 23 (24.7%) respondents are somewhat familiar but 15 (16.1%) remain unfamiliar. In terms of programming languages, out of 93 (100%) respondents, 21 (22.6%) respondents are very familiar, 14 (15.1%) are familiar, and remaining 58 (62.4%) respondents are unfamiliar. Graphic design software, out of 93 (100%), 6 (6.5%) respondents are familiar, 10 (10.8%) respondents are somewhat familiar and remaining 77 (82.8%) respondents are unfamiliar. Similarly, with video editing software out of 93 (100%) respondents, 6 (6.5%) respondents are familiar, 10 (10.8%) respondents are somewhat familiar and remaining 77 (82.8%) respondents are unfamiliar.

At NEHU, similar trends appear, but with slight differences. For Microsoft Office Suite, out of 58 (100%) respondents, 17 (29.3%) respondents are very familiar, 39 (67.2%) respondents are familiar and 2 (3.4%) respondents are somewhat familiar. Adobe Creative Cloud, out of 58 (100%) respondents, 9 (15.5%) respondents very familiar, 28 (48.3%) respondents familiar, 13 (22.4%) respondents are somewhat familiar and 8 (13.8%) unfamiliar. For Google Workspace, out of 58 (100%) respondents, 18 (31.0%) respondents are very familiar, 33 (56.9%) respondents are familiar, 5 (8.6%) are somewhat familiar, and 2 (3.4%) respondents are unfamiliar. Social media platforms are quite familiar, out of 58 (100%) respondents 34 (58.6%) respondents very familiar, 22 (37.9%) respondents familiar and 2 (3.4%) respondents are somewhat familiar. Content Management Systems usage, out of 58 (100%) respondents, 10 (17.2%) respondents are familiar, 22 (37.9%) respondents are somewhat familiar and 26 (44.8%) respondents are unfamiliar. Data analysis tools, out of 58 (100%) respondents, 27 (46.6%) respondents are familiar, 22 (37.9%) respondents are somewhat familiar, and remaining 9 (15.5%) respondents are unfamiliar. For graphic design out of 58 (100%), 9 (15.5%) respondents are familiar, 22 (37.9%) respondents are somewhat familiar and remaining 27 (46.6%) respondents are unfamiliar. Similarly, with video editing software out of 58 (100%) respondents, 8

(13.8%) respondents are familiar, 23 (39.7%) respondents are somewhat familiar and remaining 27 (46.6%) respondents are unfamiliar.

This data highlights that while both universities show familiarity with common digital tools like Microsoft Office Suite, social media, and Google Workspace, there is less proficiency in more specialized tools such as programming languages, graphic design, and video editing software.

Table 4.18: Familiarity with digital tools and software applications

Options	**MZU**				
	Very Familiar (%)	**Familiar (%)**	**Somewhat Familiar (%)**	**Unfamiliar (%)**	**Total (%)**
Microsoft Office Suite	27 (29.0)	66 (71.0)	0 (0)	0 (0)	**93 (100)**
Adobe Creative Cloud	6 (6.5)	56 (60.2)	16 (17.2)	15 (16.1)	**93 (100)**
Google Workspace	6 (6.5)	72 (77.4)	6 (6.5)	9 (9.7)	**93 (100)**
Social media platforms	69 (74.2)	21 (22.6)	3 (3.2)	0 (0)	**93 (100)**
Content management systems	10 (10.8)	22 (23.7)	0 (0)	61 (65.6)	**93 (100)**
Data analysis tools	3 (3.2)	52 (55.9)	23 (24.7)	15 (16.1)	**93 (100)**
Programming languages	21 (22.6)	14 (15.1)	0 (0)	58 (62.4)	**93 (100)**
Graphic design software	0 (0)	6 (6.5)	10 (10.8)	77 (82.8)	**93 (100)**
Video editing software	0 (0)	6 (6.5)	10 (10.8)	77 (82.8)	**93 (100)**
Options	**NEHU**				
	Very Familiar	**Familiar**	**Somewhat Familiar**	**Unfamiliar**	**Total**
Microsoft Office Suite	17 (29.3)	39 (67.2)	2 (3.4)	0 (0)	**58 (100)**
Adobe Creative Cloud	9 (15.5)	28 (48.3)	13 (22.4)	8 (13.8)	**58 (100)**
Google Workspace	18 (31.0)	33 (56.9)	5 (8.6)	2 (3.4)	**58 (100)**
Social media platforms	34 (58.6)	22 (37.9)	2 (3.4)	0 (0)	**58 (100)**
Content management systems	0 (0)	10 (17.2)	22 (37.9)	26 (44.8)	**58 (100)**
Data analysis tools	0 (0)	27 (46.6)	22 (37.9)	9 (15.5)	**58 (100)**
Programming languages	0 (0)	7 (12.1)	24 (41.4)	27 (46.6)	**58 (100)**
Graphic design software	0 (0)	9 (15.5)	22 (37.9)	27 (46.6)	**58 (100)**
Video editing software	0 (0)	8 (13.8)	23 (39.7)	27 (46.6)	**58 (100)**

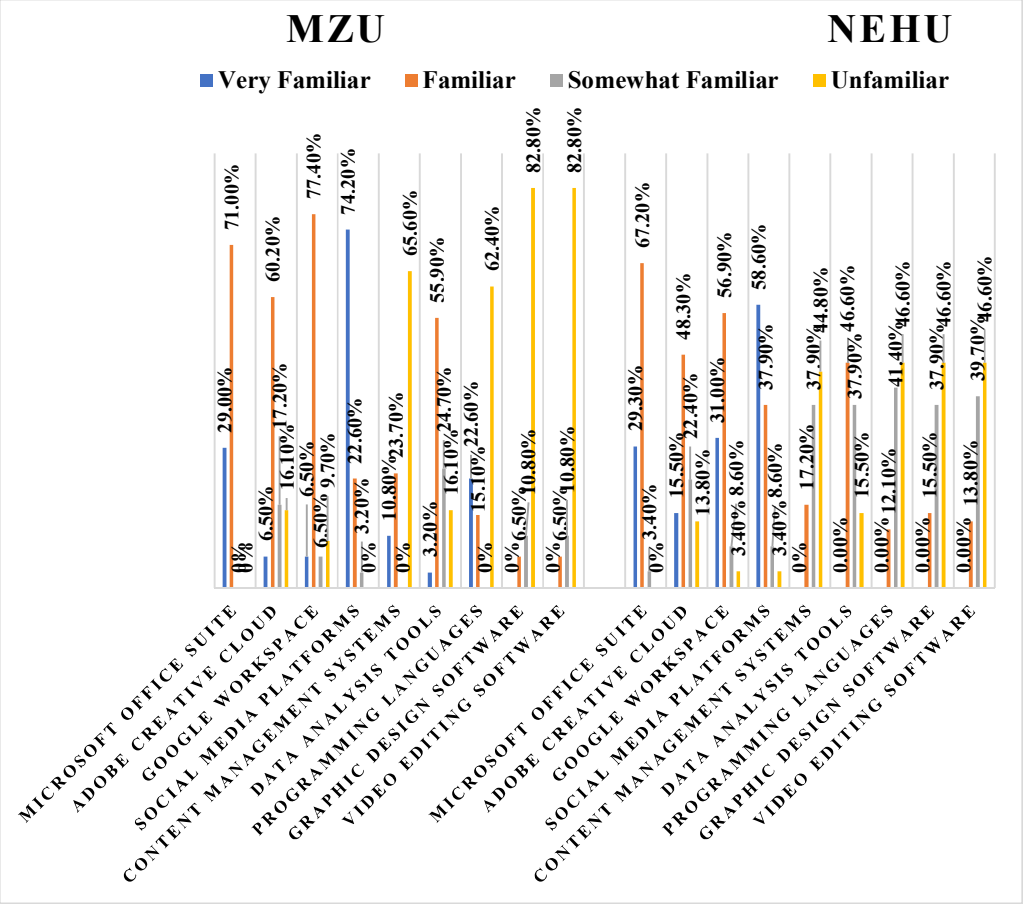


Table 4.17: Familiarity with digital tools and software applications

4.6.4 Frequency on updates in the digital tools and techniques

Table 4.19 and figure 4.18 provides insights into how frequently respondents at Mizoram University (MZU) and North-Eastern Hill University (NEHU) stay updated on the latest developments in digital tools and techniques across various methods.

At MZU, out of 93 respondents, one of the methods for staying updated is through online tutorials and documentation, with 43 (46.2%) respondents indicating they do this frequently, while 44 (47.3%) do so sometimes, and 6 (6.5%) respondents do so rarely. Webinars and online workshops, out of 93 respondents, with only 19 (20.4%) respondents frequently engaging in them, while 50 (53.8%) respondents do sometimes, and 24 (25.8%) respondents do rarely. For publications and websites, 31 (33.3%) respondents frequently consult them, while 44 (47.3%) respondents do sometimes, and 18 (19.4%) respondents do rarely. For networking with peers or professionals, out of 93 respondents,13 (14.0%) respondents do it frequently, 27

(29.0%) respondents do it sometimes, and 53 (57.0%) respondents do so rarely. Social media groups or forums are a notable source of updates; out of 93 respondents, 51 (54.8%) respondents them frequently, while 30 (32.3%) respondents use them sometimes, and 12 (12.9%) respondents use them rarely. Overall, MZU respondents primarily rely on online tutorials and social media groups for updates, with a strong tendency to engage sometimes across most methods.

In contrast, NEHU respondents show different engagement patterns. Among 58 respondents, 24 (41.4%) respondents frequently use online tutorials and documentation, while 31 (53.4%) use them sometimes, and 3 (5.2%) respondents use rarely. Webinars and online workshops, out of 58 respondents, 42 (72.4%) respondents frequently engaging in them, while only 12 (20.7%) respondents do so sometimes, and 4 (6.9%) respondents do so rarely. For industry publications and websites, out of 58 respondents, 27 (46.6%) respondents frequently engage with them, 12 (20.7%) respondents do so sometimes, and 19 (32.8%) respondents do so rarely. Networking with peers or professionals, out of 58 respondents, 28 (48.3%) respondents frequently connect, 15 (25.9%) respondents do so sometimes, 11 (19.0%) respondents do so rarely, and remaining 4 (6.9%) respondents do never. Social media groups or forums, out of 58 respondents, 28 (48.3%) respondents use frequently, 19 (32.7%) respondents participate sometimes, and remaining 11 (19.0%) respondents use rarely. While NEHU respondents frequently participate in webinars, MZU respondents are more likely to rely on social media and online tutorials, reflecting differing strategies for staying informed about digital tools and techniques.

Table 4.19: Frequency on updates in the digital tools and techniques

Options	MZU				
	Frequently (%)	Sometimes (%)	Rarely (%)	Never (%)	Total (%)
Online tutorials and documentation	43 (46.2)	44 (47.3)	6 (6.5)	0 (0)	**93 (100)**
Webinars and online work-shops	19 (20.4)	50 (53.8)	24 (25.8)	0 (0)	**93 (100)**
Industry publications and websites	31 (33.3)	44 (47.3)	18 (19.4)	0 (0)	**93 (100)**
Networking with peers or professionals	13 (14.0)	27 (29.0)	53 (57.0)	0 (0)	**93 (100)**
Social media groups or forums	51 (54.8)	30 (32.3)	12 (12.9)	0 (0)	**93 (100)**
Options	**NEHU**				
	Frequently (%)	**Sometimes (%)**	**Rarely (%)**	**Never (%)**	**Total (%)**
Online tutorials and documentation	24 (41.4)	31 (53.4)	3 (5.2)	0 (0)	**58 (100)**
Webinars and online work-shops	42 (72.4)	12 (20.7)	4 (6.9)	0 (0)	**58 (100)**
Industry publications and websites	27 (46.6)	12 (20.7)	19 (32.8)	0 (0)	**58 (100)**
Networking with peers or professionals	28 (48.3)	15 (25.9)	11 (19.0)	4 (6.9)	**58 (100)**
Social media groups or forums	28 (48.3)	19 (32.7)	11 (19.0)	0 (0)	**58 (100)**

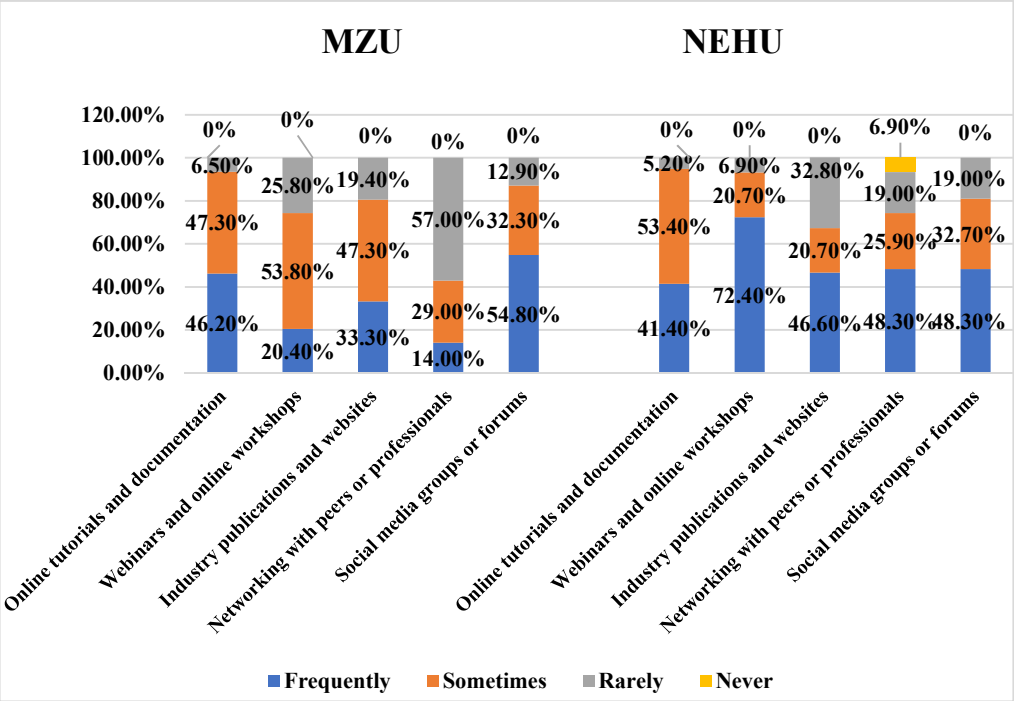


Figure 4.18: Frequency on updates in the digital tools and techniques

4.6.5 Impact of digital tools on the academic productivity

Table 4.20 and figure 4.19 illustrates the impact of digital tools and techniques on the productivity and work quality of respondents from two institutions, Mizoram University (MZU) and North-Eastern Hill University (NEHU).

The majority of respondents from both institutions reported a positive or very positive impact. At MZU, 41 (44.1%) respondents stated that digital tools have a "very positive" impact, while 44 (47.3%) respondents noted a "positive" impact, and the remaining 8 (8.6%) respondents stated neutral.

Similarly, at NEHU, 26 (44.8%) respondents rated the impact as "very positive", and an equal 26 (44.8%) respondents rated it as "positive", and the remaining 6 (10.3%) respondents stated neutral. Overall it shows that digital tools are overwhelmingly perceived as beneficial in enhancing productivity and work quality among the surveyed participants.

Table 4.20: Impact of digital tools and techniques

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Very positively	41	44.1	26	44.8
Positively	44	47.3	26	44.8
Neutral	8	8.6	6	10.3
Negatively	0	0	0	0
Very negatively	0	0	0	0
Total	**93**	**100**	**58**	**100**

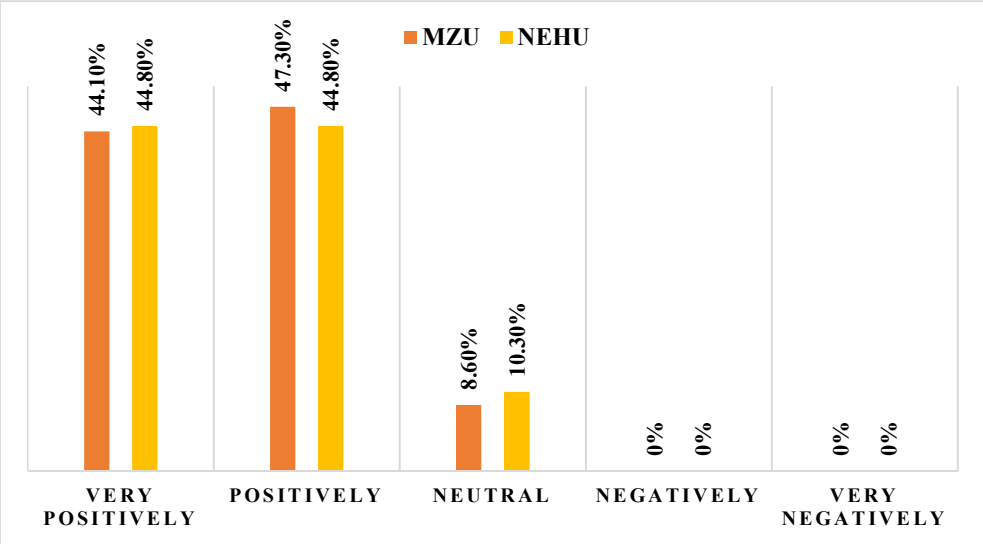


Figure 4. 19: Impact of digital tools and techniques

4.7 Capability to retrieve, examine, evaluate, and use authentic digital information

4.7.1 Primary search for digital information

Table 4.21 and figure 4.20 reveals where academic researchers from Mizoram University (MZU) and North-Eastern Hill University (NEHU) primarily search for digital information. At MZU, a smaller proportion relies on "University library resources" i.e., 37 (17.6%) respondents. "Online databases and journals" are the most popular source of digital information is utilized by 87 (41.4%) respondents, indicating a preference for academic and credible resources. This is followed by "Google search engines" with 74 (35.2%) respondents using general search tools for their research needs. Lastly, "Social media platforms" is used by 12 (5.7%) suggesting that it is the least preferred resource. At NEHU, the trends are similar. "University library resources" are used by 24 (17.1%) respondents. "Online databases and journals" are the most frequently used, with 56 (40.0%) respondents indicating their reliance on these academic sources. "Google search engines" are also popular, used by 51 (36.4%) respondents, which is slightly higher than at MZU. Lastly, "Social media platforms" are the least used, with 9 (6.4%) respondents. Both universities show a strong inclination towards scholarly databases and online resources for academic research.

Table 4.21: Primary search for digital information

Options	MZU (N=93)		NEHU (N=58)	
	Frequency	Percentage	Frequency	Percentage
University library resources	37	17.6%	24	17.1%
Online database and journals	87	41.4%	56	40.0%
Google search engines	74	35.2%	51	36.4%
Social media platforms	12	5.7%	9	6.4%

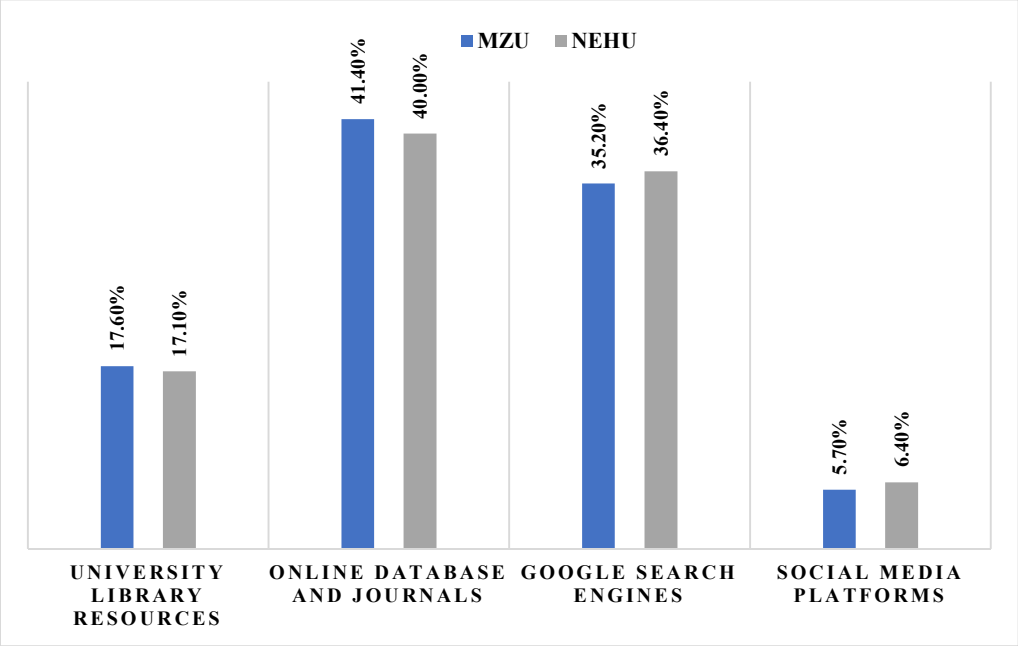


Figure 4.20: Primary search for digital information

4.7.2 Frequency of dependence on digital sources

Table 4.22 and figure 21 outlines how frequently respondents from Mizoram University (MZU) and North-Eastern Hill University (NEHU) rely on different digital sources for their academic work and research.

At MZU, "Online databases" are most frequently used, out of 93 respondents, 63 (67.7%) respondents stating they rely on them "always", while an additional 12 (12.9%) respondents use them "very often", 15 (16.1%) respondents use "sometimes", and remaining 3 (3.2%) respondents use "rarely". "Academic journals" also play a crucial role, out of 93 respondents, 60 (64.5%) respondents use them "always", 27 (29.0%) respondents use "very often", and remaining 6 (6.5%) respondents use "sometimes". "Websites" are widely used, out of 93 respondents, 56 (60.2%) respondents rely on them "always", while 31 (33.3%) respondents use "very often", and remaining 6 (6.5%) respondents use "sometimes". However, reliance on "Blogs" is low, out of 93 respondents, only 7 (7.5%) respondents use them "always", 3 (3.2%) respondents use them "very often", 44 (47.3%) respondents rely on them "sometimes", while 27 (29.0%) respondents use "rarely", and remaining 12 (12.9%) respondents never use them. Similarly, "Crowdsourced encyclopaedias", out of 93 respondents, 10 (10.8%) respondents rely on them "always", 3 (3.2%) respondents use the "very

often", 34 (36.6%) respondents use "sometimes", while 31 (33.3%) respondents use them "rarely", and the remaining 12 (16.1%) respondents never use them.

At NEHU, a similar pattern emerges. "Online databases" follow closely, out of 58 respondents, 33 (56.9%) respondents stating they rely on them "always", while an additional 19 (32.8%) respondents use them "very often", 1 (1.7%) respondent use "sometimes", while 4 (6.91%) respondents use "rarely", and the remaining 1 (1.7%) respondent never use them. "Academic journals" are more frequently use, out of 58 respondents, 38 (65.5%) respondents use them "always", 18 (31.0%) respondents use "very often", and remaining 2 (3.4%) respondents use "sometimes". "Websites" are commonly used, out of 58 respondents, 28 (48.3%) respondents rely on them "always", while 21 (36.2%) respondents use "very often", while 8 (13.8%) respondents use "sometimes", and the remaining 1 (1.7%) respondent never use them. Similarly, "Blogs", out of 58 respondents, only 2 (3.4%) respondents use them "always", 4 (6.9%) respondents use them "very often", 19 (32.8%) respondents rely on them "sometimes", while 14 (24.1%) respondents use "rarely", and remaining 19 (32.8%) respondents never use them. Lastly, "Crowdsourced encyclopaedias", out of 58 respondents, 1 (1.7%) respondent rely on them "always", 4 (6.9%) respondents use the "very often", 19 (32.8%) respondents use "sometimes", while 19 (32.8%) respondents use them "rarely", and the remaining 23 (39.7%) respondents never use them.

This shows a preference for more credible and academic resources at both institutions, with limited reliance on informal or user-generated content.

