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Print ISSN: [3006-2497](#) Online ISSN: [3006-2500](#)Platform & Workflow by: [Open Journal Systems](#)<https://doi.org/10.55966/assaj.2025.4.1.050>**Explore the impact of Digital Literacy on Research Practices among BS Students at the University Level****Amna Manzoor**

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habeerakabirk@gmail.com**Abstract**

The purpose of this study is to investigate the influence of digital literacy on the research practices of BS Education students studying at University of Narowal. Digital literacy has increasingly to be seen as a key component of academic success and as a factor that impacts on students' research practices. This was done by investigating how digital literacies impact on what students can and cannot do when researching at postgraduate level in terms of being able to make use of digital resources, tools and databases. Both quantitative and qualitative modes of data collection were used in a mixed-method research design. The sample, which was distributed across academic years, was of 120 students of BS Education taken through simple random sampling. The information was collected using a structure questionnaire on students' use of digital tool, digital literacy level and problems in academic research. We also conducted semi-structured interviews with 20 of these students to gain greater insight of study practices and experiences. The results indicated that most students (68%) had moderate digital literacy and that a substantial number (45%) reported not using academic databases and research management tools. Both were positively associated with the digital literacy level and good research practices. Digitally literate students are more familiar with digital tools and uses more efficient research methods. But it was important that (52%) of respondents cited a lack of training in advanced digital research tools. This study provides insights into the role of digital literacy, which may improve research practices in the area of teacher education. The results indicate that the universities need to provide a specific training on digital literacy in curricula to boost students' research performance. Subsequent studies could examine the enduring impact of digital literacy interventions on academic achievement and research productivity.

Keywords: Digital Literacy, Research Practices, BS Education Students

1. Introduction

In today's digital world, technology infusion in higher education has greatly changed how students research. Digital literacy, the capacity to locate, review, produce, and communicate information using digital media effectively is an important skill set for students to have; a skill set especially important in academic settings where research is prevalent (Van Deursen & Van Dijk, 2014). Digital literacy covers a whole range of skills from technical skills to critical skills, and the need to keep abreast of new technologies, stressed as becoming more essential for students to engage in high quality research (Penketh and Godwin, 2013). Such development of knowledge, skills, and dispositions is particularly important for students who are preparing to become teachers as they are not only potential teachers but members of the academic community.

Digital literacy is an essential factor influencing research practices, particularly of academic discipline, that is, education researchers. But there is no followed empirical work on how digital literacy has phenomenon on student's research practices in Pakistan, in particular at University of Narowal. The study seeks to investigate how digital literacy is influencing research behavior of BS Education students at the University of Narowal with the focus on the ability of students to use digital tools, access academic resources, and apply digital strategies to academic tasks. This study may contribute to the discovery of strong and weak aspects that could pave the way to future interventions in HE.

1.2 Research Objectives

- 1) To assess the level of digital literacy among BS Education students at the University of Narowal.
- 2) To examine the relationship between digital literacy and research practices among BS Education students.
- 3) To identify the challenges that BS Education students face in using digital tools for research activities.

1.3 Research Questions

- 1) What is the level of digital literacy among BS Education students at the University of Narowal?
- 2) How does digital literacy influence the research practices of BS Education students at the University of Narowal?
- 3) What challenges do BS Education students face when using digital tools and resources for academic research?

1.4 Problem Statement

The field of education has increasingly acknowledged the value of digital literacy, little is known about its relevance to the research practices of prospective teachers, specifically BS Education students in Pakistan. Yet, it is ambiguous to what extent the students at the University of Narowal use these digital resources enhance. The purpose of this research is to fill the current knowledge gap by looking at the extent of digital literacy in the degree of BS Education and its implications on their research practices and subsequently to find out possibilities to enhance the digital skills of the students for better academic work.