Table 4.22: Frequency of dependence on digital sources

Options	MZU					
	Always (%)	**Very Often (%)**	**Sometimes (%)**	**Rarely (%)**	**Never (%)**	**Total (%)**
Online Database	63 (67.7)	12 (12.9)	15 (16.1)	3 (3.2)	0 (0)	**93 (100)**
Academic Journals	60 (64.5)	27 (29.0)	6 (6.5)	0 (0)	0 (0)	**93 (100)**
Websites	56 (60.2)	31 (33.3)	6 (6.5)	0 (0)	0 (0)	**93 (100)**
Blogs	7 (7.5)	3 (3.2)	44 (47.3)	27 (29.0)	12 (12.9)	**93 (100)**
Crowdsourced Encyclopaedias	10 (10.8)	3 (3.2)	34 (36.6)	31 (33.3)	12 (16.1)	**93 (100)**
Options	**NEHU**					
	Always (%)	**Very Often (%)**	**Sometimes (%)**	**Rarely (%)**	**Never (%)**	**Total (%)**
Online Database	33 (56.9)	19 (32.8)	1 (1.7)	4 (6.91)	1 (1.7)	**58 (100)**
Academic Journals	38 (65.5)	18 (31.0)	2 (3.4)	0 (0)	0 (0)	**58 (100)**
Websites	28 (48.3)	21 (36.2)	8 (13.8)	0 (0)	1 (1.7)	**58 (100)**
Blogs	2 (3.4)	4 (6.9)	19 (32.8)	14 (24.1)	19 (32.8)	**58 (100)**
Crowdsourced Encyclopaedias	1 (1.7)	4 (6.9)	11 (19.0)	19 (32.8)	23 (39.7)	**58 (100)**

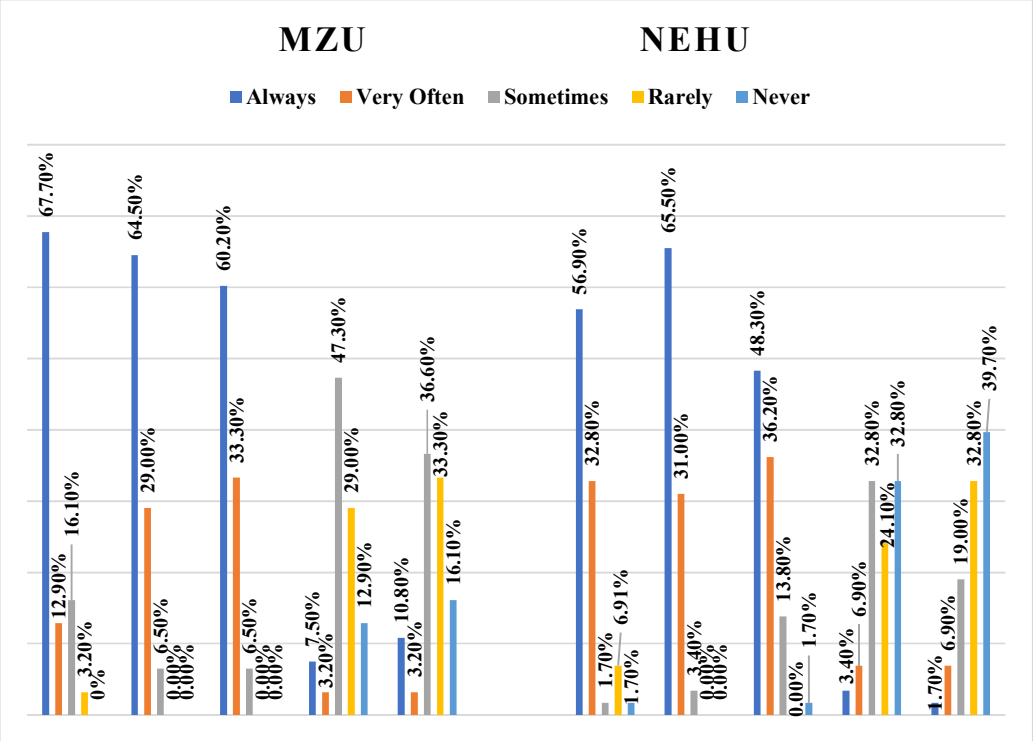


Figure 4.21: Frequency of dependence on digital sources

4.7.3 Preference for database for searching digital information

Table 4.23 and figure 4.22 provides insights into the commonly used databases by researchers at Mizoram University (MZU) and North-Eastern Hill University (NEHU).

At MZU, "Google Scholar" is the most frequently used database, out of 93 respondents, 66 (71.0%) respondents stated they use it "always", while 24 (25.8%) respondents use "very often", and only 3 (3.2%) use them "sometimes". This indicates a high reliance on this academic tool. "ScienceDirect" follows, out of 93 respondents, 47 (50.5%) respondents use it "always", following 27 (29.0%) use it "very often", while 15 (16.1%) respondents use it "sometime", and remaining 4 (4.3%) respondents use it "rarely" making it another key resource. In contrast, "Scopus" sees a moderate level of use, out of 93 respondents, 35 (37.6%) respondents rely on it "always", 18 (19.4%) respondents use it "very often", 21 (22.6%) respondents use it sometimes, while 15 (16.1%) respondents use it "rarely", and remaining 4 (4.3%) respondents never use it. "ResearchGate" is also popular, out of 93 respondents, 36 (38.7%) respondents use it "always", a notable 47 (50.5%) respondents use it "very often", and

only 10 (10.8%) respondents use it "sometimes". "PubChem", out of 93 respondents, 23 (24.7%) respondents use it "always", and an equal number of respondents i.e., 12 (12.9%) each use it "very often", "sometimes", and "rarely, and remaining 34 (36.6%) respondents never use it. "SciFinder" show lower utilization, out of 93 respondents, 12 (12.9%) respondents use "always", 29 (31.2%) respondents use "very often", only 6 (6.5%) respondents use "sometimes", while 21 (22.6%) respondents use "rarely", and 25 (26.9%) never use it. "Web of Science", out of 93 respondents, 21 (22.6%) respondents use "always", 20 (21.5%) respondents use "very often", only 12 (12.9%) respondents use "sometimes", while 21 (22.6%) respondents use "rarely", and 19 (20.4%) never use it. "RCSB Protein Data Bank", out of 93 respondents, 6 (6.5%) respondents use "always", 9 (9.7%) respondents use "very often", only 10 (10.8%) respondents use "sometimes", while 12 (12.9%) respondents use "rarely", and rest 56 (60.2%) never use it. Similarly, "e-ShodhSindhu", out of 93 respondents, 9 (9.7%) respondents use "always", 14 (15.1%) respondents use "very often", only 12 (12.9%) respondents use "sometimes", while 15 (16.1%) respondents use "rarely", and 43 (46.2%) never use it. Lastly, "JSTORE", out of 93 respondents, 9 (9.7%) respondents use "always", only 6 (6.5%) respondents use "sometimes", while 17 (18.3%) respondents use "rarely", and remaining 61 (65.6%) never use it.

At NEHU, "Google Scholar" is even more dominant, out of 58 respondents, 50 (86.2%) respondents stated they use it "always", and remaining 8 (13.8%) respondents use "very often. "ScienceDirect" is also widely used, out of 58 respondents, 38 (65.5%) respondents use it "always", following 12 (20.7%) use it "very often", while 5 (8.6%) respondents use it "sometime", and remaining 3 (5.2%) respondents use it "rarely". "Scopus", out of 58 respondents, 31 (53.4%) respondents rely on it "always", 12 (20.7%) respondents use it "very often", and an equal number of respondents i.e., 7 (12.1%) each use it "sometimes" and "rarely", and only 1 (1.7%) respondent never use it. "ResearchGate", out of 58 respondents, 35 (60.3%) respondents use it "always", while 10 (17.2%) respondents use it "very often", and only 13 (22.4%) respondents use it "sometimes". "PubChem", out of 58 respondents, 28 (48.3%) respondents use it "always", 4 (6.9%) respondents use it "very often", 6 (10.3%) respondents use it "sometimes", 9 (15.5%) respondents use it "rarely, and remaining 11 (19.0%) respondents never use it. "SciFinder", out of 58 respondents, 39 (67.2%) respondents

use “always”, 1 (1.7%) respondent use “very often”, only 4 (6.9%) respondents use “sometimes”, while 8 (13.8%) respondents use “rarely”, and rest 6 (10.3%) never use it. “Web of Science”, out of 58 respondents, 37 (63.8%) respondents use “always”, 5 (8.6%) respondents use “very often”, only 8 (13.8%) respondents use “sometimes”, only 2 (3.4%) respondents use “rarely”, and remaining 6 (10.3%) never use it. “RCSB Protein Data Bank”, out of 58 respondents, 6 (10.3%) respondents use “always”, 2 (3.4%) respondents use “very often”, 3 (5.2%) respondents use “sometimes”, while 15 (25.9%) respondents use “rarely”, and remaining 32 (55.2%) never use it. Similarly, “e-ShodhSindhu”, out of 58 respondents, 5 (8.6%) respondents use “always”, 1 (1.7%) respondent use “very often”, 8 (13.8%) respondents use “sometimes”, while 12 (20.7%) respondents use “rarely”, and 32 (55.2%) never use it. Lastly, “JSTORE”, out of 58 respondents, an equal number of respondents i.e., 2 (3.4%) each use “always” and “very often”, 6 (10.3%) respondents use “sometimes”, while 11 (19.0%) respondents use “rarely”, and remaining 37 (63.8%) never use it.

In summary, both universities show a strong preference for “Google Scholar,” “ScienceDirect,” and “ResearchGate,” while more specialized tools like “PubChem” and “RCSB Protein Data Bank” are less frequently used.

Table 4.23: Preference of database for searching digital information

Options	MZU					
	Always (%)	Very Often (%)	Sometimes (%)	Rarely (%)	Never (%)	Total (%)
Google Scholar	66 (71.0)	24 (25.8)	3 (3.2)	0 (0)	0 (0)	93 (100)
ScienceDirect	47 (50.5)	27 (29.0)	15 (16.1)	4 (4.3)	0 (0)	93 (100)
Scopus	35 (37.6)	18 (19.4)	21 (22.6)	15 (16.1)	4 (4.3)	93 (100)
ResearchGate	36 (38.7)	47 (50.5)	10 (10.8)	0 (0)	0 (0)	93 (100)
PubChem	23 (24.7)	12 (12.9)	12 (12.9)	12 (12.9)	34 (36.6)	93 (100)
SciFinder	12 (12.9)	29 (31.2)	6 (6.5)	21 (22.6)	25 (26.9)	93 (100)
Web of Science	21 (22.6)	20 (21.5)	12 (12.9)	21 (22.6)	19 (20.4)	93 (100)
RCSB Protein Data Bank	6 (6.5)	9 (9.7)	10 (10.8)	12 (12.9)	56 (60.2)	93 (100)
PubMed	12 (12.9)	3 (3.2)	9 (9.7)	12 (12.9)	57 (61.3)	93 (100)
e-ShodhSindhu	9 (9.7)	14 (15.1)	12 (12.9)	15 (16.1)	43 (46.2)	93 (100)
JSTORE	9 (9.7)	0 (0)	6 (6.5)	17 (18.3)	61 (65.6)	93 (100)
Options	**NEHU**					
	Always	**Very Often**	**Sometimes**	**Rarely**	**Never**	**Total**
Google Scholar	50 (86.2)	8 (13.8)	0 (0)	0 (0)	0 (0)	58 (100)
ScienceDirect	38 (65.5)	12 (20.7)	5 (8.6)	3 (5.2)	0 (0)	58 (100)
Scopus	31 (53.4)	12 (20.7)	7 (12.1)	7 (12.1)	1 (1.7)	58 (100)
ResearchGate	35 (60.3)	10 (17.2)	13 (22.4)	0 (0)	0 (0)	58 (100)
PubChem	28 (48.3)	4 (6.9)	6 (10.3)	9 (15.5)	11 (19.0)	58 (100)
SciFinder	39 (67.2)	1 (1.7)	4 (6.9)	8 (13.8)	6 (10.3)	58 (100)
Web of Science	37 (63.8)	5 (8.6)	8 (13.8)	2 (3.4)	6 (10.3)	58 (100)
RCSB Protein Data Bank	6 (10.3)	2 (3.4)	3 (5.2)	15 (25.9)	32 (55.2)	58 (100)
PubMed	24 (41.4)	1 (1.7)	9 (15.5)	8 (13.8)	16 (27.6)	58 (100)
e-ShodhSindhu	5 (8.6)	1 (1.7)	8 (13.8)	12 (20.7)	32 (55.2)	58 (100)
JSTORE	2 (3.4)	2 (3.4)	6 (10.3)	11 (19.0)	37 (63.8)	58 (100)

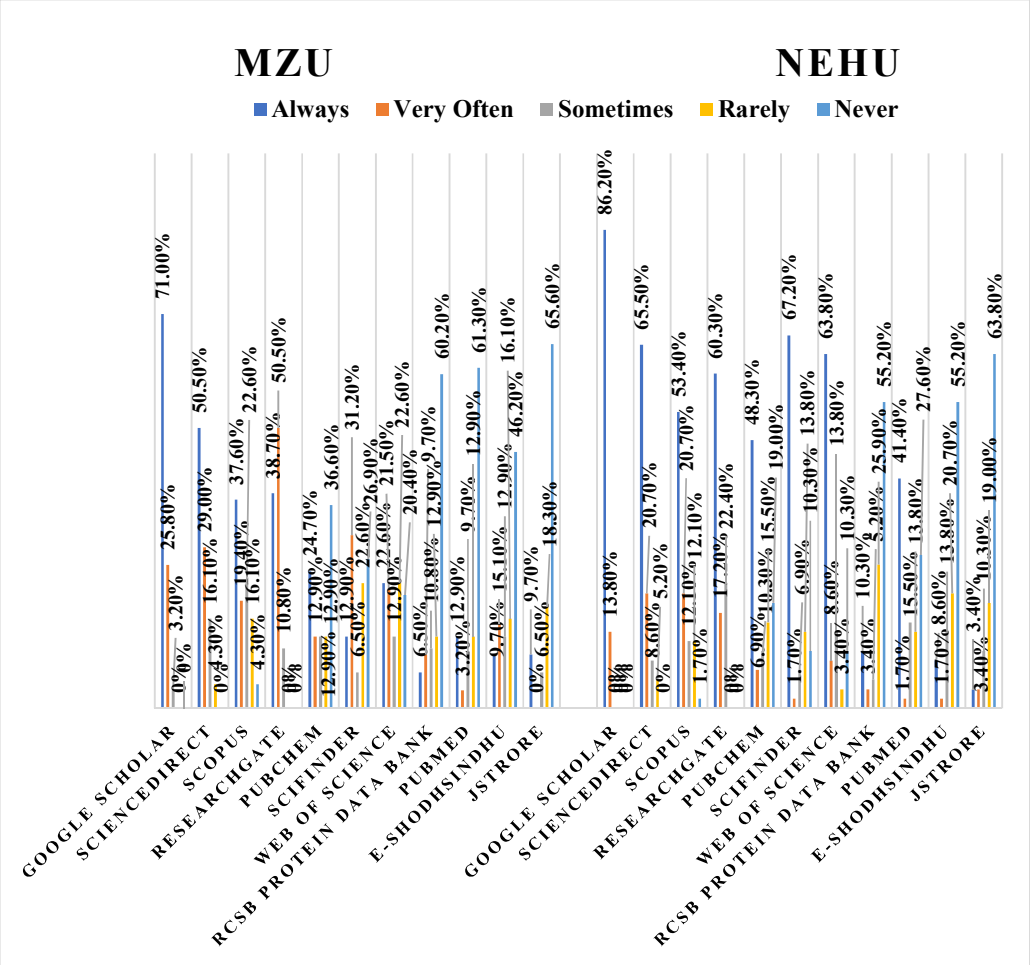


Figure 4.22: Preference of database for searching digital information

4.7.4 Essential factors for evaluating digital information

Table 4.24 and figure 4.23 highlights the essential factors considered by researchers at Mizoram University (MZU) and North-Eastern Hill University (NEHU) when evaluating digital information for their academic work.

At MZU, "Author's credentials and expertise" are regarded as very important, out of 93 respondents, 62 (66.7%) respondents responded "very important", while 28 (30.1%) respondents responded "moderately important", and only 3 (3.2%) respondents responded "not important". "Publication source", out of 93 respondents, 59 (63.4%) respondents responded "very important", while 31 (33.3%) respondents responded "moderately important", and only 3 (3.2%) respondents responded "not important". "Date of publication", out of 93 respondents, 38 (40.9%) respondents responded "very important", while 46 (49.5%) respondents responded "moderately

important", and 9 (9.7%) respondents responded "not important". "Citations and references", out of 93 respondents, 32 (34.4%) respondents responded "very important", 42 (45.2%) respondents responded "moderately important", and remaining 19 (20.4%) respondents responded "not important". "Peer-reviewed status", out of 93 respondents, 38 (40.9%) respondents responded "very important", 40 (43.0%) respondents responded "moderately important", and 15 (16.1%) respondents responded "not important". "Relevance to the research topic" out of 93 respondents, 78 (83.9%) respondents responded "very important", and 15 (16.1%) respondents responded "moderately important". Lastly, "Accuracy and precision of the information" is deemed the most critical factor, out of 93 respondents, 84 (90.3%) respondents responded "very important", while 6 (6.5%) respondents responded "moderately important", and only 3 (3.2%) respondents responded "not important".

At NEHU, "Author's credentials and expertise" are regarded as very important, out of 58 respondents, 51 (87.9%) respondents responded "very important", and remaining 7 (12.1%) respondents responded "moderately important". "Publication source", out of 58 respondents, 48 (82.8%) respondents responded "very important", and 10 (17.2%) respondents responded "moderately important". "Date of publication", out of 58 respondents, 25 (43.1%) respondents responded "very important", and 33 (56.9%) respondents responded "moderately important". "Citations and references", out of 58 respondents, 39 (67.2%) respondents responded "very important", and 19 (32.8%) respondents responded "moderately important". "Peer-reviewed status", out of 58 respondents, 41 (70.7%) respondents responded "very important", and 17 (29.3%) respondents responded "moderately important". Similarly, "Relevance to the research topic" out of 58 respondents, 55 (94.8%) respondents responded "very important", and only 3 (5.2%) respondents responded "moderately important". Lastly, "Accuracy and precision of the information", out of 58 respondents, 52 (89.7%) respondents responded "very important", and only 6 (10.3%) respondents responded "moderately important".

Both universities prioritize accuracy, relevance, and the author's credibility, reflecting a consistent focus on high-quality, reliable information for academic work.

Table 4.24: Essential factors for evaluating digital information

Options	MZU			
	Very Important (%)	Moderately Important (%)	Not Important (%)	Total (%)
Author's credentials and expertise	62 (66.7)	28 (30.1)	3 (3.2)	93 (100)
Publication source	59 (63.4)	31 (33.3)	3 (3.2)	93 (100)
Date of publication	38 (40.9)	46 (49.5)	9 (9.7)	93 (100)
Citations and references	32 (34.4)	42 (45.2)	19 (20.4)	93 (100)
Peer-reviewed status	38 (40.9)	40 (43.0)	15 (16.1)	93 (100)
Relevance to the research topic	78 (83.9)	15 (16.1)	0 (0)	93 (100)
Accuracy and precision of the information	84 (90.3)	6 (6.5)	3 (3.2)	93 (100)
Options	**NEHU**			
	Very Important (%)	**Moderately Important (%)**	**Not Important (%)**	**Total (%)**
Author's credentials and expertise	51 (87.9)	7 (12.1)	0 (0)	58 (100)
Publication source	48 (82.8)	10 (17.2)	0 (0)	58 (100)
Date of publication	25 (43.1)	33 (56.9)	0 (0)	58 (100)
Citations and references	39 (67.2)	19 (32.8)	0 (0)	58 (100)
Peer-reviewed status	41 (70.7)	17 (29.3)	0 (0)	58 (100)
Relevance to the research topic	55 (94.8)	3 (5.2)	0 (0)	58 (100)
Accuracy and precision of the information	52 (89.7)	6 (10.3)	0 (0)	58 (100)

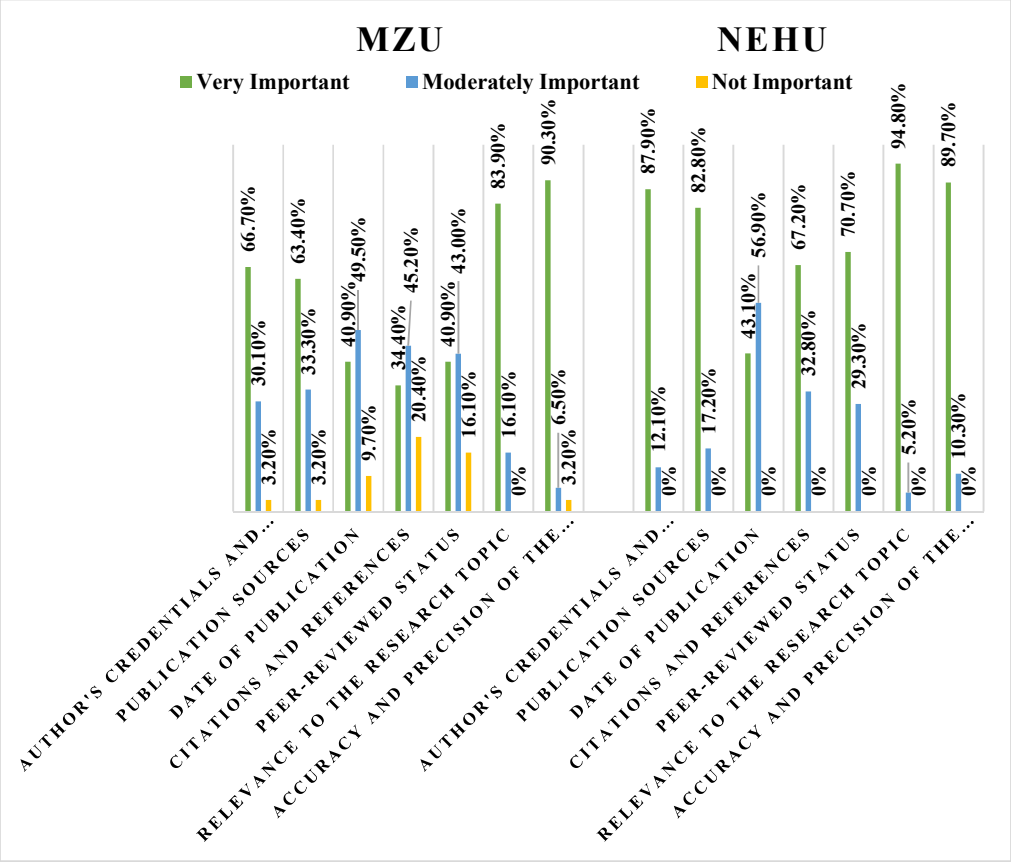


Figure 4.23: Essential factors for evaluating digital information

4.7.5 Ability for evaluating the authenticity of digital information

Table 4.25 and figure 4.24 outlines the ability of students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) in evaluating the authenticity of digital information through various methods during their research process.

At MZU, "checking the source and authorship" is where students feel the most confident, out of 93 respondents, 60 (64.5%) respondents are "very confident", while 30 (32.3%) respondents are "moderately confident", and only 3 (3.2%) expressed "not confidence". When it comes to "verifying citations and references", out of 93 respondents, 47 (50.5%) respondents are "very confident", 37 (39.8%) are "moderately confident", and rest 9 (9.7%) are "not confident". Evaluating the "publication date" has similar results, out of 93 respondents, an equal number of respondents i.e., 45 (48.4%) each are "very confident" and "moderately confident", and remaining 3 (3.2%) respondents are "not confident". "Analyzing the content and

writing style", out of 93 respondents, 35 (37.6%) respondents are "very confident", 46 (49.5%) respondents are "moderately confident", and 12 (12.9%) respondents are "not confident". "Cross-referencing information", out of 93 respondents, 32 (34.4%) respondents are "very confident", 54 (58.1%) respondents are "moderately confident", and 7 (7.5%) respondents are "not confident". Lastly, "evaluating the website domain and design", out of 93 respondents, 18 (19.4%) respondents are "very confident", 54 (58.1%) respondents are "moderately confident", and remaining 21 (22.6%) respondents are "not confident".

At NEHU, confidence is generally higher across the board. "Checking the source and authorship" is where students feel the most confident, out of 58 respondents, 42 (72.4%) respondents are "very confident", and 16 (27.6%) respondents are "moderately confident". When it comes to "verifying citations and references", out of 58 respondents, 38 (65.5%) respondents are "very confident", and 20 (34.5%) are "moderately confident". Evaluating the "publication date" has similar results, out of 58 respondents, 31 (53.4%) each are "very confident", 25 (43.1%) respondents are "moderately confident", and remaining 2 (3.4%) respondents are "not confident". "Analyzing the content and writing style", out of 58 respondents, 32 (55.2%) respondents are "very confident", 21 (36.2%) respondents are "moderately confident", and 5 (8.6%) respondents are "not confident". "Cross-referencing information", out of 58 respondents, 31 (53.4%) respondents are "very confident", 23 (39.7%) respondents are "moderately confident", and 4 (6.9%) respondents are "not confident". Lastly, "evaluating the website domain and design", out of 58 respondents, 16 (27.6%) respondents are "very confident", 30 (51.7%) respondents are "moderately confident", and remaining 12 (20.7%) respondents are "not confident".

Overall, NEHU students exhibit higher levels of confidence across most categories compared to MZU students, particularly in verifying sources and references. However, confidence in evaluating website domains and design is lower at both universities.