1.5 Rationale of the Study

With the growing focus on digital resources in academic research, students, and education majors in particular, must be proficient in digital literacy to successfully conduct research. As many academic institutions such as the University of Narowal in Pakistan, is adopting and making use of technology in their curricula, it is important to investigate the impact of digital literacy on students research skills. The research findings will be instrumental in understanding the how digital literacy influences research practices in a developing country, adding to global discussions on digital education and research.

1.6 Significance of the Study

The study highlights a number of important aspects. First, it will add to the literature on digital literacy in higher education and contribute towards understanding the phenomenon in developing countries such as Pakistan. Through a study design around third (3rd) year BS Education students, it will be determined how educators to-be will be affected by digital literacy that might even carry on until their teaching profession. "Also, the evidence will assist universities to prepare the next generation of researchers with the required digital skills to excel in their research careers." Lastly, the analysis will also illuminate the challenges that students encounter using digital tools, with implications for targeted interventions and strategies to enhance students' digital literacy.

1.7 Limitations of the Study

There are a number of limitations to this study. This study will also be limited to the BS Education students of University of Narowal which may not allow the external generalizability of the findings to other universities/disciplines. Moreover, the study will base on students' self-report on digital literacy skills that can cause potential biases in the form of social desirability or self-assessment. Finally, despite analyzing the influence of digital literacy on research practices in the present study, other variables, namely, quality of teaching, resources availability, and personal motivation, that may affect research performance were examined.

2. Literature Review

The impact of digital literacy on academic practices is gaining growing attention across the higher education sector, not least because students are expected to use a range of digital tools and resources for studying. In education, digital literacy is vital not only to process that amount of information but also to research, analysis of data, presentation of information. As such, the main purpose of this literature review is to consider the current state of the literature on digital literacy, and the influence it has on research methodologies themselves within the university student context. It will particularly be concentrated on BS Education students at University of Narowal, a cohort of beginners of academic learning. The review systematically evaluates the current evidence base on this topic, and identifies literature gaps, as well as outlines a theoretical foundation for the prospective study.

2.1 Current State of Research

The notion of digital literacy has changed from operating digital tools to the wider perspective of critical thinking, information assessment, and ethical use of technology (Belshaw, 2014). For the purpose of research, digital literacy is the ability to locate digital information; determine the accuracy of content; and use technology tools, resources, to access and manage digital

information.” Several research has been conducted on digital literacy in academic settings, particularly in higher education, giving insight to how digital skills improve student research power. In this line, Pimmer, Linxen and Grohbiel (2016) reported that digital literacy is associated with the quality of academic research. Their research was done on university students, what they found was that digital native students were better at doing research and students with greater digital literacy made better use of academic databases, search engines and reference management. Additionally, it was observed that digital literacy allowed students to critically assess electronic information, which is essential for their academic work.

Another example of digital literacy is the work of Ng (2012) and Helsper and Eynon (2010) which emphasises the significance of digital literacy in the experiences of students within higher education. Ng (2012) pointed out that those students who have higher level of digital literacy can achieve a higher level of academic performance and gain greater confidence levels in using digital tool for research. Helsper and Eynon (2010) also investigated how digital literacy differs between social classes and they explained those students from low social classes seem to struggle in developing digital literacy skills that will influence their research productivity and academic performance in general.

Although digital literacy has become more significant in research practices, studies that focus on the impact of digital tools on research processes within the discipline of education are still under-researched, especially in developing countries or settings. Existing research focuses primarily on Western students, and will remain so at least for the foreseeable future (Ally, 2008). This lacuna creates an opening for the present study to investigate the relationship between digital literacy and various research practices of the BS Education students of Pakistan, specifically at University of Narowal, which is relatively under-researched terrain in the literature.

2.2 Gaps in the Existing Literature

There is extensive work on digital literacy, more generally, although little research is done to the research practices of these students for education majors. In addition, most of the current literature considers digital literacy in higher education in general terms rather than in relation to students' ability to pursue research. In this regard, the Pakistani context is even starker since the digital divide and access or lack of it, to technology, may influence the research practices of students differently. Moreover, the existing research have mainly studied the concept of digital literacies in general and do not get the insight if students how students many read literature 2.2.

This gap will be filled by looking at the influence of digital literacy on the research practices of BS Education students at University of Narowal as there is dearth in the educational technology research. The research will investigate not only the degree of digital literacy, but also the forms of difficulty that students experience in using digital tools for academic research (the e-source process), ranging from factors of supply of digital content, to the necessary literacy and skills and to barriers to digital participation.

2.3 Theoretical frameworks

The study is underpinned by two theoretical frameworks: Technological Pedagogical Content Knowledge (TPACK) and the Digital Literacy Framework.

2.3.1 Technology Pedagogy and Content Knowledge (TPACK): Mishra and Koehler's (2006) TPACK framework is a rich model to explain how teachers use technology in their teaching and scholarship. It focuses on the intersection of three elements such as technological, pedagogical and content knowledge. Using TPACK in studies about research practices At the level of research practices, TPACK can elucidate how student's knowledge of the digital (knowledge of twenty-first century technology) intersects with their disciplinary knowledge (knowledge of the content) and doing research in the discipline (knowledge of pedagogy). This framework will be valuable for considering how the digital literacy of the BS Education students shapes their research activities, because it draws attention to the relationship between technology and pedagogy in academic activity.

2.3.2 Digital Literacy Framework: The Digital Literacy Framework (Eshet-Alkalai, 2004) emphasizes the multidimensional aspects of digital literacy such as:

1. **Information Literacy:** The ability to discover, evaluate and use information.
2. **Media Literacy:** The skill to comprehend and evaluate all kinds of media, including on-line communications.
3. **Technological Literacy:** Competence in engaging in academic work with digital tools and environments.
4. **Cognitive and Critical Literacy:** The ability to analyses digital content critically and to engage in reflective learning using digital tools.

The TPACK and the Digital Literacy Framework model are theoretical frames underpinning this study, other conceptual frameworks such as 'Digital Natives' (Prensky, 2001) also may be used. If this theory is true, it means that simply because they are "young," millennial, who were born into a digital world, should feel at home with technology. However, this conceptualization has been criticized for being too simplistic in the relationship between age and digital competence (Bennett et al., 2008). Accordingly, because of the focus on dynamic interactions between technology, pedagogical and content knowledge, we argue that the TPACK and Digital Literacy Frameworks are more suitable for this study relative to the IL model.

In sum, the reviewed literature demonstrates that although digital literacy influences students' research practices to a large extent, the knowledge gap still remains regarding its influence in the context of BS Education students, particularly in non-western countries such as Pakistan. The TPACK and Digital Literacy are theoretical underpinnings of this study which attempts to examine the impact of DLC on the research practices of the students' undertaking BS Education Program in the field of education at the University of Narowal. The findings of this study will have an impact on the wider field of digital literacy in education, particularly in the global south, and provide value on research methods toward higher education studies.

3. Research Methodology

This section discusses the steps used by the researcher to examine the influence of digital literacy on research of the BS Education students at University of Narowal. The method, a formal process for addressing the research question, includes description of data gathering, and analysis methods to understand the phenomenon. The research was carried out in the Education Department at the University of Narowal in a mixed research design fashion in order to address the research questions thoroughly.

3.1 Research Design

This was a mixed-methods investigation that involved the use of quantitative and qualitative research designs. This approach provided a complete understanding of the connection between digital literacy and research practices combining objective data with detailed personal accounts of participants. It was particularly useful to use mixed methods here as it combined statistical evidence and rich contextual information that supported a stronger argumentation on how digital literacy affected the use of resources and tools for research.

1. **Quantitative Method:** A questionnaire was distributed to find out the students' level of digital literacy and how often and what for they conduct research. This type of analysis offered a rich, non-reductive explanation of digital literacy's effects on research practices among the respondents.
2. **Qualitative method:** that used open interviews to understand students' perspectives and experiences with digital tools in research. The qualitative data complemented the findings with rich descriptions of individual challenges and rewards of digital literacy in academic research.