Table 4.25: Ability for evaluating the authenticity

Options	MZU			
	Very Confident (%)	Moderately Confident (%)	Not Confident (%)	Total (%)
Check the source and authorship	60 (64.5)	30 (32.3)	3 (3.2)	93 (100)
Verify citations and references	47 (50.5)	37 (39.8)	9 (9.7)	93 (100)
Assess the publication date	45 (48.4)	45 (48.4)	3 (3.2)	93 (100)
Analyzing the content and writing style	35 (37.6)	46 (49.5)	12 (12.9)	93 (100)
Cross-reference information	32 (34.4)	54 (58.1)	7 (7.5)	93 (100)
Evaluate website domain and design	18 (19.4)	54 (58.1)	21 (22.6)	93 (100)
Options	**NEHU**			
	Very Confident (%)	**Moderately Confident (%)**	**Not Confident (%)**	**Total (%)**
Check the source and authorship	42 (72.4)	16 (27.6)	0 (0)	58 (100)
Verify citations and references	38 (65.5)	20 (34.5)	0 (0)	58 (100)
Assess the publication date	31 (53.4)	25 (43.1)	2 (3.4)	58 (100)
Analyze the content and writing style	32 (55.2)	21 (36.2)	5 (8.6)	58 (100)
Cross-reference information	31 (53.4)	23 (39.7)	4 (6.9)	58 (100)
Evaluate website domain and design	16 (27.6)	30 (51.7)	12 (20.7)	58 (100)

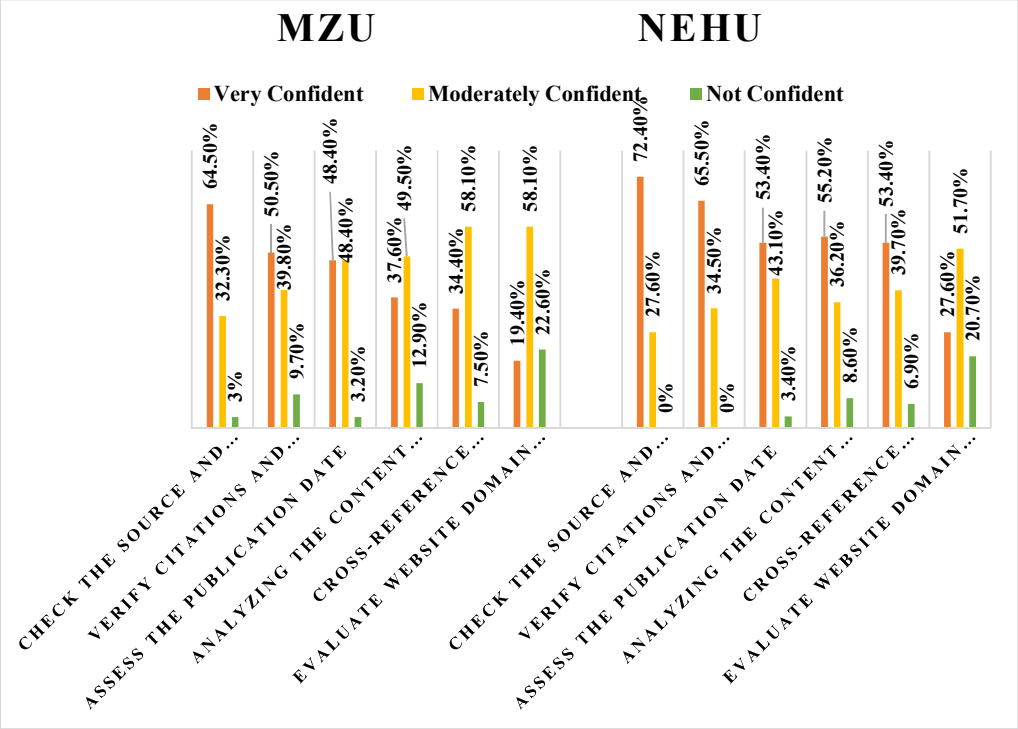


Figure 4.24: Ability for evaluating the authenticity

4.8 Satisfaction and impact of the digital literacy initiative

4.8.1 Participation in the digital literacy initiative

Table 4.26 and figure 4.25 provides data on student participation in the digital literacy initiative at two universities, MZU and NEHU. At MZU, out of 93 respondents, 22 (23.7%) respondents reported having completed the program, while 3 (3.2%) respondents are currently enrolled. However, the majority of students, 68 (73.1%) respondents, have not participated in the program. In comparison, participation at NEHU is even lower, out of 58 respondents, with only 2 (3.4%) respondents having completed the program and 4 (6.9%) respondents currently enrolled. The majority at NEHU, 52 (89.7%), have not taken part in the program. This data reflects a relatively low engagement with the digital literacy program at both universities, with NEHU showing particularly limited participation.

Table 4.26: Participation in Digital Literacy Initiative

Orientation	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes, I have completed the program	22	23.7	2	3.4
Yes, I am currently enrolled in the program	3	3.2	4	6.9
No, I have not participated in the program.	68	73.1	52	89.7
Total	**93**	**100**	**58**	**100**

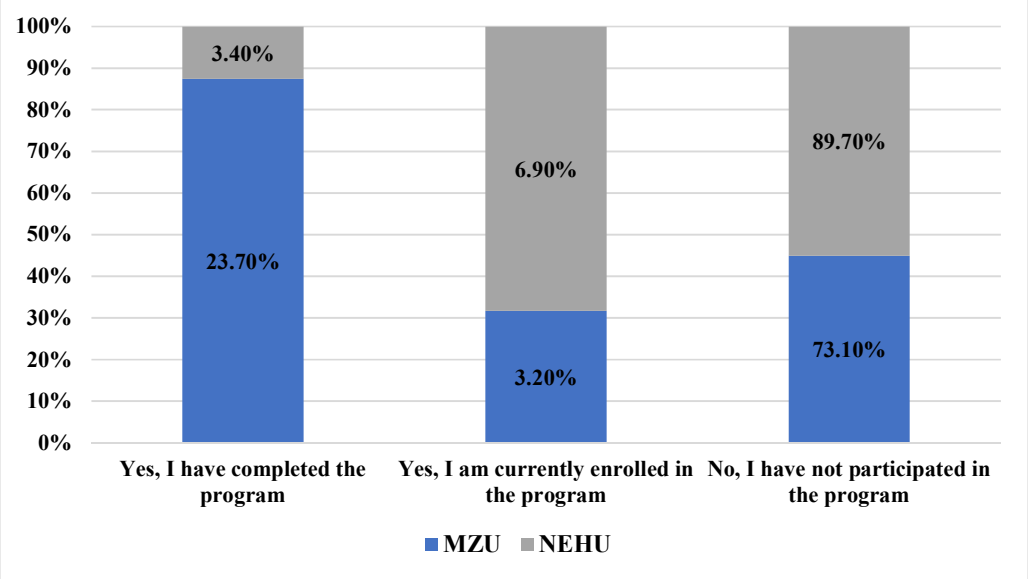


Figure 4.25: Participation in Digital Literacy Initiative

4.8.2 Ability in applying digital literacy skills

Table 4.27 and figure 4.26 presents a comparison of the confidence levels in applying digital literacy skills between two Universities, MZU and NEHU. At MZU, out of 93 respondents, the majority 52 (55.9%) respondents, expressed that they feel "confident" in their digital literacy skills. This is followed by 28 (30.1%) respondents who reported being "somewhat confident", and only 10 (10.8%) respondents indicated that they are "very confident" in their abilities, while 3 individuals (3.2%) expressed that they are "not confident at". Interestingly, none of the respondents in MZU reported feeling "not very confident all", as this category has a frequency of 0.

At NEHU, out of 58 respondents, 6 (10.3%) respondents are "very confident". This is followed by 28 (48.3%) respondents are "confident", while 16 (27.6%)

respondents are “somewhat confident”. Notably, 8 (13.8%) respondents expressed that they are “not very confident”. Unlike MZU, no one in NEHU selected “not confident at all”. The study highlights, while both MZU and NEHU show a majority of respondents feeling confident or somewhat confident in their digital literacy skills.

Table 4.27: Ability in applying digital literacy skills

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Very confident	10	10.8	6	10.3
Confident	52	55.9	28	48.3
Somewhat confident	28	30.1	16	27.6
Not very confident	3	3.2	8	13.8
Not confident at all	0	0	0	0
Total	**93**	**100**	**58**	**100**

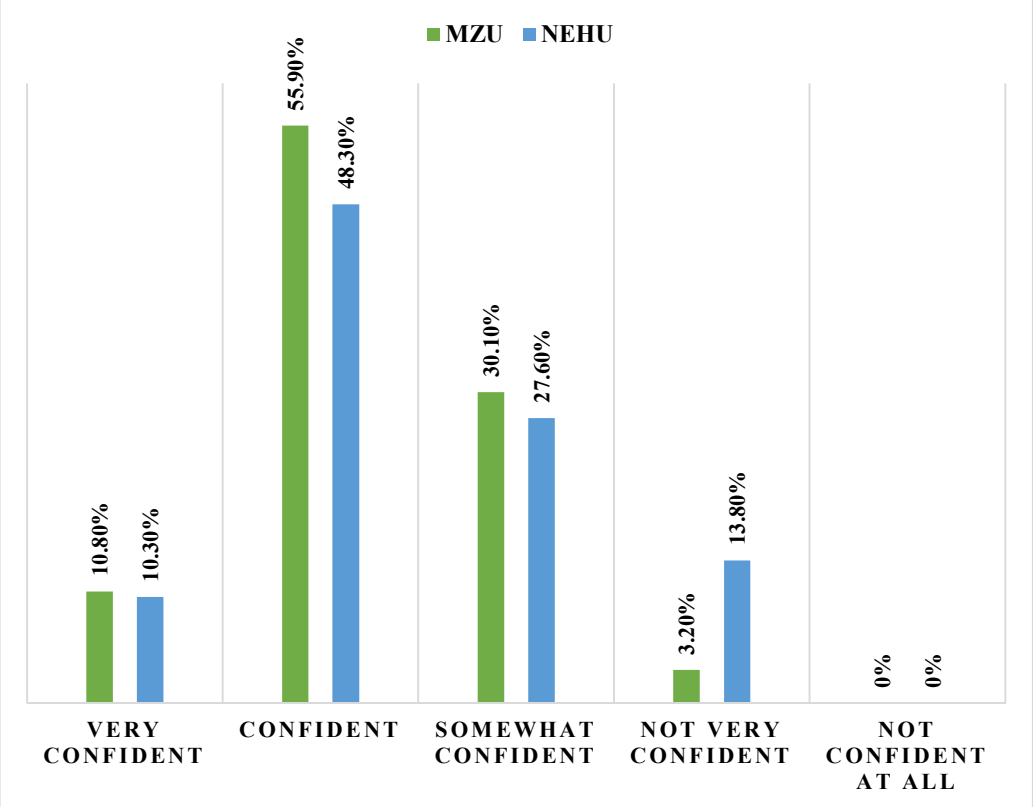


Figure 4.26: Ability in applying digital literacy skills

4.8.3 Satisfaction levels regarding the impact of the digital literacy initiative

Table 4.28 and figure 4.27 shows the satisfaction levels regarding the impact of the digital literacy program on digital literacy competency between two universities, Mizoram University (MZU) and North Eastern Hill University (NEHU).

At MZU, out of 93 respondents, only 3 (3.2%) respondents, expressed that they are "Very satisfied". This is followed by 40 (43.0%) respondents who are "Satisfied" with the program's effect on their digital literacy skills. Similarly, 43 (46.2%) respondents, reported "Neutral" about the impact of the digital literacy program. However, 7 (7.5%) respondents indicated that they are "Very dissatisfied" with the impact of the program. Interestingly, no one in MZU reported being "Dissatisfied".

In contrast, for NEHU, out of 58 respondents, 5 (8.6%) respondents expressed that they are "Very satisfied". Following, 30 (51.7%) respondents, reported being "Satisfied" with the impact of the program. Similarly, 23 (39.7%) respondents stated "Neutral". There are no respondents in NEHU who reported being "Very dissatisfied" or "Dissatisfied", indicating a more positive overall perception in this group.

The results show that, while both MZU and NEHU show a significant portion of respondents feeling satisfied or neutral about the program, NEHU reflects a more positive outcome overall, with no dissatisfaction reported, whereas MZU shows a small group expressing strong dissatisfaction.

Table 4.28: Satisfaction levels regarding digital literacy initiative

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Very satisfied	10	10.8	5	8.6
Satisfied	40	43.0	30	51.7
Neutral	43	46.2	23	39.7
Dissatisfied	0	0	0	0
Very dissatisfied	0	0	0	0
Total	**93**	**100**	**58**	**100**

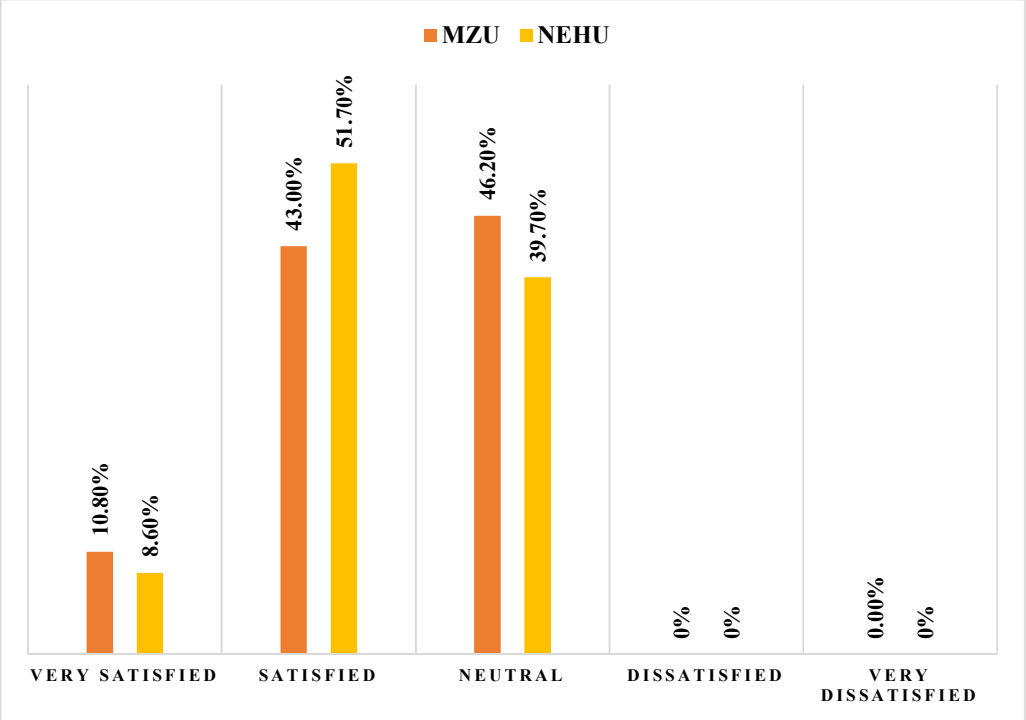


Figure 4.27: Satisfaction levels regarding the digital literacy initiative

4.8.4 Perspectives regarding the impact of digital literacy competency

Table 4.29 and figure 4.28 highlights the perspectives of respondents from Mizoram University (MZU) and North-Eastern Hill University (NEHU) regarding the impact of digital literacy competency on various aspects of academic and professional pursuits.

At MZU, a majority of respondents show a strong consensus regarding the benefits of digital literacy. For "save time and money", out of 93 respondents, 65 (69.9%) respondents responded "strongly agree", while 21 (22.6%) respondents responded "agree", and only 7 (7.5%) respondents stated "disagree". Similarly, for "enhances research efficiency and productivity" out of 93 respondents, 59 (63.4%) respondents responded "strongly agree", and 34 (36.6%) respondents responded "agree". When it comes to "enhanced data analysis and visualization", out of 93 respondents, 66 (71.0%) respondents stated "strongly agree", while 24 (25.8%) respondents responded "agree", and only 3 (3.2%) respondents responded "disagree", indicating that almost all respondents acknowledge the benefit in this area. In terms of "improved information evaluation", out of 93 respondents, 50 (53.8%) respondents

responded “strongly agree” and remaining 43 (46.2%) respondents stated “agree”, showing no disagreement at all. For “global outreach and dissemination of research”, out of 93 respondents, 39 (41.9%) respondents responded “strongly agree”, while 51 (54.8%) respondents responded “agree”, and only 3 (3.2%) respondents responded “disagree”. Lastly, “facilitation of remote research and collaboration”, out of 93 respondents, 40 (43.0%) respondents responded “strongly agree” and 53 (57.0%) respondents responded “agreeing”.

At NEHU, the responses are also positive but exhibit some differences in distribution compared to MZU. For “saving time and money”, out of 58 respondents, 37 (63.8%) respondents “strongly agree” and 21 (36.2%) respondents responded “agree”. In terms of “enhanced research efficiency and productivity”, out of 58 respondents, a larger proportion of respondents i.e., 44 (75.9%) responded “strongly agree”, while 14 (24.1%) respondents responded “agree”. Regarding “enhanced data analysis and visualization”, out of 58 respondents, 42 (72.4%) respondents stated “strongly agree” and 16 (27.6%) respondents responded “agree”. “Improved information evaluation”, out of 58 respondents, 38 (65.5%) respondents “strongly agree” and 20 (34.5%) respondents responded “agree”, indicating strong overall support. The concept of “global outreach and dissemination of research” is also highly regarded, out of 58 respondents, 39 (67.2%) respondents responded “strongly agree” and 19 (32.8%) respondents responded “agree”. Lastly, “facilitate remote research and collaboration”, out of 58 respondents, 36 (62.1%) respondents responded “strongly agree” and 22 (37.9%) respondents responded “agree”.

In both university, digital literacy is recognized as having a significant positive impact on academic and professional activities, with strong agreement on its benefits, especially in areas like saving time, enhancing research productivity, and facilitating collaboration. The data reveals unanimous agreement across both universities, highlighting the critical role of digital literacy in modern education and research.

Table 4.29 Perspectives regarding the impact of digital literacy competency

Options	MZU				
	Strongly Agree (%)	Agree (%)	Strongly Disagree (%)	Disagree (%)	Total (%)
Save time and money	65 (69.9)	21 (22.6)	0 (0)	7 (7.5)	93 (100)
Enhanced research efficiency and productivity	59 (63.4)	34 (36.6)	0 (0)	0 (0)	93 (100)
Enhanced data analysis and visualization	66 (71.0)	24 (25.8)	0 (0)	3 (3.2)	93 (100)
Improved information evaluation	50 (53.8)	43 (46.2)	0 (0)	0 (0)	93 (100)
Global outreach and dissemination of research	39 (41.9)	51 (54.8)	0 (0)	3 (3.2)	93 (100)
Facilitation of remote research and collaboration	40 (43.0)	53 (57.0)	0 (0)	0 (0)	93 (100)
Options	**NEHU**				
	Strongly Agree (%)	**Agree (%)**	**Strongly Disagree (%)**	**Disagree (%)**	**Total (%)**
Save time and money	37 (63.8)	21 (36.2)	0 (0)	0 (0)	58 (100)
Enhanced research efficiency and productivity	44 (75.9)	14 (24.1)	0 (0)	0 (0)	58 (100)
Enhanced data analysis and visualization	42 (72.4)	16 (27.6)	0 (0)	0 (0)	58 (100)
Improved information evaluation	38 (65.5)	20 (34.5)	0 (0)	0 (0)	58 (100)
Global outreach and dissemination of research	39 (67.2)	19 (32.8)	0 (0)	0 (0)	58 (100)
Facilitation of remote research and collaboration	36 (62.1)	22 (37.9)	0 (0)	0 (0)	58 (100)

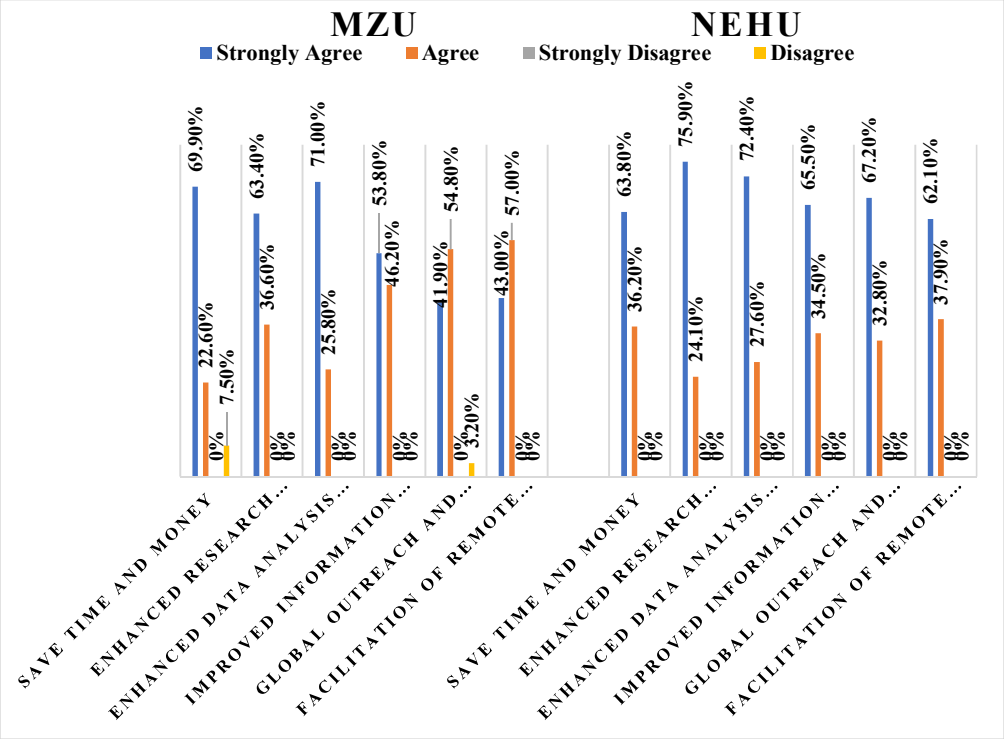


Figure 4.28: Perspectives regarding the impact of digital literacy competency

4.9 Strength and weakness of digital literacy skills

4.9.1 Importance of digital literacy skills are for research

Table 4.30 and figure 4.29 shows the insights into how students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) think the importance of digital literacy skills for academic and research purposes.

At MZU, out of 93 respondents, 43 (46.2%) respondents consider it "extremely important", while 37 (39.8%) respondents rate it as "very important". A smaller group of 13 (14.0%) respondents see it as "moderately important". No one rates it as "slightly important" or "not important at all". This shows that students at MZU almost universally recognize the value of digital literacy in their academic endeavours, with a high percentage placing it in the top stage of importance.

At NEHU, the importance of digital literacy is even more pronounced, out of 58 respondents, 23 (39.7%) respondents considered it "extremely important" and the remaining 35 (60.3%) respondents rated it as "very important". No respondents at NEHU view it as "moderately important", "slightly important", and "not important at

all" showing a complete importance that digital literacy holds considerable value for academic purposes.

The study highlights, both MZU and NEHU students emphasize the high importance of digital literacy skills for academic and research purposes, with NEHU showing slightly stronger positive sentiment.

Table 4.30 Importance of digital literacy skills

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Extremely important	43	46.2	23	39.7
Very important	37	39.8	35	60.3
Moderately important	13	14.0	0	0
Slightly important	0	0	0	0
Not important at all	0	0	0	0
Total	**93**	**100**	**58**	**100**

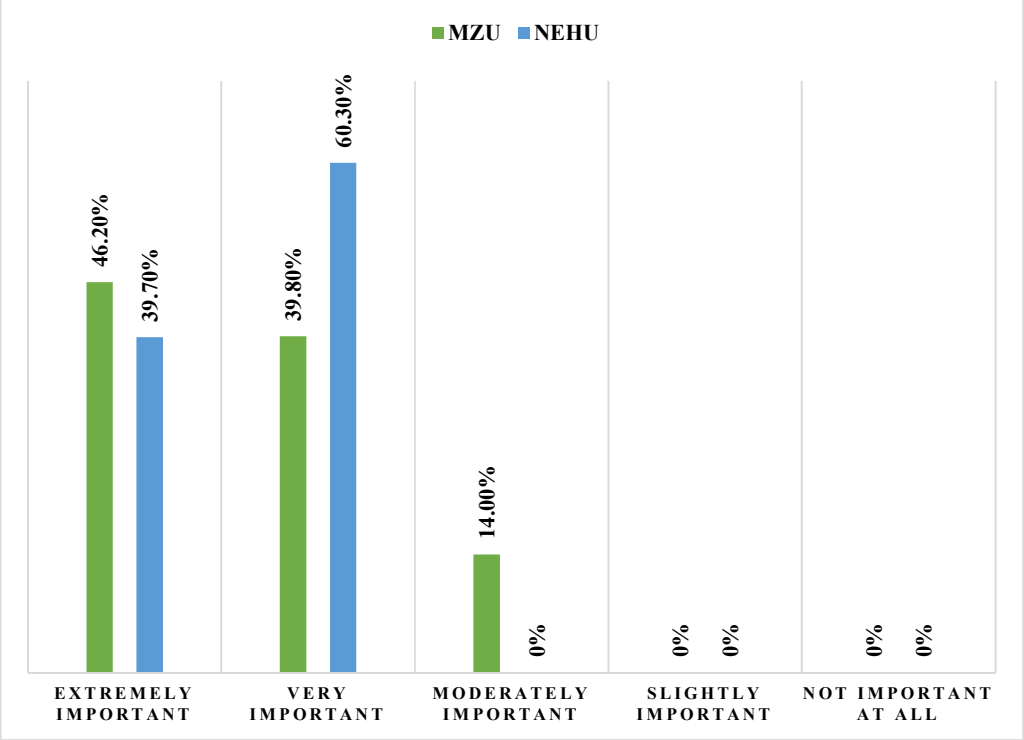


Figure 4.29 Importance of digital literacy skills

4.9.2 Contribution of digital literacy to the overall efficiency and quality

Table 4.31 and figure 4.30 highlights into how students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) views on how these skills contribute to research efficiency and quality.

At MZU, out of 93 respondents, 26 (28.0%) respondents “strongly agree” that it significantly improves these aspects, and 42 (45.2%) respondents responded “agree”. However, 22 (23.7%) respondents remained “neutral”, and only 3 (3.2%) respondents responded “disagree”. There are no respondents who “strongly disagree”, indicating that while there is some neutral sentiment, the majority acknowledges the contribution of digital literacy to research progress.