It was conducted on the BS Education students of Narowal University. Stratified Random Sampling was used to select the participants from different levels of study (Second Semester, Fourth Semester, Sixth and eighth Semester) in order to attain a mixed representative sample. A 120-serving student sample size was chosen according to data saturation principle in qualitative research and statistical power in quantitative analysis. This sample size was thought to be large enough to reach meaningful conclusions, yet manageable for data collection and analysis. The students according to their academic year (e.g., first, second, third, and fourth-year students) were classified. Stratified sampling was able to guarantee that every group was involved leading to a more complete description of digital literacy's influence in the levels of academic acquisition.

3.2 Data Collection Instruments:

In this investigation, two main data gathering instruments were employed:

3.2.1 Digital Literacy Survey: A survey was developed, and the respondents were invited to measure their digital literacy levels. The survey was based on existing scales (e.g., Ng, 2012; Belshaw, 2014) and consisted of items that addressed cliques' students' digital literacy with academic research tools (e.g., online databases, reference management software, search engines). It included Likert-scale questions assessing the frequency and confidence with which students used digital tools as well as open-ended questions gathering detailed accounts of students' struggles and practices with the digital research process.

Descriptive statistics was used to calculate the mean level of digital literacy and depth of engagement in research activities as evidenced from the quantitative Survey data. The collected data were analyzed using SPSS package, which was used to measure the arithmetic means, standard deviations, and frequency distributions of the responses to the survey.

3.2.2 In-depth Semi-Structured Interviews: Semi-structured interviews were held with a subset of twenty respondents from the survey. The interviews were designed to further explore students' sense of digital literacy in their academic studies. The interviews were

based on an interview guide that included open-ended questions regarding the students' use of digital tools, obstacles to digital literacy, as well as the effect of digital skills on the quality and productivity of their research.

Thematic analysis was conducted for the qualitative data of the semi-structured interviews. This analysis included transcribing the interviews, coding the data, and finding themes relevant to participants' experiences and perceptions of digital literacy in researching academic studies. The Manual thematic analysis facilitated in the coding and theme identification process, thereby enabling a more structured analysis of the qualitative information.

3.3 Advantages of the Methodology

The selected mixed-methods approach provided a number of benefits:

- 1) Through adopting mixed methodologies, the study generated data generalizable across specific aspects of digital literacy levels, in addition to the more nuanced and contextual data concerning what students do when they are doing research.
- 2) Qualitative interviews were conducted that explored students' perceptions and experiences, usually lost from entirely quantitative studies.
- 3) The study was situated within a limited context: the University of Narowal, a considerably less studied context. The findings of the study could be taken as contextually specific to the institute with the possibility of being used for similar institutes in Pakistan and abroad.

3.4 Limitations of the Approach

Although the mixed-methods study design allowed for a thorough analysis, there were limitations to the study:

1. **Sampling Bias:** While stratified random sampling was employed, we cannot exclude the possibility of bias concerning the students' decision to participate in the research. There is a possibility of self-selection bias, as more digitally literate students could have been more likely to complete the survey, potentially over representing the higher levels of digital literacy.
2. **Self-Reporting:** The survey and interview data was based on self-reports, which could be subject to social desirability bias or inaccurate perceptions of digital literacy ability.
3. **Time Coordinating with Student Time:** Time was a limitation of the study as the students' time during the semester was limited; the amount of in depth interviews and surveys that could be conducted was limited.

3.5 Ethical Considerations

The study looked into the ethical issues and all participants in the survey and the interviews provided informed consent. Information was provided anonymously and treated confidentially and students were informed of their freedom to be removed from the study at any time without punishment. Furthermore, all information was held confidential and accessible to research staff only. The mixed method adopted potential a strong model for the exploring digital literacy on research practices among the BS Education students of the University of Narowal. This mixed-methods approach facilitated both the wide-lens perspective and the academic probing of the research question. In spite of these limitations, the method was appropriate to meet the research objectives, and it led to a greater understanding of how digital literacy impacts academic research in more advanced education.

4. Data Analysis and Findings

This section presents the results of survey used to address the research question of this study that is to find out the impact of digital literacy on the research habits of BS(Ed) students from University of Narowal. Survey and interview responses are evaluated based on qualitative and quantitative perspectives and results are presented in the tables. The main findings with their implications are presented following each table.

4.1 Levels of Digital Literacy of the BS Education Students

The results from this first part of the analysis present the self-declared level of student's digital literacy. The use of digital tools and resources for educational purposes, like research, however, is digital literacy. The distribution of students by reporting their digital literacy level is presented in Table 1 below.

Table1: Levels of Digital Literacy of the BS Education Students

Digital Literacy Level	Percentage of Students (%)
High (Strong proficiency in using digital tools)	22%
Moderate (Basic digital tools usage)	68%
Low (Limited use of digital tools)	10%

A large proportion (68%) of students reported a medium level of digital literacy, such that they are easy with the use of simple digital tools (e.g., search engines, word processors), however they experience greater difficulties when working with more advanced research tools. 22% of students were, to a high degree of proficiency, competent in digital literacy they can use varied information and communication technologies to support academic tasks. 10% had low digital literacy, indicating that these students had little experience or knowledge about working with digital tools in connection with academic research.

4.2 Frequency of use of digital tools for academic research

This section examines the level of use of digital tools for academic research by students. This table summarizes the use of digital tools according to student reporting.

Table 2: Use of Digital Tools for Academic Research

Frequency of Use	Percentage of Students (%)
Daily	30%
Several times a week	50%
Once a week or less	20%

30% said they were daily users of digital tools a predictable daily behavior in the context of day-to-day use of digital resources. 50% students reported use of digital tools a few times a week as an indicator of a medium level of experience working with research tools. Another 20% of students used the digital tools once per week or less frequent, suggesting a more limited use of digital tools that could be related to issues such as unawareness, training or time restrictions.

4.3 Types of digital tools for academic research

By knowing the most popular digital instruments that students use for academic research, we can learn about their research habits. This table.3 shows the digital resources most commonly used by students.

Table 3: Digital Tools for Academic Research

Digital Tool	Percentage of Students (%)
Search Engines (e.g., Google)	95%
Online Academic Databases	65%
Reference Management Software	35%
Academic Journals' Websites	50%

Search engines, especially Google, were the most frequently utilized resources, used regularly by 95% of students. This illustrates that the general online resources are used for searching. 65% use academic databases such as Google Scholar and JSTOR, representing moderate use of scholarly materials. 35% of the students used a bibliographic software (i.e., Zotero, Mendeley), indicating that, despite its importance in structuring and managing academic references, such software is not widely used. As far as usage of academic journals is concerned, 50% of students go directly to the websites of academic journals: indicating that some students go directly to academic resources, but this is a low number indicating overlooked scope for improvement.

4.4 Relationship between Online Literacy and Research Habits

Pearson's correlation was used to assess the association between levels of digital literacy and number of times digital tools were used. The data suggest there is some moderate relationship between research digital literacy and research behaviors.

Table 4: Online Literacy and Research Habits

Correlation Variable	Pearson Correlation (r)
Digital Literacy and Tool Use	0.65

Students with higher digital literacy levels will be more likely to engage in academic research using digital tools ($r = 0.65$). This raises the possibility that if digital literacy is enhanced, this may lead to students using digital research tools more often and more effectively.

4.5 Qualitative Data: Themes from Interviews

Qualitative data in the form of semi-structured interviews (Unstructured questions) were also gathered from some of the students. Emergent themes from analysis of the interview data provided further insights into the quantitative findings.

Theme	Percentage of Students Reporting This Theme (%)
Perceived Benefits of Digital Literacy	80%
Challenges in Using Digital Tools	65%
Impact of Digital Literacy on Research Quality	55%
Support and Training Needs	70%

- 1) **Benefits of Digital Literacy:** 80% of students agree digital literacy helps them find scholarly content that is relevant and useful, easily. This corresponds to the heavy usage of search engines and scientific databases.