At NEHU, out of 58 respondents, 28 (48.3%) respondents “strongly agree” that it has a significant impact, and 22 (37.9%) respondents responded “agree”. Which means more than half acknowledged the strong contribution of digital literacy skills to their research. While 6 (10.3%) respondents responded “neutral”, and only 2 (3.4%) respondents responded “disagree”. No respondents were found who “strong disagree”.

The result shows that, the majority of students in both institutions agree that digital literacy plays a critical role in enhancing research quality and efficiency, although some neutrality is present, at both the universities.

Table 4.31: Contribution of digital literacy

Options	MZU		NEHU	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Strongly agree	26	28.0	28	48.3
Agree	42	45.2	22	37.9
Neutral	22	23.7	6	10.3
Disagree	3	3.2	2	3.4
Strongly disagree	0	0	0	0
Total	**93**	**100**	**58**	**100**

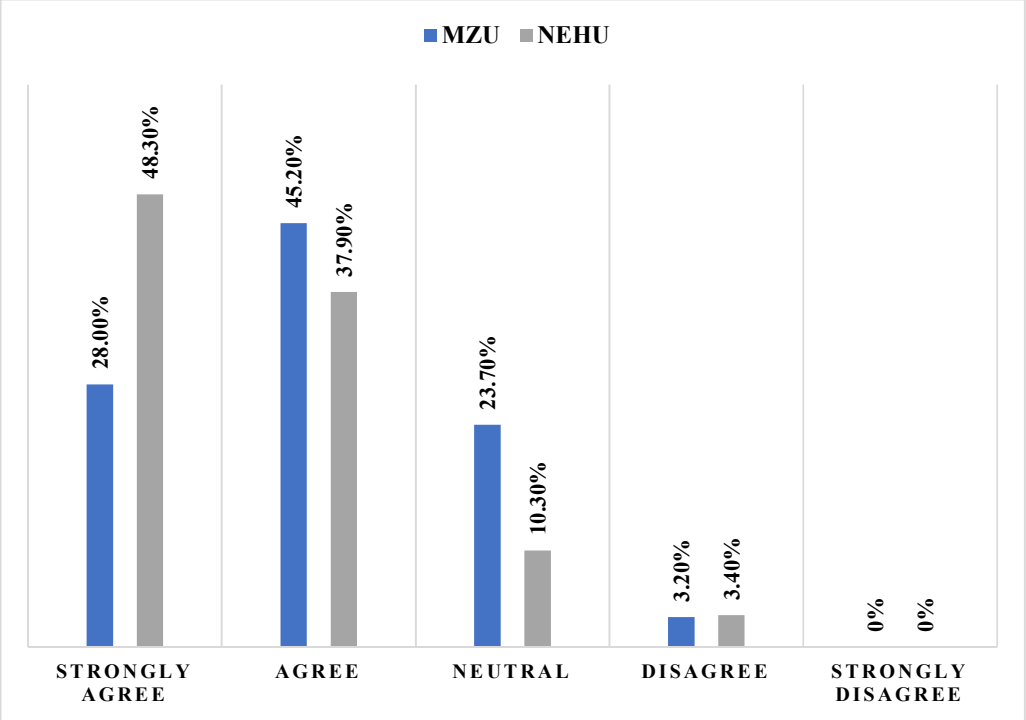


Figure 4.30: Contribution of digital literacy

4.9.3 Level of efficiency in accessing digital information

Table 4.32 and figure 4.31 illustrates the skills of students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) in accessing digital information to find relevant academic sources across various platforms.

At MZU, out of 93 respondents, 35 (37.6%) respondents display strong proficiency in accessing "academic databases and journals" as "highly skilled", and 46 (49.5%) respondents are "skilled", indicating more than half are proficient in this area. Remaining 12 (12.9%) respondents are "competent". Similarly, for "libraries and academic repositories", out of 93 respondents, only 3 (3.2%) respondents are "highly skilled", 44 (47.3%) are "skilled", while 39 (41.9%) respondents consider themselves "competent", and remaining 7 (7.5%) respondents are "not very skilled". When it comes to using "e-books platforms and e-libraries", out of 93 respondents, 12 (12.9%) are "highly skilled", 38 (40.9%) respondents are "skilled", while 36 (38.7%) respondents are "competent", and 7 (7.5%) respondents are "not very skilled". Accessing "open access repositories" shows a more varied distribution, out of 93 respondents, 23 (24.7%) respondents are "highly skilled", 27 (29.0%) respondents are

"skilled", and 40 (43.0%) respondents are "competent", with only 3 (3.2%) respondents are "not very skilled". Lastly, "search engines" are a strong area of competence for MZU students, out of 93 respondents, 42 (45.2%) are "highly skilled", 27 (29.0%) are "skilled", while 18 (19.4%) respondents identify as "competent", and only 6 (6.5%) respondents are "not very skilled".

At NEHU, for "academic database and journal", out of 58 respondents, 15 (25.9%) respondents are "highly skilled", 28 (48.3%) respondents are "skilled", and remaining 15 (25.9%) respondents are "competent". Regarding "libraries and academic repositories", out of 58 respondents, only 3 (3.2%) respondents are "highly skilled", 25 (43.1%) are "skilled", while 17 (29.3%) respondents consider themselves "competent", and remaining 13 (22.4%) respondents are "not very skilled". For "e-books platforms and e-libraries", out of 58 respondents, 5 (8.6%) are "highly skilled", 25 (43.1%) respondents are "skilled", while 26 (44.8%) respondents are "competent", and 2 (3.4%) respondents are "not very skilled". Accessing "open access repositories" shows that, out of 93 respondents, 6 (10.3%) respondents are "highly skilled", 23 (39.7%) respondents are "skilled", while 22 (37.9%) respondents are "competent", and 7 (12.1%) respondents are "not very skilled". Lastly, "search engines" are a strong area of competence for MZU students, out of 58 respondents, 7 (12.1%) are "highly skilled", 32 (55.2%) are "skilled", while 17 (29.3%) respondents identify as "competent", and only 2 (3.4%) respondents are "not very skilled".

The finding shows that, respondents at both universities exhibit strong digital literacy skills, particularly in academic databases and journals, though MZU students demonstrate slightly higher confidence in various areas compared to their NEHU counterparts, especially regarding search engines and repositories. NEHU students tend to feel more competent but are less likely to rate themselves as highly skilled.

Table 4.32: Level of accessing digital information

Options	MZU				
	Highly Skilled (%)	Skilled (%)	Competent (%)	Not Very Skilled (%)	Total (%)
Academic Database and Journals	35 (37.6)	46 (49.5)	12 (12.9)	0 (0)	93 (100)
Libraries and Academic Repositories	3 (3.2)	44 (47.3)	39 (41.9)	7 (7.5)	93 (100)
E-Books Platforms and E-Libraries	12 (12.9)	38 (40.9)	36 (38.7)	7 (7.5)	93 (100)
Open Access Repositories	23 (24.7)	27 (29.0)	40 (43.0)	3 (3.2)	93 (100)
Search engines	42 (45.2)	27 (29.0)	18 (19.4)	6 (6.5)	93 (100)
Options	**NEHU**				
	Highly Skilled (%)	**Skilled (%)**	**Competent (%)**	**Not Very Skilled (%)**	**Total (%)**
Academic Database and Journals	15 (25.9)	28 (48.3)	15 (25.9)	0 (0)	58 (100)
Libraries and Academic Repositories	3 (5.2)	25 (43.1)	17 (29.3)	13 (22.4)	58 (100)
E-Books Platforms and E-Libraries	5 (8.6)	25 (43.1)	26 (44.8)	2 (3.4)	58 (100)
Open Access Repositories	6 (10.3)	23 (39.7)	22 (37.9)	7 (12.1)	58 (100)
Search engines	7 (12.1)	32 (55.2)	17 (29.3)	2 (3.4)	58 (100)

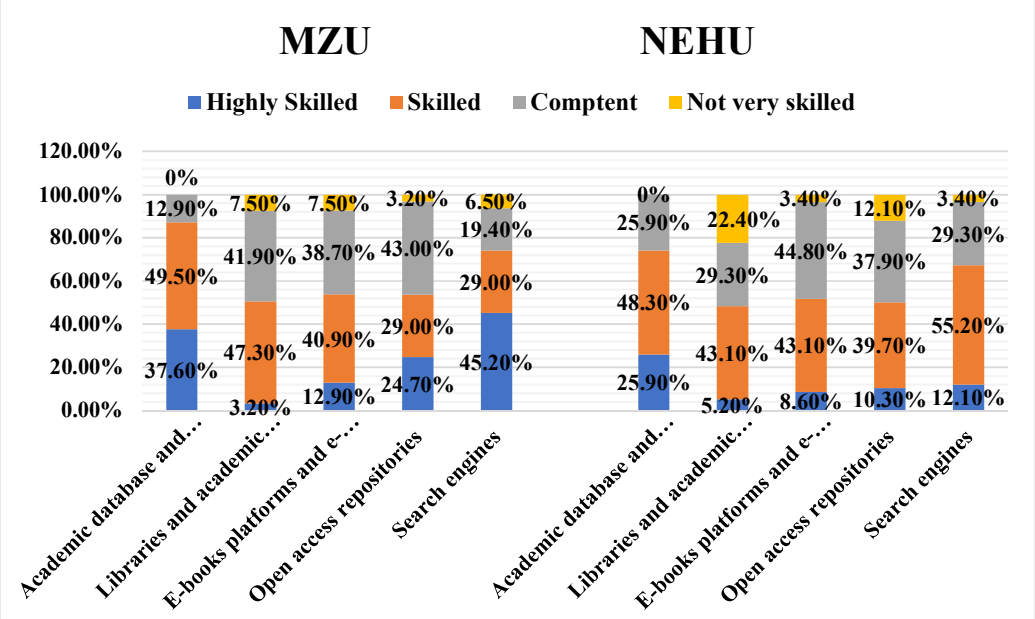


Figure 4.31: Level of accessing digital information

4.9.4 Proficiency in using digital platforms

Table 4.33 and figure 4.32 highlights the proficiency of students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) in utilizing digital platforms for collaboration and sharing research findings with their peers and mentors.

At MZU, students demonstrate a high level of proficiency in using digital platforms for research collaboration and sharing. For "Google Docs", out of 93 respondents, 46 (49.5%) respondents are "extremely proficient", while 35 (37.6%) respondents are "very proficient", while 12 (12.9%) respondents are "slightly proficient", and no one has reported "not proficient". Similarly, for "google drive", out of 93 respondents, 46 (49.5%) respondents are "extremely proficient", 32 (34.4%) respondents are "very proficient", while 9 (9.7%) respondents are "slightly proficient", and only 6 (6.5%) respondents are "not proficient". Regarding "Google Scholar", out of 93 respondents, a majority of 50 (53.8%) respondents are "extremely proficient", 31 (33.3%) respondents are "very proficient", and 12 (12.9%) respondents are "slightly proficient", showing strong competency. "Microsoft Word" also shows a high skill level, out of 93 respondents, 50 (53.8%) are "extremely proficient" and 40 (43.0%) respondents are "very proficient", and only 3 (3.2%) respondents are "slightly proficient". For "MS Excel", out of 93 respondents, 47 (50.5%) respondents are "extremely proficient", while 34 (36.6%) respondents are "very proficient", and 12 (12.9%) respondents are "slightly proficient". In "PowerPoint" highest proficiency levels can be seen, out of 93 respondents, 53 (57.0%) respondents are "extremely proficient", while 34 (36.6%) respondents are "very proficient", and 6 (6.5%) respondents are "slightly proficient". Lastly, for "Zoom", out of 93 respondents, 34 (36.6%) respondents are "extremely proficient", 37 (39.8%) respondents are "very proficient", while 19 (20.4%) respondents are "slightly proficient", and only 3 (3.2%) respondents are "not proficient".

At NEHU, students also show considerable proficiency but with some notable differences. For "Google Docs", out of 58 respondents, 22 (37.9%) respondents are "extremely proficient", 20 (34.5%) respondents are "very proficient", and 16 (27.6%) respondents are "slightly proficient. For "Google Drive", proficiency is evenly split, out of 58 respondents, 22 (37.9%) respondents are "extremely proficient", while 22 (37.9%) respondents are "very proficient", and 14 (24.1%) respondents are "slightly

proficient". For "Google Scholar", out of 58 respondents, 26 (44.8%) respondents are "extremely proficient", 21 (36.2%) respondents are "very proficient", and 11 (19.0%) respondents are "slightly proficient". Regarding "Microsoft Word", out of 58 respondents, 26 (44.8%) respondents are "extremely proficient", while 25 (43.1%) respondents are "very proficient", and 7 (12.1%) respondents are "slightly proficient". For "MS Excel", out of 58 respondents, 21 (36.2%) respondents are "extremely proficient", 23 (39.7%) respondents are "very proficient", and 14 (24.1%) respondents are "slightly proficient". Similarly, for "PowerPoint", out of 58 respondents, 24 (41.4%) respondents are "extremely proficient", 25 (43.1%) respondents are "very proficient", while 6 (10.3%) respondents are "slightly proficient", and 3 (5.2%) respondents are "not proficient". Lastly, for "Zoom", out of 58 respondents,15 (25.9%) respondents are "extremely proficient", 24 (41.4%) respondents are "very proficient", and 19 (32.8%) respondents are "slightly proficient", with no one reporting being "not proficient".

The result highlights that, MZU students generally report higher proficiency levels across all platforms compared to NEHU students, especially in tools like Google Docs, Google Scholar, and PowerPoint. However, both groups exhibit strong skills in utilizing these platforms, with some variation in comfort levels, particularly with platforms like MS Excel and Zoom.

Table 4.33: Proficiency in using digital platforms

Options	MZU				
	Extremely Proficient (%)	Very Proficient (%)	Slightly Proficient (%)	Not Proficient (%)	Total (%)
Google Docs	46 (49.5)	35 (37.6)	12 (12.9)	0 (0)	93 (100)
Google Drive	46 (49.5)	32 (34.4)	9 (9.7)	6 (6.5)	93 (100)
Google Scholar	50 (53.8)	31 (33.3)	12 (12.9)	0 (0)	93 (100)
Microsoft Word	50 (53.8)	40 (43.0)	3 (3.2)	0 (0)	93 (100)
MS Excel	47 (50.5)	34 (36.6)	12 (12.9)	0 (0)	93 (100)
PowerPoint	53 (57.0)	34 (36.6)	6 (6.5)	0 (0)	93 (100)
Zoom	34 (36.6)	37 (39.8)	19 (20.4)	3 (3.2)	93 (100)
Options	**NEHU**				
	Extremely Proficient (%)	**Very Proficient (%)**	**Slightly Proficient (%)**	**Not Proficient (%)**	**Total (%)**
Google Docs	22 (37.9)	20 (34.5)	16 (27.6)	0 (0)	58 (100)
Google Drive	22 (37.9)	22 (37.9)	14 (24.1)	0 (0)	58 (100)
Google Scholar	26 (44.8)	21 (36.2)	11 (19.0)	0 (0)	58 (100)
Microsoft Word	26 (44.8)	25 (43.1)	7 (12.1)	0 (0)	58 (100)
MS Excel	21 (36.2)	23 (39.7)	14 (24.1)	0 (0)	58 (100)
PowerPoint	24 (41.4)	25 (43.1)	6 (10.3)	3 (5.2)	58 (100)
Zoom	15 (25.9)	24 (41.4)	19 (32.8)	0 (0)	58 (100)

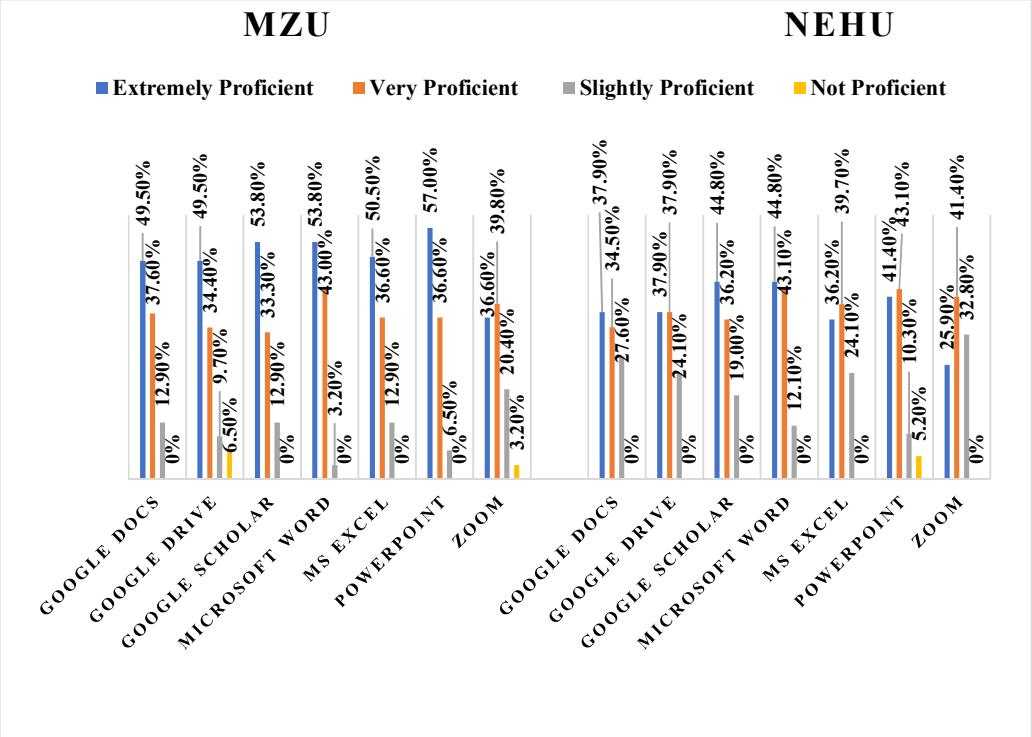


Figure 4.32: Proficiency in using digital platforms

4.9.5 Level of satisfaction in using online databases and repositories

Table 4.34 and figure 4.33 highlights the comfort levels of students from Mizoram University (MZU) and North-Eastern Hill University (NEHU) in using various online databases and repositories for accessing research articles and scholarly resources.

At MZU, out of 93 respondents, the majority of students are highly confident in using “Google Scholar”, with 81 (87.1%) respondents reporting they are “very confident”, and the remaining 12 (12.9%) respondents are “somewhat confident”, indicating a strong overall comfort level. For “ScienceDirect”, out of 93 respondents, 62 (66.7%) respondents are very “confident”, 22 (23.7%) respondents are “somewhat confident”, 6 (6.5%) respondents are “not very confident” and 3 (3.2%) respondents are “not confident at all”. In contrast, “IEEE Xplore” shows more varied responses, out of 93 respondents, 27 (29.0%) respondents are “very confident”, while 45 (48.4%) respondents are “somewhat confident”, and 21 (22.6%) respondents are “not very confident”, suggesting less familiarity or ease with this database. For “SpringerLink”, out of 93 respondents, 50 (53.8%) respondents are “very confident”, 24 (25.8%)

respondents are “somewhat confident”, 13 (14.0%) respondents are “not very confident”, and 6 (6.5%) respondents are “not confident at all”. Usage of “ArXiv” is low, out of 93 respondents, 7 (7.5%) respondents are “very confident”, 35 (37.6%) respondents are “somewhat confident”, while 30 (32.3%) respondents are “not very confident” and 21 (22.6%) respondents are “not confident at all”, indicating significant discomfort. For “Web of Science”, out of 93 respondents, 32 (34.4%) respondents are “very confident”, 27 (29.0%) respondents are “somewhat confident”, 25 (26.9%) respondents are “not very confident”, and 9 (9.7%) respondents are “not confident at all”. With “Scopus”, out of 93 respondents, 30 (32.3%) respondents are “very confident”, 38 (40.9%) respondents are “somewhat confident”, while 19 (20.4%) respondents are “not very confident”, and 6 (6.5%) respondents are “not confident at all”. Lastly, for “DOAJ”, out of 93 respondents, only 9 (9.5%) respondents are “very confident”, 18 (19.4%) respondents are “somewhat confident”, while a substantial 36 (38.7%) respondents are “not very confident”, and 30 (32.3%) respondents are “not confident at all”, revealing considerable discomfort with this platform.

At NEHU, for “Google Scholar”, out of 58 respondents, with 43 (74.1%) respondents are “very confident”, and the remaining 15 (25.9%) respondents are “somewhat confident. For “ScienceDirect”, out of 58 respondents, 37 (63.8%) respondents are very “confident”, 18 (31.0%) respondents are “somewhat confident”, and 3 (5.2%) respondents are “not very confident”. In contrast, “IEEE Xplore”, out of 58 respondents, 11 (19.0%) respondents are “somewhat confident”, 32 (55.2%) respondents are “not very confident”, and remaining 15 (25.9%) respondents are “not confidents at all”. For “SpringerLink”, out of 58 respondents, 32 (55.2%) respondents are “very confident”, 16 (27.6%) respondents are “somewhat confident”, 4 (6.9%) respondents are “not very confident”, and 6 (10.3%) respondents are “not confident at all”. Usage of “ArXiv” is low, out of 58 respondents, 2 (3.4%) respondents are “very confident”, 13 (22.4%) respondents are “somewhat confident”, while 21 (36.2%) respondents are “not very confident” and 22 (37.9%) respondents are “not confident at all”. For “Web of Science”, out of 58 respondents, 34 (58.6%) respondents are “very confident”, 16 (27.6%) respondents are “somewhat confident”, 6 (10.3%) respondents are “not very confident”, and 2 (3.4%) respondents are “not confident at all”. With “Scopus”, out of 58 respondents, 31 (53.4%) respondents are “very confident”, 20

(34.5%) respondents are “somewhat confident”, and 7 (12.1%) respondents are “not very confident”, indicating good familiarity overall. Lastly, for “DOAJ”, out of 58 respondents, only 1 (1.7%) respondent is “very confident”, 14 (24.1%) respondents are “somewhat confident”, 19 (32.8%) respondents are “not very confident”, and 24 (41.4%) respondents are “not confident at all”.

The result shows that, both MZU and NEHU students exhibit strong confidence in widely used platforms like Google Scholar and ScienceDirect. However, there is considerable variation in comfort levels with more specialized databases like IEEE Xplore, ArXiv, and DOAJ.

Table 4.34: Level of satisfaction in using online databases and repositories

Options	MZU				
	Very Confident (%)	Somewhat Confident (%)	Not very Confident (%)	Not Confident at all (%)	Total (%)
Google Scholar	81 (87.1)	12 (12.9)	0 (0)	0 (0)	93 (100)
ScienceDirect	62 (66.7)	22 (23.7)	6 (6.5)	3 (3.2)	93 (100)
IEEE Xplore	27 (29.0)	45 (48.4)	21 (22.6)	0 (0)	93 (100)
SpringerLink	50 (53.8)	24 (25.8)	13 (14.0)	6 (6.5)	93 (100)
ArXiv	7 (7.5)	35 (37.6)	30 (32.3)	21 (22.6)	93 (100)
Web of Science	32 (34.4)	27 (29.0)	25 (26.9)	9 (9.7)	93 (100)
Scopus	30 (32.3)	38 (40.9)	19 (20.4)	6 (6.5)	93 (100)
DOAJ	9 (9.5)	18 (19.4)	36 (38.7)	30 (32.3)	93 (100)
Options	**NEHU**				
	Very Confident (%)	**Somewhat Confident (%)**	**Not very Confident (%)**	**Not Confident at all (%)**	**Total (%)**
Google Scholar	43 (74.1)	15 (25.9)	0 (0)	0 (0)	58 (100)
ScienceDirect	37 (63.8)	18 (31.0)	3 (5.2)	0 (0)	58 (100)
IEEE Xplore	0 (0)	11 (19.0)	32 (55.2)	15 (25.9)	58 (100)
SpringerLink	32 (55.2)	16 (27.6)	4 (6.9)	6 (10.3)	58 (100)
ArXiv	2 (3.4)	13 (22.4)	21 (36.2)	22 (37.9)	58 (100)
Web of Science	34 (58.6)	16 (27.6)	6 (10.3)	2 (3.4)	58 (100)
Scopus	31 (53.4)	20 (34.5)	7 (12.1)	0 (0)	58 (100)
DOAJ	1 (1.7)	14 (24.1)	19 (32.8)	24 (41.4)	58 (100)

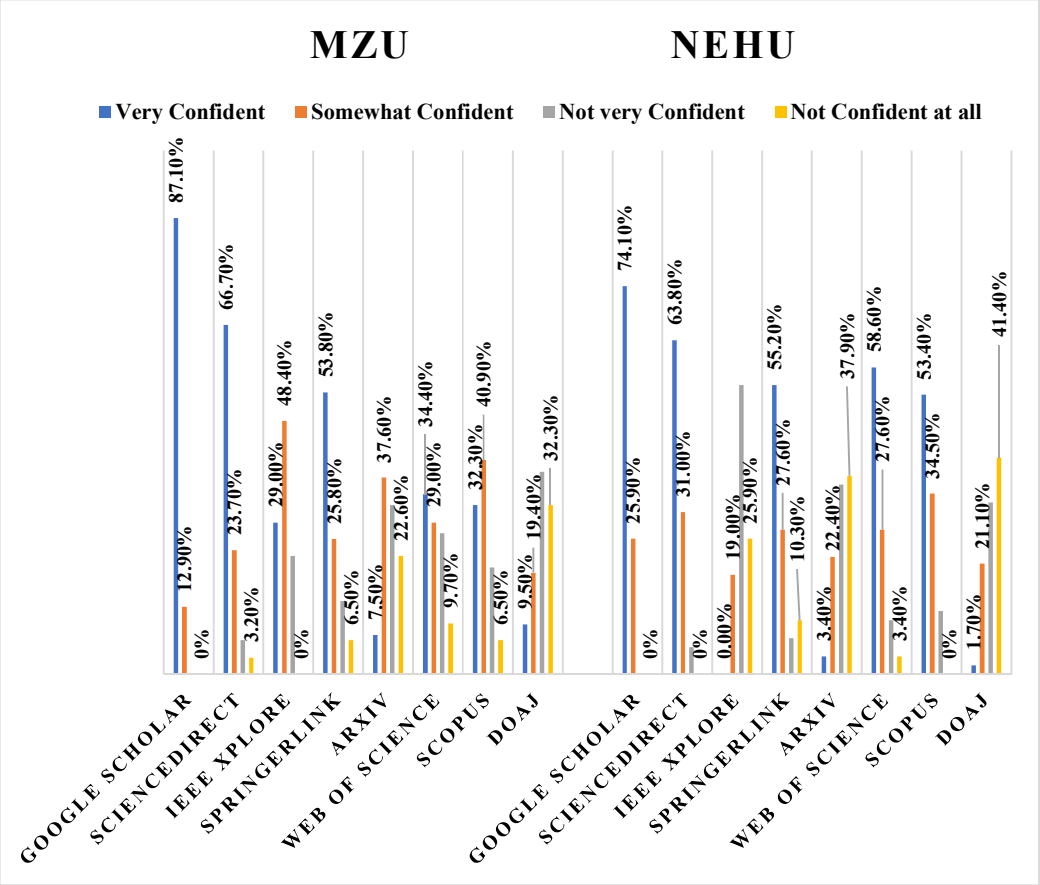


Figure 4.33: Level of satisfaction in using online databases and repositories

4.10 Hypothesis testing

Chi-squared test

The Chi-Square Test is a statistical technique used to figure out if a significant link exists between two variables that are categorical or whether the distribution of observed data deviates from a theoretical distribution. It is frequently utilised in hypothesis testing for comparing observed data with anticipated data based on a certain hypothesis.

The Chi-Square statistic (χ^2) is calculated as:

$$\chi^2 = \sum \frac{(Oi - E)^2}{Ei}$$

Where:

- x^2: Chi-Square statistic
- Oi: Observed frequency for category i
- Ei: Expected frequency for category i
- $\sum$: Summation over all categories

H1: There is no significant difference between research scholars of NEHU and MZU in awareness of the digital literacy.

Awareness	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Yes	84	90.30	54	93.10
No	9	9.70	4	6.90
Total	**93**	**100**	**58**	**100**

Chi-Square Test	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.351[a]	1	.553
N of Valid Cases	151		

Pearson Chi-Square:

- Value: 0.351
- df (Degrees of Freedom): 1
- Asymptotic Significance (2-sided): 0.553

This value indicates the p-value for the test, which is the probability of observing the data if the null hypothesis is true. Since this is greater than the typical significance level (e.g., 0.05), we do not reject the null hypothesis. Thus, there is no significant association between the variables. H1 is not rejected.

H2: There is no significant difference between research scholars of NEHU and MZU in contributing to the overall efficiency and quality of digital literacy skills in their research work.

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Strongly agree	26	28.0	28	48.3
Agree	42	45.2	22	37.9
Neutral	22	23.7	6	10.3
Disagree	3	3.2	2	3.4
Strongly disagree	0	0	0	0
Total	**93**	**100**	**58**	**100**

Chi-Square Test	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.983[a]	3	.553
N of Valid Cases	151		

Pearson Chi-Square:

- Value: 7.983
- Degrees of Freedom (df): 3
- Asymptotic Significance (2-sided): 0.553

The p-value of 0.553 is much greater than the conventional significance level (e.g., 0.05). This means that the observed relationship between the variables is not statistically significant. The p-value (0.553) indicates that there is insufficient evidence to reject the null hypothesis. This implies: No statistically significant association exists between the variables under study. The test results indicate no significant relationship between the variables. Ensure that assumptions (e.g., expected cell counts) are checked for the validity of the test. H2 is not rejected.

H3: There is no significant difference between research scholars of NEHU and MZU in actively seeking new digital tools for improving their skills and efficiency.

Options	MZU		NEHU	
	Frequency	Percentage	Frequency	Percentage
Frequently	15	16.1	17	29.3
Sometimes	66	71.0	36	62.1
Rarely	12	12.9	5	8.6
Never	0	0	0	0
Total	**93**	**100**	**58**	**100**

Chi-Square Test	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.929[a]	2	.140
N of Valid Cases	151		

Pearson Chi-Square:

- Value: 3.929
- Degrees of Freedom (df): 2
- Asymptotic Significance (2-sided): 0.140

The p-value is 0.140, which is greater than the common significance threshold (e.g., 0.05). This indicates that the null hypothesis cannot be rejected. Null Hypothesis: There is no association between the variables being analyzed. The p-value (0.140)

suggests insufficient evidence to reject the null hypothesis. The observed association between the variables is likely due to random chance and is not statistically significant at the 0.05 level. H3 is not rejected.

CHAPTER - 5
FINDINGS, CONCLUSION AND SUGGESTION

5.1 Introduction

The term Digital Literacy indicates the capacity to proficiently and critically use digital technology, tools, and platforms for diverse objectives, such as communication, problem-solving, information retrieval and assessment, content creation, and societal engagement. It needs a synthesis of technological expertise, cognitive faculties, and social comprehension to manoeuvre and participate in the digital landscape.

This chapter is organized into five sections: (i) Major findings aligned with the study's objectives, (ii) General findings, (iii) Conclusion, (iv) Suggestions, and (v) Areas for future research.

5.2 Findings according to the objectives of the study

5.2.1 The first objective of the study is "To identify and compare the level of digital literacy awareness among respondents of Mizoram University (MZU) and North Eastern Hill University (NEHU)."

i. The majority 90.30% of respondents were aware of the term "digital literacy", while the rest 9.70% of respondents were not aware of it at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), a large number, i.e., 93.10% of respondents, were aware of the term "digital literacy", while the rest, 6.90%, were not aware of it. Therefore, the result shows that research scholars at both universities are aware of the term. (Table 4.11)

ii. At Mizoram University (MZU), a significant proportion of respondents, i.e., 67.70%, rated their digital literacy as moderate, while only 6.50% of respondents indicated it was low. However, at North Eastern Hill University (NEHU), the majority 62.10% of respondents classified their digital literacy as moderate, and only 3.40% of respondents rated the level very high. Overall, while a majority of scholars at both institutions display a moderate competency in digital literacy, the findings highlight a potential gap in advanced digital skills, suggesting an opportunity for targeted digital literacy training to elevate proficiency among scholars. (Table 4.12)

iii. All the respondents, i.e., 100% at Mizoram University (MZU), were familiar with fundamental digital skills, such as internet browsing, social media usage, and email usage. At North Eastern Hill University (NEHU), the results are similar, with 100% of respondents demonstrating familiarity with internet browsing and email, and 96.6% of respondents demonstrating familiarity with social media usage. However, the data reveals at both universities specific areas where familiarity is lower, suggesting potential areas for development such as in online security practices, basic computer troubleshooting, data analysis, and interpretation. Although the findings show a strong competency in fundamental digital skills, gaps in online security practices and troubleshooting highlight areas that require primary attention to enhance their digital competence and confidence. (Table 4.13)

iv. The majority of respondents, specifically 59.1%, reported encountering digital literacy terms frequently, while 37.6% reported encountering them occasionally, and 3.2% reported encountering them rarely at Mizoram University (MZU). On the other hand, only 20.7% of respondents reported frequent exposure to digital literacy terms, compared to 36.2% who encountered them infrequently, 31.0% who reported occasionally, and 12.1% who reported always at North Eastern Hill University (NEHU). Overall, it highlights that MZU respondents showed a higher level of acquaintance with digital literacy terms; this disparity suggests that the two institutions may vary in their focus on or accessibility to digital literacy. (Table 4.14)

v. A large number of respondents from both universities agreed that digital literacy has improved their communication and information access, enhanced professional and educational opportunities, enabled critical evaluation of online content, improved their understanding of digital security and privacy, improved their competence in various digital platforms, and increased their awareness of the reliability of digital information. Very few respondents remained undecided, and none disagreed with any of the statements. Overall, these findings highlight a strong agreement among research scholars that digital literacy positively influences essential skills and opportunities in both academic and personal

domains, with minor areas of variance in levels of confidence across specific skills. (Table 4.15)

5.2.2 The second objective of the study is "To compare the awareness on digital tools and techniques among the research scholars of both universities."

i. It shows a higher rate of participation in digital competency development at Mizoram University (MZU), i.e., 73.1% respondents, compared to North Eastern Hill University (NEHU), i.e., 63.8% respondents. However, both universities display a strong trend toward engaging in online courses, reflecting a growing emphasis on digital literacy and skill acquisition among students. (Table 4.16)

ii. A minority of respondents, i.e., 16.1%, reported frequently seeking new tools, while the majority, 71.0% respondents, indicated they do so occasionally. A smaller group, comprising 12.9% of respondents, stated that they engage rarely, and notably, none of them reported never seeking new digital tools at Mizoram University (MZU). However, North Eastern Hill University (NEHU) showed a higher proportion of individuals frequently seeking new tools, with 29.3% of respondents indicating they do so occasionally. The majority, 62.1% of respondents, reported doing so sometimes, while a smaller group, 8.6% of respondents, rarely sought new tools; none indicated a complete lack of engagement in seeking new digital tools. NEHU respondents exhibit a more proactive approach, frequently exploring new digital tools and techniques, while MZU respondents primarily fall into the occasional engagement category. (Table 4.17)

iii. At Mizoram University (MZU), all 93 respondents exhibited proficiency in the Microsoft Office Suite, with 29% being very familiar. However, for more specialized tools, like Adobe Creative Cloud, familiarity decreased, with only 6.5% of respondents being very familiar. Google Workspace was generally well-known, with 6.5% of respondents being very familiar, whereas social media platforms had the highest proficiency, with 74.2% of respondents being very familiar. Similarly, tools such as content management systems and data analysis tools had lower familiarity levels, with 10.8% of respondents and 3.2% of respondents, respectively, being very familiar. Familiarity with programming

languages, graphic design, and video editing software was also low, with over 60% of respondents unfamiliar with these tools. However, at North Eastern Hill University (NEHU), respondents showed a similar pattern, with 29.3% demonstrating a high level of familiarity with the Microsoft Office Suite, and 58.6% indicating a high level of familiarity with social media platforms. Compared to MZU, respondents showed a slightly greater familiarity with Adobe Creative Cloud at 15.5% and Google Workspace at 31%. However, similar to MZU, over 40% of NEHU participants were unfamiliar with CMS, data analysis tools, graphic design, and video editing software. (Table 4.18)

iv. At Mizoram University (MZU), respondents primarily use online tutorials and social media groups as primary methods, with 46.2% of respondents frequently using online tutorials and 54.8% of respondents regularly participating in social media forums. A significant proportion also occasionally engages with various methods, indicating a balanced approach to resource utilisation. 33.3% of respondents respond to industry publications and websites, 14.0% respond to networking with peers or professionals, and 54.8% respond to social media groups or forums. However, North-Eastern Hill University (NEHU) respondents exhibit a distinct pattern, with 41.4% of respondents frequently using online tutorials and a strong preference for webinars and online workshops, as evidenced by 72.4% of respondents regularly participating in these sessions. Additionally, the majority of respondents frequently network with peers i.e., 48.3%, industry publications and websites i.e., 46.6%, and social media groups or forums i.e., 48.3%. NEHU respondents exhibit a preference for structured and professional methods of staying updated, such as webinars, professional networking, and industry publications. In contrast, MZU respondents are more inclined toward accessible, informal methods, such as online tutorials and social media groups, indicating differing institutional cultures and preferences in digital literacy engagement between the two universities. These patterns underscore varying approaches to digital literacy development and reflect how institutional environments may shape preferences for staying informed. (Table 4.19)

v. At Mizoram University (MZU), a majority of participants perceive digital tools as beneficial, with 44.1% of respondents rating the impact as "very positive" and 47.3% of respondents as "positive". Only a small fraction 8.6% of respondents remain neutral regarding the impact. Similarly, North Eastern Hill University (NEHU) respondents share a favourable view, with 44.8% indicating a "very positive" impact and another 44.8% noting a "positive" effect, while 10.3% remain neutral. These results highlight a strong consensus across both institutions on the positive influence of digital tools in enhancing professional effectiveness and productivity. (Table 4.20)

5.2.3 The third objective of the study is "To find out the research scholars' capability to retrieve, examine, evaluate and use authentic digital information for their academic purposes in both universities."

i. The findings indicate that academic researchers from both Mizoram University (MZU) and North-Eastern Hill University (NEHU) prefer credible scholarly sources for their digital information needs, with "online databases and journals" emerging as the most utilized resource. At MZU, 41.4% of respondents favour these databases, 35.2% use "Google search engines" as an alternative, and only 17.6% rely on "university library resources". "Social media platforms" are the least preferred, with only 5.7% of MZU researchers turning to them for academic purposes. Similarly, 40.0% of NEHU researchers strongly prefer "online databases and journals," closely followed by "Google search engines" at 36.4%. Only 17.1% of respondents use "university library resources," and only 6.4% use "social media platforms" for their research. These patterns highlight a dominant reliance on academic sources and reputable online resources for digital information across both institutions, highlighting a limited reliance on social media for research. (Table 4.12)

ii. At Mizoram University (MZU), 67.7% of respondents reported using online databases "always" for academically credible resources. Similarly, 64.5% of respondents indicated that they always use academic journals. Websites also show high usage frequency, with 60.2% of respondents relying on them "always". Conversely, informal sources like blogs and crowdsourced

encyclopaedias demonstrate significantly lower usage rates, with the majority of respondents either using them occasionally, rarely, or never. At North Eastern Hill University (NEHU), a maximum of 56.9% of respondents reported using online databases "always". Researchers also widely use academic journals, with 65.5% of respondents reporting "always" reliance on them. 48.3% of respondents indicated that they use websites "always". However, reliance on blogs and crowdsourced encyclopaedias is notably lower, with many respondents indicating "rarely" or "never" using these sources. Overall, these results highlight a preference for scholarly and reliable information sources, with limited reliance on user-generated content. This trend reflects the prioritization of credibility and academic accuracy in information-seeking behaviours among respondents from both institutions. (Table 4.22)

iii. At Mizoram University (MZU), 71.0% of respondents primarily rely on Google Scholar. ScienceDirect emerges as the second most-used tool, with 50.5% of respondents indicating "always". However, Scopus reflects a moderate level of engagement; 37.6% of respondents use it "always". ResearchGate is another widely accessed resource, with 38.7% of respondents using it "always". In contrast, more specialized tools, such as PubChem and SciFinder, have comparatively limited usage. Only 24.7% of respondents consistently use PubChem, while just 12.9% consistently use SciFinder. Web of Science sees moderate engagement, with 22.6% of respondents using it "always". Similarly, RCSB Protein Data Bank, 60.2% of respondents said they never use, and e-ShodhSindhu, which 46.2% of respondents said they never use it. Lastly, JSTOR reflects minimal usage, with 65.6% of respondents never utilizing the resource. Whereas at North-Eastern Hill University (NEHU), Google Scholar is even more dominant, with 86.2% of respondents using it "always". ScienceDirect also shows significant utilization, with 65.5% of respondents using it "always." Similarly, 53.4% of respondents prefer Scopus "always". ResearchGate exhibits a strong presence among researchers, with 60.3% of respondents indicating "always". On the other hand, PubChem shows moderate engagement, with 48.3% of respondents using it "always". SciFinder is one of the most highly utilized specialized databases, with 67.2% of respondents using it "always". For

Web of Science, 63.8% of respondents use it "always". However, specialized databases like the RCSB Protein Data Bank and e-ShodhSindhu show limited utilization. JSTOR is the least used resource, with 63.8% of respondents indicating they never access it. The data reveals distinct patterns in the use of search engines and databases among researchers at Mizoram University (MZU) and North-Eastern Hill University (NEHU). Google Scholar stands out as the most widely utilized search engine at both institutions, reflecting its popularity and accessibility as a primary research tool. This trend indicates a preference for general, versatile resources, with less frequent access to specialised databases. These findings underscore the reliance on widely accessible platforms for research needs, with both universities demonstrating similar usage patterns. (Table 4.23)

iv. At Mizoram University (MZU), the evaluation of digital information for academic purposes reveals the prioritization of several key factors. The majority of respondents, specifically 66.7%, consider the "author's credentials and expertise" as highly important. Additionally, 63.4% of respondents rate the "publication source" as highly important. 40.9% of respondents see the "date of publication" as a significant factor, rating it as "very important". The importance of "citations and references" is somewhat less pronounced, with only 34.4% of respondents rating it as "very important". "Peer-reviewed status" holds considerable weight, with 40.9% of respondents considering it "very important". In terms of relevance, "relevance to the research topic" is a critical factor, with a notable 83.9% of respondents rating it as "very important". However, a substantial 90.3% of respondents rated the "accuracy and precision of the information" as "very important", highlighting the university's emphasis on the reliability and exactness of information. However, North-Eastern Hill University (NEHU) has shown similar patterns, with an even stronger emphasis on specific criteria. The majority of respondents, 87.9%, rate the author's credentials and expertise as "very important." The "publication source" also ranks highly, with 82.8% of respondents identifying it as "very important". The "date of publication" receives a balanced response, with 43.1% of respondents rating it as "very important". NEHU places a higher value on the "citations and

references" factor, with 67.2% of respondents rating it as "very important." Similarly, 70.7% of respondents regard the "peer reviewed status" as important. 94.8% of respondents rated it as "very important", indicating NEHU's strong focus on "relevance to the research topic". Lastly, "accuracy and precision of the information" are essential, with 89.7% of respondents rating it as "very important", reaffirming NEHU's emphasis on information reliability. In summary, both universities prioritize the accuracy, relevance, and author credibility of digital information, reflecting a shared commitment to using high-quality, reliable sources for academic work. (Table 4.24)

v. At Mizoram University (MZU), evaluating the authenticity of digital information reveals varying levels of confidence across different evaluation methods. In "checking the source and authorship", the majority (64.5%) of respondents stated "very confident", For "verifying citations and references", 50.5% of respondents were "very confident". When evaluating the "publication date", 48.4% of respondents reported being "very confident". Regarding "analysing the content and writing style", less than half, 37.6% of respondents were "very confident". In "cross-referencing information", 34.4% of respondents were "very confident". It is observed the lowest confidence levels in "evaluating the website domain and design", with only 19.4% of respondents expressing "very confidence". In contrast to MZU, students at North-Eastern Hill University (NEHU) generally displayed higher levels of confidence. 72.4% of respondents reported the highest level of confidence in "checking the source and authorship". For "verifying citations and references", 65.5% of respondents were "very confident". In evaluating the "publication date", 53.4% of respondents were "very confident". Regarding "analysing the content and writing style", 55.2% of respondents were "very confident". For "cross-referencing information", 53.4% of respondents were "very confident". Lastly, in "evaluating the website domain and design", 27.6% of respondents were "very confident". The findings indicate that NEHU students exhibit a relatively higher confidence level across all methods of evaluating digital information authenticity compared to their counterparts at MZU, particularly in "checking the source and authorship" and "verifying citations and references". However,

both groups showed lower confidence in "evaluating the website domain and design". (Table 4.25)

5.2.4 The fourth objective of the study is "To know the respondents' satisfaction with digital literacy initiatives and its impact on their digital literacy competency."

i. At Mizoram University (MZU), the student participation in the digital literacy program is relatively low. Among the 93 respondents, only 23.7% reported having completed the program, while 3.2% were currently enrolled. A significant majority of 73.1% of respondents indicated that they have not participated in the program. At North-Eastern Hill University (NEHU), out of 58 respondents, only 3.4% have completed the program, and 6.9% of respondents are currently enrolled. A vast majority, 89.7% of respondents, have not participated in the program. These findings show a significant absence of participation in the digital literacy program at both universities. This data highlights the need for targeted efforts to enhance student participation in digital literacy programs at both universities. (Table 4.26)

ii. At Mizoram University (MZU), the findings reveal that the majority of respondents, i.e., 55.9%, were "confident" in their digital literacy skills. Additionally, 30.1% of respondents reported being "somewhat confident". A smaller group, comprising 10.8% of respondents, described themselves as "very confident". Notably, 3.2% of respondents indicated they were "not confident" in their digital literacy skills, while none selected "not very confident at all". At NEHU, the distribution of confidence levels reflects a slightly different trend. Here, less than half, 48.3% of respondents reported "confident", making it the most frequently chosen category. Followed by, 27.6% of respondents, indicating they were "somewhat confident". Interestingly, 10.3% of respondents identified as "very confident". Additionally, 13.8% of respondents reported feeling "not very confident". Similarly, to MZU, no respondents at NEHU indicated that they were "not confident at all". These findings highlight variations in digital literacy confidence levels between the two institutions, offering valuable insights into

the differing self-assessments of digital skills among the respondents. (Table 4.27)

iii. At Mizoram University (MZU), the finding reveals a diverse perception of the digital literacy program's impact. Among the 93 respondents, only 3.2% reported were "very satisfied" with the program. A significant proportion, 43.0% of respondents, were "satisfied". However, the largest group, comprising 46.2% of respondents, remained "neutral" regarding the program's effect on their digital literacy skills. On the other hand, 7.5% of respondents indicated being "very dissatisfied". Notably, none of the respondents from MZU reported being simply "dissatisfied". At North Eastern Hill University (NEHU), of the 58 respondents, 8.6% reported being "very satisfied", while the majority, 51.7%, reported being "satisfied". Additionally, 39.7% of respondents expressed a "neutral" opinion. Interestingly, no respondents in NEHU reported being either "very dissatisfied" or "dissatisfied", highlighting an overall more favourable perception of the program among this group. (Table 4.28)

iv. At Mizoram University (MZU), a significant majority, 69.9% of respondents, "strongly agree" that digital literacy helps in saving time and money. Similarly, 63.4% of respondents "strongly agree" that digital literacy enhances research efficiency and productivity. Regarding the aspect of "enhanced data analysis and visualisation", 71.0% of respondents strongly agree. In terms of "improved information evaluation", 53.8% of respondents "strongly agree". 41.9% of respondents "strongly agree" to the benefits of "global outreach and dissemination of research". Lastly, 43.0% of respondents "strongly agree" with the facilitation of remote research and collaboration. These results highlight the perceived importance of digital literacy in enhancing various aspects of academic and professional work among respondents at MZU. North-Eastern Hill University (NEHU) also indicates a positive perception of digital literacy competencies. 63.8% of respondents "strongly agree" with the concept of "saving time and money". A higher proportion of respondents, i.e., 75.9%, "strongly agree" that digital literacy enhances research efficiency and productivity. Regarding "enhanced data analysis and visualization", 72.4% of respondents said they "strongly agree". Regarding the aspect of "improved

information evaluation", 65.5% of respondents "strongly agree", while 67.2% of respondents "strongly agree" with "global outreach and dissemination of research". Lastly, 62.1% of respondents positively perceive the "facilitation of remote research and collaboration". These findings highlight the consistent recognition of the benefits of digital literacy in supporting academic and professional growth among respondents at NEHU. (Table 4.29)

5.2.5 The fifth objective of the study is "To find out the area of strength and weakness of digital literacy competency among the research scholars of both universities."

i. At Mizoram University (MZU), among the 93 respondents, 46.2% of respondents perceived digital literacy as "extremely important", while 39.8% of respondents rated it as "very important". A smaller proportion, 14.0% of respondents, considered it "moderately important". Notably, no respondents rated digital literacy as "slightly important" or "not important at all". This data indicates that MZU students largely acknowledge the critical role of digital literacy in their academic pursuits, with the majority emphasizing its utmost importance. At North-Eastern Hill University (NEHU), the perceived importance of digital literacy skills is even more prominent. Of the 58 respondents, 39.7% consider digital literacy to be "extremely important", and the remaining 60.3% of respondents rate it as "very important". Significantly, no respondents rated it as "moderately important", "slightly important", or "not important at all". This unanimous recognition underscores the critical role that digital literacy plays in supporting academic and research activities among NEHU students, highlighting a consensus regarding its indispensable value. (Table 4.30)

ii. At Mizoram University (MZU), most of the respondents recognizes the importance of digital literacy skills for enhancing research efficiency and quality. Among the 93 respondents, the majority (45.2%) agreed that these skills significantly improve research outcomes. However, at North Eastern Hill University (NEHU), the findings demonstrate even stronger support for the contribution of digital literacy to research quality and efficiency. Out of 58

respondents, a maximum of 48.3% strongly agreed. Overall, the findings from both institutions reveal a strong agreement on the importance of digital literacy in research, with NEHU students showing slightly higher agreement levels. A small proportion of neutrality is evident at both universities, but the overwhelming majority of respondents acknowledge the positive impact of these skills on research quality and efficiency. (Table 4.31)

iii. At Mizoram University (MZU), a significant number of respondents demonstrate proficiency in accessing academic databases and journals, with 49.5% indicating themselves as "skilled". However, when it comes to libraries and academic repositories, 47.3% of respondents rated themselves as "skilled". For e-book platforms and e-libraries, 40.9% of respondents are "skilled". Less than half of respondents, specifically 29.0%, reported being "skilled" in accessing open-access repositories. Search engines emerge as the strongest area of expertise among researchers, with 45.2% of respondents being "highly skilled". On the other hand, at North-Eastern Hill University (NEHU), 48.3% of the respondents are "skilled" in accessing academic databases and journals. For libraries and academic repositories, 43.1% of respondents are "skilled". In the domain of e-book platforms and e-libraries, 44.8% of respondents are "skilled". 39.7% of respondents consider accessing open-access repositories to be "skilled". Search engines are the strongest area for NEHU students, with 55.2% of respondents being "skilled". Overall, MZU students demonstrate notable strengths in accessing academic databases and search engines, with many showcasing advanced skills in open-access repositories. In comparison, NEHU students tend to rate themselves as more competent but are less likely to identify as "highly skilled", with their strengths primarily in search engines and academic databases, while other areas reflect moderate proficiency levels. (Table 4.32)

iv. At Mizoram University (MZU), the data reveals a high level of proficiency in utilizing various digital platforms for research collaboration and information sharing. Specifically, "Google Docs" and "Google Drive" demonstrate strong competency, with approximately half of the respondents, or 49.5%, reporting that they are "extremely proficient". "Google Scholar" usage is also prominent among scholars, where 53.8% of the respondents are "extremely proficient".