- 2) **Obstacles in digital tools usage:** 65% of students indicated that they faced challenges in using complex digital tools, including citation management software and scholarly databases. This means that even though the students have basic digital skills, there is a lag with the specialized tools that are appropriate for academic research.
- 3) **Influence on Research Quality:** 55% of the learners reported digital literacy contributed to enhancing research quality by helping them to access and integrate more diverse academic sources into their research. But some students questioned the trustworthiness of online sources.
- 4) **Support and Training:** 70% of students felt that they would benefit from more formal training in digital tools. This would be consistent with previous studies showing many students are not skilled in using advanced search tools and can profit from coaching and support.

4.6 Synthesis of Quantitative and Qualitative Findings

Through the merging of quantitative and qualitative data, the following major findings emerged:

- 1) Researcher can observe that most students demonstrated a moderate level of digital literacies and relied heavily on basic digital tools like search engines.
- 2) Despite the frequent use of digital resources, the use in relation to specialized tools (e.g., academic databases, reference management) is narrow.
- 3) The correlation between digital literacy and research practice is slightly significant, which indicates that the increase in the level of digital literacy could improve student utilization of advanced tools.
- 4) Interview data confirm these findings, with students emphasizing gains and barriers with digital tools, and expressing a strong desire for additional training and support.

These findings highlight a pressing need for University of Narowal to develop digital literacy focused initiatives on students, ie., specialized research tools. Another important systems change is to offer educational and training programs to improve students' skills as digital consumers of research, and to address the barriers they are likely to encounter using these resources.

5. Discussion

The purpose of the study was to investigate the impact of digital literacy on research practices of BS Education students of University of Narowal. Findings on the gathered data help us to understand students' level of digital literacy and how digital tools are used by students for research as well as the problems faced by them. The convergence of these two sets of the results is synthesized and discussed in what follows.

5.1 Digital literacy and tool use frequency

According to the research, of all the participants 68% had moderate digital literacy, 22% good digital literacy and 10% poor digital literacy. These findings echo past research that have shown that while students are aware and have access to digital tools, they tend to only have basic skills in their functionality (e.g., internet search and social media) (Ng, 2012). This result suggests that although students admit the importance of digital literacy in education, the extent of its use in the academic investigation still seems limited to many students.

The use of digital tools was most frequent for basic tools that included search engines (which 30% of the students used on a daily basis and 50% several times a week). It is an indication

that students depend on readily available tools like Google to do research. But when it came to other research-related services like online research databases and citation management software, the utilization rate significantly decreased. This implies that these advanced tools are known to students, but they are not using them on regular basis, which may be due to unfamiliarity or unaware of how it helps them. These results are in line with studies which demonstrated that digital literacy was only weakly integrated with study practices (Hollands et al., 2017).

5.2 Use of Digital Tools for Academic Research

In regard to the use of ICT for searching activities, the findings suggested that 95% of students used search engines, 65 % used academic databases and 50 % used academic journal websites in relation to their research practices. But only 35% of them used reference management software for better management of citations and researched materials. A significant underuse of reference management tools This underuse of reference management tools is problematic in that these tools have been found to be instrumental in coping with information overload, a critical skill for academic research (Hersh, 2007). This difference in implementation of tools indicates that they are available, but the students are not well-versed or trained in utilizing them.

It was also possible to form the impression that many students had problems to use academic databases and similar advanced scientific service. These barriers were identified as problems of complexity, poor training and poor support in their use. These findings are similar to previous research and highlight that providing students with extensive initial experience of tools in academia is critical for success (Cochrane, 2015).

5.3 Correlation between Digital Literacy and Research Practices

A low positive association ($r = 0.65$) between digital literacy has been found to research practices, indicating that those that possess better digital literacy may be also more predisposed to use digital tools for research activities. This relationship highlights the role of digital literacy in determining the extent to which students are able to conduct in depth academic research. In addition, advanced digital literacy will enable students to search through a various academic databases, organize their references and access variety of digital resources that can improve quality and efficiency of their research performance.