Similarly, “Microsoft Word” and “MS Excel” show high proficiency levels, with over 50% of respondents in both categories being “extremely proficient”. “PowerPoint” shows the highest proficiency among the assessed platforms, with 57.0% of respondents rated as “extremely proficient”. Regarding communication tools, “Zoom” proficiency is slightly lower compared to other platforms, with 36.6% of respondents being “extremely proficient”. On the other hand, North-Eastern Hill University (NEHU) also demonstrates considerable proficiency in digital platforms, albeit with some variations compared to MZU. For “Google Docs” and “Google Drive,” 37.9% of respondents each are “extremely proficient”. Similarly, in “Google Scholar”, 44.8% of respondents are “extremely proficient”. “Microsoft Word” and “MS Excel” show similar trends, with approximately 44.8% and 36.2% of respondents being “extremely proficient”, respectively. Followed by “PowerPoint”, 41.4% of respondents are “extremely proficient”. “Zoom” usage proficiency is comparatively lower at NEHU, where only 25.9% of respondents are “extremely proficient”. Overall, while both MZU and NEHU students show high proficiency in digital platforms essential for research collaboration and sharing, MZU students generally display higher levels of expertise across most tools. (Table 4.33)

v. At Mizoram University (MZU), researchers reported a high level of confidence in using widely accessible platforms like “Google Scholar” and “ScienceDirect” for accessing scholarly resources. Among the 93 respondents, the majority (87.1%) expressed being “very confident” in using “Google Scholar”. Similarly, for “ScienceDirect”, 66.7% of respondents reported being “very confident”. In contrast, the level of confidence with “IEEE Xplore” was significantly lower. Only 29.0% of respondents were “very confident”. The responses for “SpringerLink” indicated more than half, i.e., 53.8% of students being “very confident.” Usage of “ArXiv” showed a marked lack of familiarity or comfort, as only 7.5% of respondents were “very confident”. Similar to “DOAJ”, only 9.5% of respondents expressed “very confidence”. For “Web of Science”, less than half, i.e., 34.4%, reported being “very confident”. In the same way, for “Scopus”, only 32.3% of respondents reported being “very confident”. On the other hand, North-Eastern Hill University (NEHU) also demonstrated high

confidence levels in using platforms like "Google Scholar" and "ScienceDirect". Among the 58 respondents, 74.1% were "very confident" in using "Google Scholar". For "ScienceDirect", 63.8% of respondents reported being "very confident". In contrast, the usage of "IEEE Xplore" showed significant discomfort. None of the students were confident about this platform. For "SpringerLink", more than half, 55.2% of respondents, were "very confident". The usage of "ArXiv" was notably low, with only 3.4% of respondents being "very confident". Similarly, only 1.7% of respondents expressed high confidence in "DOAJ". For "Web of Science", 58.6% of respondents reported feeling "very confident". Similarly, for "Scopus", 53.4% of respondents reported being "very confident". It reveals that both MZU and NEHU students displayed high levels of confidence in using widely known platforms like Google Scholar and ScienceDirect. (Table 4.34)

5.3 General findings

i. The majority 61.30% of respondents were male, while the rest 38.70% were female at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), a large number 55.18% of respondents were male, while the rest were 44.82% were female. It was found that the maximum respondents were male in both universities. (Table 4.2)

ii. The majority 83.88% of respondents were between 26-30 years of age group, followed by 12.90% of respondents who were below 25 years of age group and 3.22% of respondents were between 31-35 years of the age group, and none of the respondents were above 36 years of age in Mizoram University (MZU). However, out of a total of 58 respondents, the majority, 94.82 percent, were between 26-30 years of age. This was followed by 5.18% of respondents who were below 25 years of age, and none of the respondents at North Eastern Hill University (NEHU) were between 31-35 years and above 36 years. This also shows that the majority of students at both universities were in the 26-30 years of age group. (Table 4.3)

iii. The majority 96.8% of respondents were visiting the library, while the rest, 3.2%, didn't visit the library at Mizoram University (MZU). However, at North Eastern

Hill University (NEHU), a large number 91.4% of respondents were visiting the library, while the rest 8.6% of respondents didn't. (Table 4.4)

iv. More than half, i.e., 80.6% of respondents, stated that the library has adequate resources, while 19.4% of respondents said it does not have at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), the majority 77.6% of respondents responded that the library had adequate resources, and the remaining 22.4% of respondents stated it does not have. (Table 4.5)

v. The majority 74.2% of respondents found the library useful, followed by 22.6% who stated it was very useful, and the remaining 3.2% of respondents responded that it was not useful at all at Mizoram University (MZU). However, at North Eastern Hill University, more than half 56.1% of respondents found the library useful, following 34.5% of respondents who responded very useful, and the rest 8.6% of respondents who responded not at all useful. (Table 4.6)

vi. The majority 34.5% of respondents at Mizoram University (MZU) use the library resources for writing research papers, following preparing notes (28.5%), project work (21.2%), assignment preparation (11.5%), and bibliography preparation (4.2%). However, at North Eastern Hill University (NEHU), the majority 37.5% of respondents visited the library to write a research paper, followed by 26.8%, 19.6%, 13.4%, and 2.7% for preparing notes, assignment preparation, project work, and bibliography preparation respectively. (Table 4.7)

vii. In both universities, the data reveals that direct browsing of bookshelves emerges as the most commonly used method by research scholars for locating resources in the library. In contrast, the usage of OPAC (Online Public Access Catalogue) and seeking assistance from library staff are comparatively less frequent. Peer assistance, however, is the least preferred method among the available options. (Table 4.8)

viii. The data from both universities reveals that a significant proportion of research scholars actively use the electronic resources provided by their libraries. This underscores the critical role of digital resources in facilitating academic research by offering convenient access to a vast array of scholarly materials. These

resources not only support the diverse needs of researchers but also enhance the overall academic experience. (Table 4.9)

ix. At Mizoram University (MZU), awareness of library services is notably high for essentials. 93.5% of respondents recognize circulation services, while 90.3% are aware of shelf issues, return services using RFID technology, and photocopy services. OPAC services are familiar to 80.6% of respondents, and 71.0% are aware of database searching services. Specialised services such as Braille services and Inter-Library Loan (ILL) services have lower awareness, with 24.7% and 11.8% of respondents aware, respectively. On the other hand, at North Eastern Hill University (NEHU), 93.1% of respondents are aware of circulation services, and 89.7% are familiar with database searching services. Awareness of OPAC services is lower at 67.2%, while Current Awareness Services (CAS) and Selective Dissemination of Information (SDI) services are known to 41.4% of respondents. Only 20.7% of respondents are familiar with specialised services, such as Braille services, and 17.2% are aware of Inter-Library Loan (ILL) services. Overall, while awareness of basic services is strong at both institutions, specialized services require greater outreach efforts to enhance their visibility and usage. (Table 4.10)

5.4 Conclusion

Digital literacy has enhanced the essential skill in the 21st century, especially within the realm of education. Digital literacy is defined as the capacity to approach, assess, and generate knowledge using digital technology, allowing people to traverse the more intricate digital environment (Ng, 2012). As educational institutions incorporate technology into curriculum, proficiency in digital tools has become essential for academic achievement, continuous learning, and engagement in the information established economy. The use of digital literacy in education revolutionizes conventional teaching methods by fostering more dynamic and interactive learning environments. Educators with digital literacy competencies may use web resources, multimedia instruments, and instructional software to create captivating classes. This method promotes personalized education, allowing educators to address varied learning styles and requirements (Ribble, 2011). Moreover, digital

literacy enhances collaborative learning using platforms such as Google Classroom, Microsoft Teams, and interactive whiteboards, facilitating cooperation and critical analysis. Digital literacy empowers students to conduct research, analyze data, and present results proficiently. Digital literacy fosters the competency of students to distinguish between legitimate sources and incorrect information, which is necessary given the abundance of online academic materials (Livingstone & Helsper, 2007). By cultivating these abilities, students are more equipped to confront intricate academic obstacles and adjust to the requirements of a digital-centric environment. The significance of digital literacy in school transcends personal learning results to tackle social disparities. The "digital divide" denotes differences in admittance to innovation and digital competencies, which might sustain socioeconomic inequities (Van Dijk, 2020). Educational efforts emphasizing digital literacy provide students from underprivileged backgrounds with vital skills that enable them to compete in a technology-oriented employment market. Furthermore, digital literacy guarantees that students are not only consumers of digital material but also producers. The transition from passive consumption to active engagement in the digital economy aids in diminishing inequities and promoting inclusion in educational and career prospects (Sefton-Green et al., 2009). With the ongoing use of digital technology across sectors, digital literacy has emerged as an essential employability skill. A survey from the World Economic Forum predicts that by 2025, 50% of the workforce will require reskilling, emphasizing technology-related skills (World Economic Forum, 2020). Education systems are essential in equipping students for this reality by integrating digital literacy into curriculum from an early age. The STEM fields - science, technology, engineering, and mathematics - are among the most technologically dependent in higher education, making digital literacy a must for success in these fields. However, non - STEM disciplines also require digital literacy due to the increasing use of digital technologies in data analysis, marketing, and communication (Ng, 2012). Integrating digital literacy into education equips students to effectively navigate and thrive in the future workforce. Digital literacy is vital for lifelong learning since it allows people to get new information and skills via online platforms. Webinars, Massive Open Online Courses (MOOCs), and e-learning platforms facilitate ongoing education, making learning accessible to anyone irrespective of their geographical

location or life stage (Kimmons et al., 2018). The democratization of education promotes individual and professional development in accordance with the requirements of a rapidly changing global economy. Moreover, digital literacy enables people to be aware and responsible global citizens. It provides students with the capacity to critically assess information, counter disinformation, and participate in substantive online discussions. In a time characterized by the widespread dissemination of "fake news" and cyber threats, digital literacy is crucial for preserving the integrity of information ecosystems and fostering ethical online conduct (Livingstone, 2018). The COVID-19 epidemic highlighted the essential role of digital literacy in maintaining educational continuity. As educational institutions shifted to remote and hybrid learning models, both instructors and students were required to acclimate to digital platforms and technologies. Individuals with digital literacy skills managed this change more adeptly, highlighting its significance in crisis scenarios (Bozkurt & Sharma, 2020). Digital literacy not only enables the use of virtual classrooms but also improves students' capacity for autonomous learning management. Skills such as time management, online collaboration, and digital etiquette are essential for success in remote learning settings. This transition has highlighted the need for educational systems to prioritize digital literacy as an essential element of academic readiness. Besides technical abilities, digital literacy includes comprehension of the ethical ramifications of technology use. Students must acquire the ability to traverse the digital landscape judiciously, combining screen time with offline pursuits and protecting their mental well-being (Ribble, 2011). Education systems that comprise digital literacy in their course to provide learners with the information and skills required to promote digital well-being, ensuring that technology improves rather than diminishes their quality of life. Furthermore, digital literacy includes comprehension of matters such as copyright, intellectual property, and data privacy. These elements are essential for cultivating a generation of accountable digital citizens capable of navigating the ethical intricacies of the digital world (Livingstone, 2018).

5.5 Suggestions

The following recommendations are proposed, based on data analysis and study results, to improve digital literacy competencies among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU).

i. Conduct awareness campaigns to educate students about the importance and benefits of advanced digital literacy.

ii. Both universities should design and implement structured digital literacy programs that cover fundamental and advanced digital skills. So that research scholars can access and utilize digital resources from library consortium and another database.

iii. Provide targeted training in advanced areas like programming, graphic design, video editing, and content management systems. To seek new digital tools for improving their skills and efficiency.

iv. Encourage scholars to enrol in online and offline courses, workshops, and certification programs focusing on digital tools and techniques.

v. Facilitate webinars, peer learning sessions, and collaborations with other institutions to expose research scholars to diverse digital practices and tools.

5.6 Future areas for research

On the findings of this study, future research can explore the following domains to improve digital literacy competencies across all levels of education.

i. The present study involves the digital literacy competency among research scholars of School of Physical Sciences at Mizoram University (MZU) and North Eastern Hill University (NEHU). Further, the study can be conducted in other schools and other universities.

ii. A study could be repeated with the PG students to find the impact of Digital Literacy Competency.

iii. Examine the direct correlation between digital literacy levels and academic outcomes.

iv. A comparative study on the usage patterns of digital tools across different universities and disciplines.

v. A research on the impact of digital literacy on research collaboration can be done.

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Questionnaire for Research Scholars

Respected Responders,

I am pursuing a Ph.D. in Library & Information Science, Mizoram University, Aizawl in the area of **"Digital Literacy Competency among Research Scholars of School of Physical Sciences: A Comparative Study of Mizoram University (MZU) and North Eastern Hill University (NEHU)"** under the guidance of Dr. F. Chanchinmawia. You are kindly requested to fill up the questionnaire. I assure you that the information given by you will be used for academic purposes only.

(Please answer the question or tick mark in the bracket provided against each question)

Thanking You,

Bhaigyashree Boro
Ph.D Scholar
Dept. of Library & Information Science
Mizoram University
Phone No.: 7002602203
Email: bhaigyashreeboro24@gmail.com

1. GENERAL INFORMATION

1. Name of the Institute: _____
2. Name of the Department: _____
3. Gender: Male ( ) Female ( )
4. Age group of correspondent:
   (i) Below 25 years ( ) (ii) Between 25-30 years ( )
   (ii) Between 31-35 years ( ) (iv) 36+ ( )

2. LIBRARY USE AND SERVICES

1. The frequency of visits to the library
   (i) Daily ( ) (ii) Weekly ( )
   (iii) Monthly ( ) (iv) Occasionally ( ) (v) Never ( )

2. Do you think that the library has adequate resources?

   (i) Yes ( ) (ii) No ( )

3. How useful do you find library?

   (i) Very Useful ( ) (ii) Useful ( ) (iii) Not at all ( )

4. Purpose of using library resources. (You may tick more than one)

   (i) Preparing Notes ( ) (ii) Writing a research paper ( )

   (iii) Preparing a bibliography ( ) (iv) Preparing an assignment ( )

   (v) For a project work ( )

5. Methods of searching documents in the library

   (i) Search bookshelves directly ( )

   (ii) Use OPAC ( )

   (iii) Taking assistance from Library staff ( )

   (iv) Taking assistance from friends ( )

6. Are you using the electronic resources of the library?

   (i) Yes ( ) (ii) No ( )

7. Are you aware of the services provided by your Library?

Library Services	Yes	No
Reference Service		
Circulation (Issue/Return Service)		
OPAC		
Current Awareness Service/ SDI		
Shelf Issue and Return (RFID)		
Databases Searching		
Photocopy Service		
Brail Service for Blind Students		
Inter Library Loan		

3. IDENTIFY AND COMPARE THE LEVEL OF DIGITAL LITERACY

1. Are you aware of the term Digital Literacy?

   (i) Yes ( ) (ii) No ( )

2. What is your level of Digital Literacy?

   (i) Very High ( ) (ii) High ( )

   (iii) Moderate ( ) (iv) Low ( )

3. Which of the following digital skills are you familiar? (Select all that apply)

Familiarity	Yes	No
Internet Browsing		
Social Media Usage		
Email		
Online Security Practices		
Basic Computer Troubleshooting		
Data Analysis and Interpretation		

4. How frequently do you encounter the terms or concepts related to digital literacy in your daily life?

(i) Rarely ( ) (ii) Sometimes ( )

(iii) Often ( ) (iv) Always ( )

5. To what extent do you agree that the following aspects have improved due to digital literacy in your daily life?

Digital Literacy	SA	A	UD	DA
Improved communication and information access				
Enhanced professional and educational opportunities				
Enabled critical evaluation of online content				
Understand digital security and privacy				
Competence in various digital platforms				
Awareness of digital information reliability				

Abbreviations: Strongly Agree ***(SA),*** *Agree* ***(A),*** *Undecided* ***(UD),*** *Disagree* ***(DA)***

4. AWARENESS AMONG THE RESPONDENTS ON DIGITAL TOOLS AND TECHNIQUES

1. Have you ever participated in online courses or workshops related to digital tools and techniques?

(i) Yes ( ) (ii) No ( )

2. How often do you actively seek out new digital tools and techniques to improve your skills or work efficiency?

(i) Frequently ( ) (ii) Sometimes ( )

(iii) Rarely ( ) (iv) Never ( )

3. What is your familiarity with the following digital tools and software applications)

Options	VF	F	SF	UF
Microsoft Office Suite				
Adobe Creative Cloud				
Google Workspace				
Social media platforms				
Content management systems				
Data analysis tools				
Programming languages				
Graphic design software				
Video editing software				

*Abbreviations: Very Familiar **(VF)**, Familiar **(F)**, Somewhat Familiar **(SF)**, Unfamiliar **(UF)***

4. How do you stay updated on the latest developments and updates in the digital tools and techniques you use? (Select all that apply)

Options	Frequently	Sometimes	Rarely	Never
Online tutorials and documentation				
Webinars and online work-shops				
Industry publications and websites				
Networking with peers or professionals				
Social media groups or forums				

5. How do you assess the impact of digital tools and techniques on your productivity and work quality?

(i) Very positively ( ) (ii) Positively ( )

(iii) Neutral ( ) (iv) Negatively ( )

(v) Very negatively ( )

5. CAPABILITY TO RETRIEVE, EXAMINE, EVALUATE, AND USE AUTHENTIC DIGITAL INFORMATION

1. When conducting academic research, where do you primarily search for digital information? (Select all that apply)

(i) University library resources ( )

(ii) Online databases and journals ( )

(iii) Google search engines ( )

(iv) Social media platforms ( )

2. How often do you rely on digital sources of information for your research and academic work?

Digital Sources	Always	Very Often	Sometimes	Rarely	Never
Online Database					
Academic Journals					
Websites					
Blogs					
Crowdsourced encyclopedias					

3. When searching for digital information, which search databases do you commonly use?

Database	Always	Very Often	Sometimes	Rarely	Never
Google Scholar					
ScienceDirect					
Scopus					
ResearchGate					
PubChem					
SciFinder					
Web of Science					
RCSB Protein Data Bank					
PubMed					
e-ShodhSindhu					

4. When evaluating digital information for your research, which of the following is are essential factor to consider?

Evaluating digital information	Very Important	Moderately Important	Not Important
Author's credentials and expertise			
Publication source			
Date of publication			
Citations and references			
Peer-reviewed status			
Relevance to the research topic			
Accuracy and precision of the information			

5. How confident are you in evaluating the authenticity of digital information that can be ascertained during the research process?

Evaluating the authenticity	Very Confident	Moderately Confident	Not Confident
Check the source and authorship			
Verify citations and references			
Assess the publication date			
Analyze the content and writing style			
Cross-reference information			
Evaluate website domain and design			

6. SATISFACTION AND IMPACT OF THE DIGITAL LITERACY PROGRAM

1. Have you participated in the digital literacy initiative offered by the university?
   (i) Yes, I have completed the program. ( )
   (ii) Yes, I am currently enrolled in the program. ( )
   (iii) No, I have not participated in the program. ( )

2. How confident are you in your ability to apply digital literacy skills in your academic or professional work?
   (i) Very confident ( ) (ii) Confident ( )
   (iii) Somewhat confident ( ) (iv) Not very confident ( )
   (v) Not confident at all ( )

3. Overall, how satisfied are you with the impact of the digital literacy program on your digital literacy competency?
   (i) Very satisfied ( ) (ii) Satisfied ( )
   (iii) Neutral ( ) (iv) Dissatisfied ( )
   (v) Very dissatisfied ( )

4. To what extent, do you agree that digital literacy competency has a significant impact on your academic and professional pursuit?

Significant impact	SA	A	SD
Save time and money			
Enhanced research efficiency and productivity			
Enhanced data analysis and visualization			
Improved information evaluation			
Global outreach and dissemination of research			
Facilitation of remote research and collaboration			

*Abbreviations: Strongly Agree **(SA),** Agree **(A),** Disagree **(DA)***

G. STRENGTH AND WEAKNESS OF DIGITAL LITERACY SKILLS

1. How important do you think digital literacy skills are for your research or academic purpose?

   (i) Extremely important ( ) (ii) Very important ( )

   (iii) Moderately important ( ) (iv) Slightly important ( )

   (v) Not important at all ( )

2. To what extent do you agree that your digital literacy skills significantly contribute to the overall efficiency and quality of your research work?

   (i) Strongly Disagree ( ) (ii) Disagree ( )

   (iii) Neutral ( ) (iv) Agree ( )

   (v) Strongly Agree ( )

3. What are your skills in accessing digital information to find relevant academic sources?

Academic Sources	Highly skilled	Skilled	Competent	Not very skilled
Academic Database and Journals				
Libraries and Academic Repositories				
E-Books Platforms and E-Libraries				
Open Access Repositories				
Search engines				

4. How proficient are you in utilizing digital platforms for collaboration and sharing research findings with your peers and mentors?

Digital Platforms	Extremely Proficient	Very Proficient	Slightly Proficient	Not Proficient
Google Docs				
Google Drive				
Google Scholar				
Microsoft Word				
MS Excel				
PowerPoint				
Zoom				

5. How satisfied are you with using online databases and repositories for accessing research articles and scholarly resources?

Online Databases and Repositories	Very Confident	Somewhat Confident	Not very Confident	Not Confident at all
Google Scholar				
ScienceDirect				
IEEE Xplore				
SpringerLink				
ArXiv				
Web of Science				
Scopus				
DOAJ				

H. Any Comments/Suggestions

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LIST OF PUBLICATIONS

Journal Publication

1. **Boro, B.,** Laltlanzova, R., & Chanchinmawia, F. (2023). 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
2. Lalduhzuali, Lallawmawmi, **Boro, B.,** & Chanchinmawia, F. (2023). Digitization and digital preservation of library resources in the contemporary era: A study with reference to selected special libraries in Mizoram. *Annals of Library and Information Studies,* 70, 208-214.doi:10.56042/alis.v70i4.6363

3. **Boro, B.,** 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(2), 40-49.
4. **Boro, B.,** & Chanchinmawia, F. (2022). Assessment of digital literacy skills among UG students of Tangla College, Udalguri, Assam: A study. *Library Philosophy and Practice.*
5. Chanchinmawia, F., **Boro, B.,** Chawngthansangi, & Dawngliana, J. M. (n.d.). Awareness and utilization of e-resources by faculty members of Goverment Serchhip College in the digital environment: A study. *Library Philosophy and Practice.*

Conference/ Seminar/ Workshop

1. Boro, B., & Chanchinmawia, F. (2023). **Emerging technologies for libraries in present digital era.** In A. Hussain, M. R. V , I. Khan, & M. Sanjeeva (Ed.), Empowering Libraries, Connecting Communities Innovation, Collaboration and Entrepreneurship (pp. 349-354). Global Alliance Publishers.

2. Lalduhzuali, Boro, B., & Chanchinmawia, F. (2024). **Assessing teachers perception and competencies of media literacy in the digital age: A study with special reference to the teachers of Kendriya Vidyalaya Mizoram.** (Presented at International Conference on New Era of Social Responsibility, Sustainability and Innovations held on March 4-6, 2024)

3. Boro, B., & Chanchinmawia, F. (2024). **Perceptions of students regarding the application of media literacy for mitigating online threats.** (Presented at International Conference on New Era of Social Responsibility, Sustainability and Innovations held on March 4-6, 2024)

4. Boro, B., & Chanchinmawia, F. (2023). **Emerging technologies for libraries in present digital era.** (Presented in MANLIBNET 2023, 21st International Conference on Empowering Libraries, Connecting Communities: Innovation, Collaboration and Entrepreneurship held on October 5-7, 2023)

5. Basumatary, B., Boro, B., Mansor, A. N., & Verma, M. K. (2022). **Influence of social networking sites on scholarly communication: An Altmetric Analysis of selected LIS journals.** (Presented at 5th International Conference of Information Science (ICiS 2022) held at Royale Chulan Hotel, Pulau Pinang Malaysia, 20-21 September 2022

6. Boro, B., Chanchinmawia, F., & Lalduhzuali. (2023). **Essential knowledge for LIS professionals in a tech-heavy digital environment.** (Presented at National Seminar on Revamping Libraries and Librarianship in Digital Environment held at Central Library, Mizoram University, Aizawl, 11-12 May, 2023)

7. Boro, B., & Chanchinmawia, F. (2023). **Examining digital literacy skills among Gen Z students of Mizoram University: The impact of the Internet in the academic environment.** (Presented at National Seminar on Digitizing Library Services using Modern Technology held at Central Library, Pachhunga University College, Aizawl, 27- 28 June, 2023.

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ABSTRACT

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AN ABSTRACT SUBMITTED IN PARTIAL FULLFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

SCHOOL OF ECONOMIC, MANAGEMENT AND INFORMATION SCIENCE

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ABSTRACT

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1. Introduction

Digital literacy is an important skill in today's society, with profound implications across all facets of modern life. The COVID-19 epidemic accelerated the change to digital platforms, transforming schooling, work, and collaborative creation. Digital literacy includes the competencies required to use technology effectively and appropriately, covering both basic and progressive computing skills. It involves the creation of multimodal content, including audio, video, and other media, enabling individuals to navigate, understand, access, and communicate across various digital platforms. In the present era, digital literacy represents the skills and knowledge necessary to discover, evaluate, create, and convey information through information and communication technologies (ICTs), blending intellectual and technical competencies.

As technology continues to grow and integrate into social, economic, and political realms, digital literacy opens new avenues for enhancing quality of life. It enables meaningful internet access, fostering critical and confident participation in the online environment. Being digitally literate empowers individuals to engage safely and effectively in democratic, social, and economic processes. The internet presents ethical challenges when used for entertainment, commerce, education, and creativity, highlighting the significance of digital literacy as a tool for growth and social transformation. Technology's advancements have demonstrated benefits for economic opportunity, service delivery to underserved communities, improved management, and social progress.

In a world increasingly driven by technology, digital literacy parallels traditional literacy in its importance, demanding not only technological expertise but also ethical insight, critical thinking, and a discerning approach to consuming and creating digital content. This comprehensive skill set has evolved beyond simply using technology, emphasising a deeper understanding, critical engagement, and leveraging technology for problem-solving and creative expression. As a critical competency in the 21st century, digital literacy impacts nearly every area of modern life, requiring individuals to effectively navigate digital landscapes, evaluate information critically, communicate in virtual environments, and apply technology innovatively.

2. Digital literacy

Digital literacy is now a multi-layered array of competencies involving one's ability to employ various digital platforms effectively in locating, evaluating, and communicating information. Given this, the concept engenders a complex set of trans-disciplinary competencies that extend beyond basic computer skills, essential for navigating the digitized landscape of the present era. Through digital literacy, individuals need to develop competencies in three basic areas: information, technology skills, and media; innovation and learning abilities; and life and profession proficiencies. These collective competencies equip an individual with the ability to trace with the quick pace of technical advancement, enabling them to familiarize to platforms, applications, and latest tools that continuously emerge due to the constant evolution of digital technology.

One scope of digital literacy concerns facilitating and providing more effective ways of engagement with social networking services and the whole range of Web 2.0 platforms- from social media to blogs, wikis, and interactive websites. These platforms facilitate connecting with other people, sharing information, and working together on a number of projects. Digital literacy empowers them to be not only passive consumers of content but active contributors who share knowledge and present products or services, apart from interacting meaningfully in digital communities. In so doing, it nurtures the possibility of being in step with contemporary trends, innovations, and discussions in society, ultimately bridging geographical and cultural divides in ways previously unimagined. These are part of a comprehensive set of programs in India that focus on enhancing the rate of digital literacy among Indians.

As such, digital literacy is a broad toolkit of skills that allows individuals to find, critically evaluate, and synthesise information in digital formats. It also includes being able to find credible sources, understand biases, and put information in the right context of a greater body of knowledge. Additionally, digital literacy enables responsible content creation and sharing, taking ethics and respect into account when interacting with digital content. These skills will further support collaboration across the online spaces where people can work on joint projects, share knowledge, and develop communities of interest around some common interest or purpose. Beyond collaboration, those with problem-solving skills, equipped with digital literacy, will

harness the power of digital tools to make informed decisions at a personal, academic, or professional level. In summary, digital literacy goes beyond mere technical requirements- it is a crucial skill for thriving in the contemporary world. This wider interpretation of digital literacy is respectful to the purpose it plays in modern learning, professional competence, and informed nationality. By fostering confidence and critical engagement with digital tools, digital literacy allows people to contribute meaningfully in the increasingly technical spheres of society, contributing to democratic processes, social innovation, and economic growth.

3. Mizoram University: An overview

Mizoram University founded with an Act of Parliament (No. 8 of 2000), which began operations on 2nd of July, 2001. The university, situated in Aizawl, the capital of Mizoram, encompasses 978.2 acres on the city's periphery. Preceding to the foundation of Mizoram University (MZU), North-Eastern Hill University (NEHU), based in Shillong, had a campus in Mizoram. The campus was overseen by the Pro-Vice Chancellor which housed seven postgraduate departments: English, Education, Public Administration, Forestry, Economics, Psychology, and Mizo. Mizoram University has made substantial progress in facilities, academic programs, faculty, and support services during its 22-year history. The university obtained an 'A' rating from NAAC in both 2014 and 2019 and secured ISO certification in 2018. The Ministry of Education regularly assesses the NIRF rankings from 2016 to 2023, placing it among the highest hundred universities in India. Mizoram University got the top position in the North-East Region of India in the Times Higher Education Impact Rankings 2022. It attained the first rank among central universities in the North East, securing 13th place in the Top 20 Central Universities category of the Indian Institutional Ranking Framework (IIRF) 2023.

The School of Physical Sciences commenced operations in phases during the Tenth Plan period and now has four postgraduate departments. Instruction at the Physics Department began in the academic term 2003-2004, followed by Chemistry Department in 2006-2007, Mathematics and Computer Science in 2007-2008, and Department of Industrial Chemistry in August 2019. All postgraduate program has been developed in accordance with UGC model curriculum and CBCS norms. The comprehensive Ph.D. program began in the academic session of 2007-08. Dedicated

academics, administrative staff, and dedicated students facilitate instruction and research within the school. The school has 21 faculty members, including10 assistant professors, 2 associate professors, and 6 professors. The Physics Department has 30 capacity for Post Graduate admission, the Chemistry Department has 35 capacity, and the Mathematics and Computer Science Department has 35 capacity, while the Industrial Chemistry Department has 20 capacity. From 2007 to 2012, the school got fund under the School Level DST-FIST initiative. The Departmental DST-FIST Programme now funds the Chemistry Department (2016-21) and the Physics Department (2017-22). The School of Physical Sciences is diligently working to enhance students' education via high-quality teaching and research throughout many fields of physical sciences.

4. North Eastern Hill University: An overview

The Indian Parliament established the North-Eastern Hill University (NEHU) on July 19, 1973, as a central university. The university is located on the outskirts of Shillong, the capital of Meghalaya. The university's two campuses are at Tura, and Shillong, Meghalaya. After passing both Houses of Parliament, the North-Eastern Hill University Act (24 of 1973) was approved by the President of India on May 26, 1973. The Extraordinary Gazette of India published the Act on May 26, 1973, along with the First Schedule containing the University's Statutes. A vice chancellor supervises the NEHU Tura Campus. The University Grants Commission rated it as a university with outstanding potential in 2006. Established in 1994, it functioned as a regional university catering to the north-eastern Indian states of Meghalaya, Nagaland, Mizoram and Arunachal Pradesh, and in 2001, it led to the formation of Nagaland University and Mizoram University. The university aims to share and enhance information by offering research and instructional facilities in selected fields of study while prioritizing the development of economic and social circumstances and the wellbeing of hill communities in the north-eastern region, particularly focusing on their intellectual, cultural, and academic development. The university now comprises 53 undergraduate colleges and eight professional institutes. As of March 28, 2022, the University Central Library has an assemblage of over 200,000 volumes, subscribes to 316 international and 366 Indian current journals, and 38,000 bound magazines. The

membership comprises college and university educators, undergraduate and postgraduate honours apprentices, and non-teaching staff.

The Physical Sciences School consists of 4 departments: The Department of Chemistry, the Department of Mathematics, the Department of Physics, and the Department of Statistics. The institution serves as a major hub for postgraduate education and research in advanced domains of physical sciences. It has secured monetary support for external research from national funding bodies such as the Department of Science and Technology, the Department of Atomic Energy, the Indian Council of Medical Research, and the Council of Scientific and Industrial Research. Additionally, some of the departments have conventional monetary assistance under the UGC-CAS and DST-FIST programs. The institution has advanced equipment such as single-crystal XRD, time-resolved fluorescence spectrophotometer, GC, HPLC, and HRMS, together with top-notch computing tools to facilitate pioneering research in leading-edge domains. The departments have recruited exceptionally teaching staff, many of whom have been awarded fellowships both domestically and abroad for their notable academic achievements and for engaging in joint research initiatives domestically and internationally. A significant number of pupils from the school succeed annually for several eligibility tests, including NET, SLET, and GATE. Graduates and research students from the school successfully secure employment in academic and research organizations both domestically and internationally. The students, research scientists, and professors enjoy convenient Wi-Fi access with expeditious internet connection. The institution has a conference room and seminar hall to facilitate research and academic endeavours.

5. Significance and scope of the study

Digital literacy is to efficiently understand the ICT tools and techniques and use them efficiently for searching and acquiring digital information for academic and research purpose. Students, research scholars and employees of any professionals in present era are constantly being asked to connect, communicate, access resources and network using their conceptual talents, therefore the necessity for a digitally literate is very important. In 21st century importance, dependency and requirement of digital literacy is increasing due to use of ICT and social media tools in all sectors including LIS. Digital literacy is of crucial significance; research scholars must independently

uncover information, locate necessary data, and use it to substantiate their research. It is essential for universities to certify that all scholars develop skills in learning how to acquire, formulating queries, accessing probable information sources, evaluating accuracy, organising data, and ultimately utilising the information effectively. NEHU, established in 1973, is the oldest central university in the North East region and it has a prestigious position with its NRF ranking under 100. On the other hand, MZU, which was formerly a part of NEHU, became an autonomous institution in 2001. Despite its relatively recent establishment as an independent university, MZU has remarkable progress in research and academic performance, proving itself to be a significant contributor to higher education in the region. This comparison is particularly relevant because it highlights the dynamics of institutional development and the impact of autonomy on academic and research excellence. As a result, comparing Mizoram University (MZU) and North Eastern Hill University (NEHU) in this study lies in their shared geographical and historical context, as well as their distinct routes in institutional growth and academic development. Both universities are located in the region of North-East India, a region marked by its rich cultural diversity and unique geographical challenges, which influence the academic and research ecosystem. The study also focuses on digital literacy competency among research scholars in the physical sciences, a field recognized for its foundational role in pure science. Both MZU and NEHU have made significant contributions in this area, making them ideal universities for comparison. Digital literacy is increasingly critical in academic research, and understanding its prevalence and proficiency among scholars in these universities provides insights into how they equip students to meet contemporary research and technological challenges. By investigating these aspects, the study pursues to offer a framework for evaluating the interplay between institutional development, regional challenges, and educational outcomes in the North-East region. Thus, this research is planned to compare the digital literacy competency among the research scholars of Mizoram University (MZU) and North Eastern Hill University (NEHU). Although the phrase “Digital Literacy Competency” is more a recent occurrence it refers only to the ability to use digital devices practically.

The scope of the present research is to know the digital literacy competency among the Research Scholars of Physical Sciences of Mizoram University (MZU) and

North Eastern Hill University (NEHU). At present in both the Universities there are four departments. The scope of the study will cover all the four departments of both the Universities.

6. Research Design

6.1 Statement of the problem

Digital literacy proficiency is essential not only for individuals but also for institutions and the nation collectively. The Indian context situates this study, which aims to assess the digital literacy competencies of research scholars. The study seeks to elucidate the creation of instruments for digital literacy skills and investigate the obstacles researchers face in obtaining, scrutinizing, and interpreting resources as well as employing technology to achieve their research goals. Digital literacy serves as a potent instrument for development, as technological advancements can enhance economic opportunities for the poor, broaden service delivery to marginalized populations, optimize management, and facilitate social transformation. Students and educators require current data for diverse educational endeavours. Universities in affluent nations are perpetually updating their digital literacy curricula to align with swift technological progressions. Librarians proficiently oversee computers and a diverse array of digital devices in their offices to guarantee users receive sufficient service. Proficiency with digital technologies will limit the scholar's ability to access, disseminate, and evaluate knowledge at the appropriate time and place. By giving them the proper information at the appropriate moment and place, digital literacy competence may be able to assist academics in overcoming their obstacles.

The study aims to investigate how researchers from Mizoram University (MZU) and North Eastern Hill University (NEHU) utilize digital literacy competency to access resources, connect, communicate, evaluate, organise, and analyze information. Due to a lack of research in this area, the study is attempt to fill the gap.

6.2 Objectives of the study

The objectives of the study are:

i. To identify and compare the level of digital literacy awareness among respondents of Mizoram University (MZU) and North Eastern Hill University (NEHU).
ii. To compare the awareness on digital tools and techniques among the research scholars of both universities.
iii. To find out the research scholars' capability to retrieve, examine, evaluate and use authentic digital information for their academic purposes in both universities.
iv. To know the respondents' satisfaction with digital literacy initiatives and its impact on their digital literacy competency.
v. To find out the area of strength and weakness of digital literacy competency among the research scholars of both universities.

6.3 Hypothesis

The current study's hypotheses are:

i. H1: There is no significant difference between research scholars of NEHU and MZU in awareness of the digital literacy.
ii. H2: There is no significant difference between research scholars of NEHU and MZU in contributing to the overall efficiency and quality of digital literacy skills in their research work.
iii. H3: There is no significant difference between research scholars of NEHU and MZU in actively seeking new digital tools for improving their skills and efficiency.

6.4 Research Methodology

The study primarily focuses on digital literacy competency, which encompasses a range of skills crucial for researchers to effectively identify, search, locate, retrieve, access, and utilize information from the web to meet their diverse informational needs. These competencies are particularly significant in the context of Mizoram University and North Eastern Hill University, where researchers rely on digital resources for academic and scholarly purposes. To collect primary data from the respondents,

various instruments and methods were employed to ensure comprehensive and accurate data collection. These included:

i. Survey of Respondents

The survey method was adapted to collect primary data from respondents using a structured questionnaire comprising thirty-three questions on Digital Literacy. The questionnaire was distributed to 109 research scholars at Mizoram University (MZU) and 73 research scholars at North Eastern Hill University (NEHU). Of these, 93 completed questionnaires were returned from MZU, and 58 were received from NEHU.

ii. Sample Selection

The sample for the study was selected using a census sampling technique, ensuring that each individual from the population had an equal chance of being chosen. This approach is used to gather information about the entire population, providing a comprehensive understanding of the group's characteristics. This method helped to minimize bias and enhance the representativeness of the sample. Data collection was specifically focused on the research scholars affiliated with the School of Physical Sciences from two distinct universities. The approach aimed to gather diverse perspectives and insights from scholars actively engaged in research, thereby enriching the overall quality and reliability of the data collected.

iii. Data analysis and interpretation

The data collected were analysed with the help of appropriate statistical tools and techniques using MS-Excel Version 2019 and SPSS Version 26 do draw inferences. The Chi-Square Test is used as a statistical technique to figure out if a significant link exists between two variables that are categorical or whether the distribution of observed data deviates from a theoretical distribution. The Chi-Square statistic ($\chi 2$) is calculated as:

$$x^2 = \sum \frac{(Oi-Ei)^2}{Ei}$$

7. Findings according to the objectives of the study

7.1 The first objective of the study is "To identify and compare the level of digital literacy awareness among respondents of Mizoram University (MZU) and North Eastern Hill University (NEHU)."

i. The majority 90.30% of respondents were aware of the term "digital literacy", while the rest 9.70% of respondents were not aware of it at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), a large number, i.e., 93.10% of respondents, were aware of the term "digital literacy", while the rest, 6.90%, were not aware of it. Therefore, the result shows that research scholars at both universities are aware of the term. (Table 4.11)

ii. At Mizoram University (MZU), a significant proportion of respondents, i.e., 67.70%, rated their digital literacy as moderate, while only 6.50% of respondents indicated it was low. However, at North Eastern Hill University (NEHU), the majority 62.10% of respondents classified their digital literacy as moderate, and only 3.40% of respondents rated the level very high. Overall, while a majority of scholars at both institutions display a moderate competency in digital literacy, the findings highlight a potential gap in advanced digital skills, suggesting an opportunity for targeted digital literacy training to elevate proficiency among scholars. (Table 4.12)

iii. All the respondents, i.e., 100% at Mizoram University (MZU), were familiar with fundamental digital skills, such as internet browsing, social media usage, and email usage. At North Eastern Hill University (NEHU), the results are similar, with 100% of respondents demonstrating familiarity with internet browsing and email, and 96.6% of respondents demonstrating familiarity with social media usage. However, the data reveals at both universities specific areas where familiarity is lower, suggesting potential areas for development such as in online security practices, basic computer troubleshooting, data analysis, and interpretation. Although the findings show a strong competency in fundamental digital skills, gaps in online security practices and troubleshooting highlight areas that require primary attention to enhance their digital competence and confidence. (Table 4.13)

iv. The majority of respondents, specifically 59.1%, reported encountering digital literacy terms frequently, while 37.6% reported encountering them occasionally, and 3.2% reported encountering them rarely at Mizoram University (MZU). On the other hand, only 20.7% of respondents reported frequent exposure to digital literacy terms, compared to 36.2% who encountered them infrequently, 31.0% who reported occasionally, and 12.1% who reported always at North Eastern Hill University (NEHU). Overall, it highlights that MZU respondents showed a higher level of acquaintance with digital literacy terms; this disparity suggests that the two institutions may vary in their focus on or accessibility to digital literacy. (Table 4.14)

v. A large number of respondents from both universities agreed that digital literacy has improved their communication and information access, enhanced professional and educational opportunities, enabled critical evaluation of online content, improved their understanding of digital security and privacy, improved their competence in various digital platforms, and increased their awareness of the reliability of digital information. Very few respondents remained undecided, and none disagreed with any of the statements. Overall, these findings highlight a strong agreement among research scholars that digital literacy positively influences essential skills and opportunities in both academic and personal domains, with minor areas of variance in levels of confidence across specific skills. (Table 4.15)

7.2 The second objective of the study is "To compare the awareness on digital tools and techniques among the research scholars of both universities."

i. It shows a higher rate of participation in digital competency development at Mizoram University (MZU), i.e., 73.1% respondents, compared to North Eastern Hill University (NEHU), i.e., 63.8% respondents. However, both universities display a strong trend toward engaging in online courses, reflecting a growing emphasis on digital literacy and skill acquisition among students. (Table 4.16)

ii. A minority of respondents, i.e., 16.1%, reported frequently seeking new tools, while the majority, 71.0% respondents, indicated they do so occasionally. A smaller group, comprising 12.9% of respondents, stated that they engage rarely, and notably, none of them reported never seeking new digital tools at Mizoram

University (MZU). However, North Eastern Hill University (NEHU) showed a higher proportion of individuals frequently seeking new tools, with 29.3% of respondents indicating they do so occasionally. The majority, 62.1% of respondents, reported doing so sometimes, while a smaller group, 8.6% of respondents, rarely sought new tools; none indicated a complete lack of engagement in seeking new digital tools. NEHU respondents exhibit a more proactive approach, frequently exploring new digital tools and techniques, while MZU respondents primarily fall into the occasional engagement category. (Table 4.17)

iii. At Mizoram University (MZU), all 93 respondents exhibited proficiency in the Microsoft Office Suite, with 29% being very familiar. However, for more specialized tools, like Adobe Creative Cloud, familiarity decreased, with only 6.5% of respondents being very familiar. Google Workspace was generally well-known, with 6.5% of respondents being very familiar, whereas social media platforms had the highest proficiency, with 74.2% of respondents being very familiar. Similarly, tools such as content management systems and data analysis tools had lower familiarity levels, with 10.8% of respondents and 3.2% of respondents, respectively, being very familiar. Familiarity with programming languages, graphic design, and video editing software was also low, with over 60% of respondents unfamiliar with these tools. However, at North Eastern Hill University (NEHU), respondents showed a similar pattern, with 29.3% demonstrating a high level of familiarity with the Microsoft Office Suite, and 58.6% indicating a high level of familiarity with social media platforms. Compared to MZU, respondents showed a slightly greater familiarity with Adobe Creative Cloud at 15.5% and Google Workspace at 31%. However, similar to MZU, over 40% of NEHU participants were unfamiliar with CMS, data analysis tools, graphic design, and video editing software. (Table 4.18)

iv. At Mizoram University (MZU), respondents primarily use online tutorials and social media groups as primary methods, with 46.2% of respondents frequently using online tutorials and 54.8% of respondents regularly participating in social media forums. A significant proportion also occasionally engages with various methods, indicating a balanced approach to resource utilisation. 33.3% of

respondents respond to industry publications and websites, 14.0% respond to networking with peers or professionals, and 54.8% respond to social media groups or forums. However, North-Eastern Hill University (NEHU) respondents exhibit a distinct pattern, with 41.4% of respondents frequently using online tutorials and a strong preference for webinars and online workshops, as evidenced by 72.4% of respondents regularly participating in these sessions. Additionally, the majority of respondents frequently network with peers i.e., 48.3%, industry publications and websites i.e., 46.6%, and social media groups or forums i.e., 48.3%. NEHU respondents exhibit a preference for structured and professional methods of staying updated, such as webinars, professional networking, and industry publications. In contrast, MZU respondents are more inclined toward accessible, informal methods, such as online tutorials and social media groups, indicating differing institutional cultures and preferences in digital literacy engagement between the two universities. These patterns underscore varying approaches to digital literacy development and reflect how institutional environments may shape preferences for staying informed. (Table 4.19)

v. At Mizoram University (MZU), a majority of participants perceive digital tools as beneficial, with 44.1% of respondents rating the impact as "very positive" and 47.3% of respondents as "positive." Only a small fraction 8.6% of respondents remain neutral regarding the impact. Similarly, North Eastern Hill University (NEHU) respondents share a favourable view, with 44.8% indicating a "very positive" impact and another 44.8% noting a "positive" effect, while 10.3% remain neutral. These results highlight a strong consensus across both institutions on the positive influence of digital tools in enhancing professional effectiveness and productivity. (Table 4.20)

7.3 The third objective of the study is "To find out the research scholars' capability to retrieve, examine, evaluate and use authentic digital information for their academic purposes in both universities."

i. The findings indicate that academic researchers from both Mizoram University (MZU) and North-Eastern Hill University (NEHU) prefer credible scholarly sources for their digital information needs, with "online databases and journals"

emerging as the most utilized resource. At MZU, 41.4% of respondents favour these databases, 35.2% use “Google search engines” as an alternative, and only 17.6% rely on “university library resources.” “Social media platforms” are the least preferred, with only 5.7% of MZU researchers turning to them for academic purposes. Similarly, 40.0% of NEHU researchers strongly prefer “online databases and journals,” closely followed by “Google search engines” at 36.4%. Only 17.1% of respondents use “university library resources,” and only 6.4% use “social media platforms” for their research. These patterns highlight a dominant reliance on academic sources and reputable online resources for digital information across both institutions, highlighting a limited reliance on social media for research. (Table 4.12)

ii. At Mizoram University (MZU), 67.7% of respondents reported using online databases “always” for academically credible resources. Similarly, 64.5% of respondents indicated that they always use academic journals. Websites also show high usage frequency, with 60.2% of respondents relying on them “always”. Conversely, informal sources like blogs and crowdsourced encyclopaedias demonstrate significantly lower usage rates, with the majority of respondents either using them occasionally, rarely, or never. At North Eastern Hill University (NEHU), a maximum of 56.9% of respondents reported using online databases “always.” Researchers also widely use academic journals, with 65.5% of respondents reporting “always” reliance on them. 48.3% of respondents indicated that they use websites “always”. However, reliance on blogs and crowdsourced encyclopaedias is notably lower, with many respondents indicating “rarely” or “never” using these sources. Overall, these results highlight a preference for scholarly and reliable information sources, with limited reliance on user-generated content. This trend reflects the prioritization of credibility and academic accuracy in information-seeking behaviours among respondents from both institutions. (Table 4.22)

iii. At Mizoram University (MZU), 71.0% of respondents primarily rely on Google Scholar. ScienceDirect emerges as the second most-used tool, with 50.5% of respondents indicating “always.” However, Scopus reflects a moderate level of engagement; 37.6% of respondents use it “always.” ResearchGate is another

widely accessed resource, with 38.7% of respondents using it “always.” In contrast, more specialized tools, such as PubChem and SciFinder, have comparatively limited usage. Only 24.7% of respondents consistently use PubChem, while just 12.9% consistently use SciFinder. Web of Science sees moderate engagement, with 22.6% of respondents using it “always.” Similarly, RCSB Protein Data Bank, 60.2% of respondents said they never use, and e-ShodhSindhu, which 46.2% of respondents said they never use it. Lastly, JSTOR reflects minimal usage, with 65.6% of respondents never utilizing the resource. Whereas at North-Eastern Hill University (NEHU), Google Scholar is even more dominant, with 86.2% of respondents using it “always.” ScienceDirect also shows significant utilization, with 65.5% of respondents using it “always.” Similarly, 53.4% of respondents prefer Scopus “always.” ResearchGate exhibits a strong presence among researchers, with 60.3% of respondents indicating “always.” On the other hand, PubChem shows moderate engagement, with 48.3% of respondents using it “always.” SciFinder is one of the most highly utilized specialized databases, with 67.2% of respondents using it “always.” For Web of Science, 63.8% of respondents use it “always.” However, specialized databases like the RCSB Protein Data Bank and e-ShodhSindhu show limited utilization. JSTOR is the least used resource, with 63.8% of respondents indicating they never access it. The data reveals distinct patterns in the use of search engines and databases among researchers at Mizoram University (MZU) and North-Eastern Hill University (NEHU). Google Scholar stands out as the most widely utilized search engine at both institutions, reflecting its popularity and accessibility as a primary research tool. This trend indicates a preference for general, versatile resources, with less frequent access to specialised databases. These findings underscore the reliance on widely accessible platforms for research needs, with both universities demonstrating similar usage patterns. (Table 4.23)

iv. At Mizoram University (MZU), the evaluation of digital information for academic purposes reveals the prioritization of several key factors. The majority of respondents, specifically 66.7%, consider the “author's credentials and expertise” as highly important. Additionally, 63.4% of respondents rate the