Similar results have been evidenced in the past as well, with improved digital literacy leading to progression in research skills (Bawden & Robinson, 2012). This finding has implications for the universities to incorporate the education of digital literacy into the curricula in order to promote the students' better research practices. The qualitative findings of the interviews and focus groups gave us some useful understanding of students' views on digital literacy regarding their research behaviour. One of the key reasons was that 80% of the students expressed a notion of the power of digital literacy and how it has been good in finding academic materials for them in a much more convenient and easy way. Accessing scholarly materials such as academic papers, research papers, was cited as a key advantage for students in the age of digital literacy. Yet even with these benefits, 65% of students grew frustrated with the confusion around where to find academic resources and how to search for them. A majority of respondents

indicated they found there was too much information to sift through and had difficulty filtering out relevant content.

Further, the reference management software (to which 34 Software in Research students had access) can save much processing work. This dichotomy also raises the issue of the underutilization of advanced digital tools by students. Insufficient training was identified as a common concern, as 70% of students reported that they would have benefited from some form of prescribed/ more formal digital literacy training that focused on academic research. This was consistent with the literature, highlighting the need for students to be equipped with digital literacy to navigate and use digital resources in academic work (Kimmons & Veletsianos, 2016).

5.4 Implications for Digital Literacy Development

This study has a number of significant implications to enhance the digital literacy of the BS Education students studying at the University of Narowal. Considering the general digital literacy skills of the participants and the lower use of specialized research tools, it is clear that interventions for improving students' digital practices for research are warranted. These steps could include, among others:

- 1) **Embedding Digital Literacy in the Curriculum:** Students know how to use some digital tools, a more structured approach to the use of complex research tools is necessary. Libraries are encouraged to embed digital literacy instruction in research-based courses within academic programs to prepare students with the skills needed to do in-depth academic research.
- 2) **Training for Advanced Research Tools:** The results of this study revealed an observable disparity in the students use of advanced tools (academic database and referencing software). To bridge this gap, the university could conduct workshops, provide online tutorials, or have in-class training to teach students about how to use these tools.
- 3) **Developing a Digital Research Culture:** Encouraging students to take a more digital focused approach to researching maybe one way to increase their level of digital engagement. This might involve, for instance, incorporating digital research skills at the level of the assignment, so that students were prompted to use tools at each step of the research process, from data collection through writing.
- 4) **Continuous Support and Guidance:** Once students are comfortable using digital tools, support should be ongoing. This support could be in the form of being able to contact librarians or research assistants who can provide support in effectively using digital resources, especially for students who may find advanced research tools difficult to use.

5.5 Conclusion

This research highlights the importance of digital literacy in their research behaviors of BS Education students at University of Narowal. While students exhibit an acceptable degree of digital literacy and regularly use common digital tools, their use of advanced academic tools is largely limited. Results indicate that digital literacy is key to improve the quality of academic research, however, students have significant problems dealing with such specialized tools as academic databases and reference manager. The findings from this study suggest that universities should invest in broad digital literacy programs that incorporate sophisticated tools for research and offer on-going support to developing students. Schools can help bridge these digital-literacy divides so that students may more effectively research and mitigate the

challenges of today's digital-research era. Further work could investigate the actual efficacy of various digital literacy training program and their direct effects on the research outputs of the students. Longitudinal studies might be carried out to consider the changes with students' level of digital literacy over a period of time, and the influence of digital literacy on academic performance and research productivity. Furthermore, the potential role of digital literacy in other educational domains, like pedagogical practices and learning performance could be examined in further lines of research in order to provide a more comprehensive understanding of how digital literacy may affect the academic experience. Through an investigation of these emerging trajectories, scholars can further develop an understanding of digital literacy in relation to higher education, and its wider implications for teaching, learning and research practices in the digital age.

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