"publication source" as highly important. 40.9% of respondents see the "date of publication" as a significant factor, rating it as "very important." The importance of "citations and references" is somewhat less pronounced, with only 34.4% of respondents rating it as "very important." "Peer-reviewed status" holds considerable weight, with 40.9% of respondents considering it "very important." In terms of relevance, "relevance to the research topic" is a critical factor, with a notable 83.9% of respondents rating it as "very important." However, a substantial 90.3% of respondents rated the "accuracy and precision of the information" as "very important," highlighting the university's emphasis on the reliability and exactness of information. However, North-Eastern Hill University (NEHU) has shown similar patterns, with an even stronger emphasis on specific criteria. The majority of respondents, 87.9%, rate the author's credentials and expertise as "very important." The "publication source" also ranks highly, with 82.8% of respondents identifying it as "very important." The "date of publication" receives a balanced response, with 43.1% of respondents rating it as "very important." NEHU places a higher value on the "citations and references" factor, with 67.2% of respondents rating it as "very important." Similarly, 70.7% of respondents regard the "peer reviewed status" as important. 94.8% of respondents rated it as "very important," indicating NEHU's strong focus on "relevance to the research topic." Lastly, "accuracy and precision of the information" are essential, with 89.7% of respondents rating it as "very important," reaffirming NEHU's emphasis on information reliability. In summary, both universities prioritize the accuracy, relevance, and author credibility of digital information, reflecting a shared commitment to using high-quality, reliable sources for academic work. (Table 4.24)

v. At Mizoram University (MZU), evaluating the authenticity of digital information reveals varying levels of confidence across different evaluation methods. In "checking the source and authorship," the majority (64.5%) of respondents stated "very confident." For "verifying citations and references," 50.5% of respondents were "very confident." When evaluating the "publication date," 48.4% of respondents reported being "very confident." Regarding "analysing the content and writing style," less than half, 37.6% of respondents

were “very confident.” In “cross-referencing information,” 34.4% of respondents were “very confident.” It is observed the lowest confidence levels in “evaluating the website domain and design,” with only 19.4% of respondents expressing “very confidence.” In contrast to MZU, students at North-Eastern Hill University (NEHU) generally displayed higher levels of confidence. 72.4% of respondents reported the highest level of confidence in “checking the source and authorship.” For “verifying citations and references,” 65.5% of respondents were “very confident.” In evaluating the “publication date,” 53.4% of respondents were “very confident.” Regarding “analysing the content and writing style,” 55.2% of respondents were “very confident.” For “cross-referencing information,” 53.4% of respondents were “very confident.” Lastly, in “evaluating the website domain and design,” 27.6% of respondents were “very confident.” The findings indicate that NEHU students exhibit a relatively higher confidence level across all methods of evaluating digital information authenticity compared to their counterparts at MZU, particularly in “checking the source and authorship” and “verifying citations and references.” However, both groups showed lower confidence in “evaluating the website domain and design.” (Table 4.25)

7.4 The fourth objective of the study is “To know the respondents’ satisfaction with digital literacy initiatives and its impact on their digital literacy competency.”

i. At Mizoram University (MZU), the student participation in the digital literacy program is relatively low. Among the 93 respondents, only 23.7% reported having completed the program, while 3.2% were currently enrolled. A significant majority of 73.1% of respondents indicated that they have not participated in the program. At North-Eastern Hill University (NEHU), out of 58 respondents, only 3.4% have completed the program, and 6.9% of respondents are currently enrolled. A vast majority, 89.7% of respondents, have not participated in the program. These findings show a significant absence of participation in the digital literacy program at both universities. This data highlights the need for targeted efforts to enhance student participation in digital literacy programs at both universities. (Table 4.26)

ii. At Mizoram University (MZU), the findings reveal that the majority of respondents, i.e., 55.9%, were “confident” in their digital literacy skills. Additionally, 30.1% of respondents reported being “somewhat confident.” A smaller group, comprising 10.8% of respondents, described themselves as “very confident.” Notably, 3.2% of respondents indicated they were “not confident” in their digital literacy skills, while none selected “not very confident at all.” At NEHU, the distribution of confidence levels reflects a slightly different trend. Here, less than half, 48.3% of respondents reported “confident,” making it the most frequently chosen category. Followed by, 27.6% of respondents, indicating they were “somewhat confident.” Interestingly, 10.3% of respondents identified as “very confident.” Additionally, 13.8% of respondents reported feeling “not very confident.” Similarly, to MZU, no respondents at NEHU indicated that they were “not confident at all.” These findings highlight variations in digital literacy confidence levels between the two institutions, offering valuable insights into the differing self-assessments of digital skills among the respondents. (Table 4.27)

iii. At Mizoram University (MZU), the finding reveals a diverse perception of the digital literacy program's impact. Among the 93 respondents, only 3.2% reported were “very satisfied” with the program. A significant proportion, 43.0% of respondents, were “satisfied.” However, the largest group, comprising 46.2% of respondents, remained “neutral” regarding the program's effect on their digital literacy skills. On the other hand, 7.5% of respondents indicated being “very dissatisfied.” Notably, none of the respondents from MZU reported being simply “dissatisfied.” At North Eastern Hill University (NEHU), of the 58 respondents, 8.6% reported being “very satisfied,” while the majority, 51.7%, reported being “satisfied.” Additionally, 39.7% of respondents expressed a “neutral” opinion. Interestingly, no respondents in NEHU reported being either “very dissatisfied” or “dissatisfied,” highlighting an overall more favourable perception of the program among this group. (Table 4.28)

iv. At Mizoram University (MZU), a significant majority, 69.9% of respondents, “strongly agree” that digital literacy helps in saving time and money. Similarly, 63.4% of respondents “strongly agree” that digital literacy enhances research

efficiency and productivity. Regarding the aspect of "enhanced data analysis and visualisation," 71.0% of respondents strongly agree. In terms of "improved information evaluation," 53.8% of respondents "strongly agree." 41.9% of respondents "strongly agree" to the benefits of "global outreach and dissemination of research." Lastly, 43.0% of respondents "strongly agree" with the facilitation of remote research and collaboration. These results highlight the perceived importance of digital literacy in enhancing various aspects of academic and professional work among respondents at MZU. North-Eastern Hill University (NEHU) also indicates a positive perception of digital literacy competencies. 63.8% of respondents "strongly agree" with the concept of "saving time and money." A higher proportion of respondents, i.e., 75.9%, "strongly agree" that digital literacy enhances research efficiency and productivity. Regarding "enhanced data analysis and visualization," 72.4% of respondents said they "strongly agree." Regarding the aspect of "improved information evaluation," 65.5% of respondents "strongly agree," while 67.2% of respondents "strongly agree" with "global outreach and dissemination of research." Lastly, 62.1% of respondents positively perceive the "facilitation of remote research and collaboration." These findings highlight the consistent recognition of the benefits of digital literacy in supporting academic and professional growth among respondents at NEHU. (Table 4.29)

7.**5 The fifth objective of the study is "To find out the area of strength and weakness of digital literacy competency among the research scholars of both universities."**

i. At Mizoram University (MZU), among the 93 respondents, 46.2% of respondents perceived digital literacy as "extremely important," while 39.8% of respondents rated it as "very important." A smaller proportion, 14.0% of respondents, considered it "moderately important." Notably, no respondents rated digital literacy as "slightly important" or "not important at all." This data indicates that MZU students largely acknowledge the critical role of digital literacy in their academic pursuits, with the majority emphasizing its utmost importance. At North-Eastern Hill University (NEHU), the perceived importance of digital literacy skills is even more prominent. Of the 58

respondents, 39.7% consider digital literacy to be “extremely important,” and the remaining 60.3% of respondents rate it as “very important.” Significantly, no respondents rated it as “moderately important,” “slightly important,” or “not important at all.” This unanimous recognition underscores the critical role that digital literacy plays in supporting academic and research activities among NEHU students, highlighting a consensus regarding its indispensable value. (Table 4.30)

ii. At Mizoram University (MZU), most of the respondents recognizes the importance of digital literacy skills for enhancing research efficiency and quality. Among the 93 respondents, the majority (45.2%) agreed that these skills significantly improve research outcomes. However, at North Eastern Hill University (NEHU), the findings demonstrate even stronger support for the contribution of digital literacy to research quality and efficiency. Out of 58 respondents, a maximum of 48.3% strongly agreed. Overall, the findings from both institutions reveal a strong agreement on the importance of digital literacy in research, with NEHU students showing slightly higher agreement levels. A small proportion of neutrality is evident at both universities, but the overwhelming majority of respondents acknowledge the positive impact of these skills on research quality and efficiency. (Table 4.31)

iii. At Mizoram University (MZU), a significant number of respondents demonstrate proficiency in accessing academic databases and journals, with 49.5% indicating themselves as “skilled.” However, when it comes to libraries and academic repositories, 47.3% of respondents rated themselves as “skilled.” For e-book platforms and e-libraries, 40.9% of respondents are “skilled.” Less than half of respondents, specifically 29.0%, reported being “skilled” in accessing open-access repositories. Search engines emerge as the strongest area of expertise among researchers, with 45.2% of respondents being “highly skilled.” On the other hand, at North-Eastern Hill University (NEHU), 48.3% of the respondents are “skilled” in accessing academic databases and journals. For libraries and academic repositories, 43.1% of respondents are “skilled.” In the domain of e-book platforms and e-libraries, 44.8% of respondents are “skilled.” 39.7% of respondents consider accessing open-access repositories to be

"skilled." Search engines are the strongest area for NEHU students, with 55.2% of respondents being "skilled." Overall, MZU students demonstrate notable strengths in accessing academic databases and search engines, with many showcasing advanced skills in open-access repositories. In comparison, NEHU students tend to rate themselves as more competent but are less likely to identify as "highly skilled," with their strengths primarily in search engines and academic databases, while other areas reflect moderate proficiency levels. (Table 4.32)

iv. At Mizoram University (MZU), the data reveals a high level of proficiency in utilizing various digital platforms for research collaboration and information sharing. Specifically, "Google Docs" and "Google Drive" demonstrate strong competency, with approximately half of the respondents, or 49.5%, reporting that they are "extremely proficient." "Google Scholar" usage is also prominent among scholars, where 53.8% of the respondents are "extremely proficient." Similarly, "Microsoft Word" and "MS Excel" show high proficiency levels, with over 50% of respondents in both categories being "extremely proficient." "PowerPoint" shows the highest proficiency among the assessed platforms, with 57.0% of respondents rated as "extremely proficient." Regarding communication tools, "Zoom" proficiency is slightly lower compared to other platforms, with 36.6% of respondents being "extremely proficient." On the other hand, North-Eastern Hill University (NEHU) also demonstrates considerable proficiency in digital platforms, albeit with some variations compared to MZU. For "Google Docs" and "Google Drive," 37.9% of respondents each are "extremely proficient." Similarly, in "Google Scholar," 44.8% of respondents are "extremely proficient." "Microsoft Word" and "MS Excel" show similar trends, with approximately 44.8% and 36.2% of respondents being "extremely proficient," respectively. Followed by "PowerPoint," 41.4% of respondents are "extremely proficient." "Zoom" usage proficiency is comparatively lower at NEHU, where only 25.9% of respondents are "extremely proficient." Overall, while both MZU and NEHU students show high proficiency in digital platforms essential for research collaboration and sharing, MZU students generally display higher levels of expertise across most tools. (Table 4.33)

v. At Mizoram University (MZU), researchers reported a high level of confidence in using widely accessible platforms like “Google Scholar” and “ScienceDirect” for accessing scholarly resources. Among the 93 respondents, the majority (87.1%) expressed being “very confident” in using “Google Scholar.” Similarly, for “ScienceDirect,” 66.7% of respondents reported being “very confident.” In contrast, the level of confidence with “IEEE Xplore” was significantly lower. Only 29.0% of respondents were “very confident.” The responses for “SpringerLink” indicated more than half, i.e., 53.8% of students being “very confident.” Usage of “ArXiv” showed a marked lack of familiarity or comfort, as only 7.5% of respondents were “very confident.” Similar to “DOAJ,” only 9.5% of respondents expressed “very confidence.” For “Web of Science,” less than half, i.e., 34.4%, reported being “very confident.” In the same way, for “Scopus,” only 32.3% of respondents reported being “very confident.” On the other hand, North-Eastern Hill University (NEHU) also demonstrated high confidence levels in using platforms like “Google Scholar” and “ScienceDirect.” Among the 58 respondents, 74.1% were “very confident” in using “Google Scholar.” For “ScienceDirect,” 63.8% of respondents reported being “very confident.” In contrast, the usage of “IEEE Xplore” showed significant discomfort. None of the students were confident about this platform. For “SpringerLink,” more than half, 55.2% of respondents, were “very confident.” The usage of “ArXiv” was notably low, with only 3.4% of respondents being “very confident.” Similarly, only 1.7% of respondents expressed high confidence in “DOAJ.” For “Web of Science,” 58.6% of respondents reported feeling “very confident.” Similarly, for “Scopus,” 53.4% of respondents reported being “very confident.” It reveals that both MZU and NEHU students displayed high levels of confidence in using widely known platforms like Google Scholar and ScienceDirect. (Table 4.34)

7.6 General findings

i. The majority 61.30% of respondents were male, while the rest 38.70% were female at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), a large number 55.18% of respondents were male, while

the rest were 44.82% were female. It was found that the maximum respondents were male in both universities. (Table 4.2)

ii. The majority 83.88% of respondents were between 26-30 years of age group, followed by 12.90% of respondents who were below 25 years of age group and 3.22% of respondents were between 31-35 years of the age group, and none of the respondents were above 36 years of age in Mizoram University (MZU). However, out of a total of 58 respondents, the majority, 94.82 percent, were between 26-30 years of age. This was followed by 5.18% of respondents who were below 25 years of age, and none of the respondents at North Eastern Hill University (NEHU) were between 31-35 years and above 36 years. This also shows that the majority of students at both universities were in the 26-30 years of age group. (Table 4.3)

iii. The majority 96.8% of respondents were visiting the library, while the rest, 3.2%, didn't visit the library at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), a large number 91.4% of respondents were visiting the library, while the rest 8.6% of respondents didn't. (Table 4.4)

iv. More than half, i.e., 80.6% of respondents, stated that the library has adequate resources, while 19.4% of respondents said it does not have at Mizoram University (MZU). However, at North Eastern Hill University (NEHU), the majority 77.6% of respondents responded that the library had adequate resources, and the remaining 22.4% of respondents stated it does not have. (Table 4.5)

v. The majority 74.2% of respondents found the library useful, followed by 22.6% who stated it was very useful, and the remaining 3.2% of respondents responded that it was not useful at all at Mizoram University (MZU). However, at North Eastern Hill University, more than half 56.1% of respondents found the library useful, followinf 34.5% of respondents who responded very useful, and the rest 8.6% of respondents who responded not at all useful. (Table 4.6)

vi. The majority 34.5% of respondents at Mizoram University (MZU) use the library resources for writing research papers, following preparing notes (28.5%), project work (21.2%), assignment preparation (11.5%), and bibliography preparation (4.2%). However, at North Eastern Hill University (NEHU), the

majority 37.5% of respondents visited the library to write a research paper, followed by 26.8%, 19.6%, 13.4%, and 2.7% for preparing notes, assignment preparation, project work, and bibliography preparation respectively. (Table 4.7)

vii. In both universities, the data reveals that direct browsing of bookshelves emerges as the most commonly used method by research scholars for locating resources in the library. In contrast, the usage of OPAC (Online Public Access Catalogue) and seeking assistance from library staff are comparatively less frequent. Peer assistance, however, is the least preferred method among the available options. (Table 4.8)

viii. The data from both universities reveals that a significant proportion of research scholars actively use the electronic resources provided by their libraries. This underscores the critical role of digital resources in facilitating academic research by offering convenient access to a vast array of scholarly materials. These resources not only support the diverse needs of researchers but also enhance the overall academic experience. (Table 4.9)

ix. At Mizoram University (MZU), awareness of library services is notably high for essentials. 93.5% of respondents recognize circulation services, while 90.3% are aware of shelf issues, return services using RFID technology, and photocopy services. OPAC services are familiar to 80.6% of respondents, and 71.0% are aware of database searching services. Specialised services such as Braille services and inter-library loan (ILL) services have lower awareness, with 24.7% and 11.8% of respondents aware, respectively. On the other hand, at North Eastern Hill University (NEHU), 93.1% of respondents are aware of circulation services, and 89.7% are familiar with database searching services. Awareness of OPAC services is lower at 67.2%, while current awareness services (CAS) and selective dissemination of information (SDI) services are known to 41.4% of respondents. Only 20.7% of respondents are familiar with specialised services, such as Braille services, and 17.2% are aware of Inter-Library Loan (ILL) services. Overall, while awareness of basic services is strong at both institutions, specialized services require greater outreach efforts to enhance their visibility and usage. (Table 4.10)

8. Hypothesis

H1: There is no significant difference between research scholars of NEHU and MZU in awareness of the digital literacy.

This value indicates the p-value for the test, which is the probability of observing the data if the null hypothesis is true. Since this is greater than the typical significance level (e.g., 0.05), we do not reject the null hypothesis. Thus, there is no significant association between the variables. H1 is not rejected.

H2: There is no significant difference between research scholars of NEHU and MZU in contributing to the overall efficiency and quality of digital literacy skills in their research work.

The p-value of 0.553 is much greater than the conventional significance level (e.g., 0.05). This means that the observed relationship between the variables is not statistically significant. The p-value (0.553) indicates that there is insufficient evidence to reject the null hypothesis. This implies: No statistically significant association exists between the variables under study. The test results indicate no significant relationship between the variables. Ensure that assumptions (e.g., expected cell counts) are checked for the validity of the test. H2 is not rejected.

H3: There is no significant difference between research scholars of NEHU and MZU in actively seeking new digital tools for improving their skills and efficiency.

The p-value is 0.140, which is greater than the common significance threshold (e.g., 0.05). This indicates that the null hypothesis cannot be rejected. Null Hypothesis: There is no association between the variables being analyzed. The p-value (0.140) suggests insufficient evidence to reject the null hypothesis. The observed association between the variables is likely due to random chance and is not statistically significant at the 0.05 level. H3 is not rejected.

9. Conclusion

Digital literacy has enhanced the essential skill in the 21st century, especially within the realm of education. Digital literacy is defined as the capacity to approach, assess, and generate knowledge using digital technology, allowing people to traverse the more intricate digital environment. As educational institutions incorporate technology into curriculum, proficiency in digital tools has become essential for academic achievement, continuous learning, and engagement in the information established economy. The use of digital literacy in education revolutionizes conventional teaching methods by fostering more dynamic and interactive learning environments. Educators with digital literacy competencies may use web resources, multimedia instruments, and instructional software to create captivating classes. This method promotes personalized education, allowing educators to address varied learning styles and requirements. Moreover, digital literacy enhances collaborative learning using platforms such as Google Classroom, Microsoft Teams, and interactive whiteboards, facilitating cooperation and critical analysis. Digital literacy empowers students to conduct research, analyze data, and present results proficiently. Digital literacy fosters the competency of students to distinguish between legitimate sources and incorrect information, which is necessary given the abundance of online academic materials. By cultivating these abilities, students are more equipped to confront intricate academic obstacles and adjust to the requirements of a digital-centric environment. The significance of digital literacy in school transcends personal learning results to tackle social disparities. The “digital divide” denotes differences in admittance to innovation and digital competencies, which might sustain socioeconomic inequities. Educational efforts emphasizing digital literacy provide students from underprivileged backgrounds with vital skills that enable them to compete in a technology-oriented employment market. Furthermore, digital literacy guarantees that students are not only consumers of digital material but also producers. The transition from passive consumption to active engagement in the digital economy aids in diminishing inequities and promoting inclusion in educational and career prospects. With the ongoing use of digital technology across sectors, digital literacy has emerged as an essential employability skill. A survey from the World Economic Forum predicts that by 2025, 50% of the workforce will require reskilling,

emphasizing technology-related skills. Education systems are essential in equipping students for this reality by integrating digital literacy into curriculum from an early age. The STEM fields - science, technology, engineering, and mathematics - are among the most technologically dependent in higher education, making digital literacy a must for success in these fields. However, non - STEM disciplines also require digital literacy due to the increasing use of digital technologies in data analysis, marketing, and communication. Integrating digital literacy into education equips students to effectively navigate and thrive in the future workforce. Digital literacy is vital for lifelong learning since it allows people to get new information and skills via online platforms. Webinars, Massive Open Online Courses (MOOCs), and e -learning platforms facilitate ongoing education, making learning accessible to anyone irrespective of their geographical location or life stage. The democratization of education promotes individual and professional development in accordance with the requirements of a rapidly changing global economy. Moreover, digital literacy enables people to be aware and responsible global citizens. It provides students with the capacity to critically assess information, counter disinformation, and participate in substantive online discussions. In a time characterized by the widespread dissemination of "fake news" and cyber threats, digital literacy is crucial for preserving the integrity of information ecosystems and fostering ethical online conduct. The COVID-19 epidemic highlighted the essential role of digital literacy in maintaining educational continuity. As educational institutions shifted to remote and hybrid learning models, both instructors and students were required to acclimate to digital platforms and technologies. Individuals with digital literacy skills managed this change more adeptly, highlighting its significance in crisis scenarios. Digital literacy not only enables the use of virtual classrooms but also improves students' capacity for autonomous learning management. Skills such as time management, online collaboration, and digital etiquette are essential for success in remote learning settings. This transition has highlighted the need for educational systems to prioritize digital literacy as an essential element of academic readiness. Besides technical abilities, digital literacy includes comprehension of the ethical ramifications of technology use. Students must acquire the ability to traverse the digital landscape judiciously, combining screen time with offline pursuits and protecting their mental well-being.

Education systems that comprise digital literacy in their course to provide learners with the information and skills required to promote digital well-being, ensuring that technology improves rather than diminishes their quality of life. Furthermore, digital literacy includes comprehension of matters such as copyright, intellectual property, and data privacy. These elements are essential for cultivating a generation of accountable digital citizens capable of navigating the ethical intricacies of the digital world.

10. Suggestions

The following recommendations are proposed, based on data analysis and study results, to improve digital literacy competencies among research scholars at Mizoram University (MZU) and North Eastern Hill University (NEHU).

i. Conduct awareness campaigns to educate students about the importance and benefits of advanced digital literacy.
ii. Both universities should design and implement structured digital literacy programs that cover fundamental and advanced digital skills. So that research scholars can access and utilize digital resources from library consortium and another database.
iii. Provide targeted training in advanced areas like programming, graphic design, video editing, and content management systems. To seek new digital tools for improving their skills and efficiency.
iv. Encourage scholars to enrol in online and offline courses, workshops, and certification programs focusing on digital tools and techniques.
v. Facilitate webinars, peer learning sessions, and collaborations with other institutions to expose research scholars to diverse digital practices and tools.

11. Future areas for research

On the findings of this study, future research can explore the following domains to improve digital literacy competencies across all levels of education.

i. The present study involves the digital literacy competency among research scholars of School of Physical Sciences at Mizoram University and North Eastern Hill University. Further, the study can be conducted in other schools and other universities.

ii. A study could be repeated with the PG students to find the impact of Digital Literacy Competency.

iii. Examine the direct correlation between digital literacy levels and academic outcomes.

iv. A comparative study on the usage patterns of digital tools across different universities and disciplines.

v. A research on the impact of digital literacy on research collaboration can be done.