EXAMINING THE EFFECT OF ONLINE INFORMATION-SEEKING AND SEARCHING BEHAVIORS ON THE ACADEMIC PERFORMANCE OF UNDERGRADUATE UNIVERSITY STUDENTS

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Abstract

Purpose: This study investigates how online information-seeking and searching behaviors influence the academic performance of undergraduate students at the University of Peshawar. It highlights the significance of effective search practices and students' perceptions of online information in enhancing academic outcomes.

Design/methodology/approach: A stratified random sampling technique was employed, selecting two departments from each faculty to ensure balanced representation. Data were collected through a validated 5-point Likert scale questionnaire. Of the 523 distributed surveys, 315 were filled, resulting in a 60.2% response rate. Data analysis was conducted using SPSS version 30.0 to examine students' information-seeking patterns, search strategies, and perceived quality of online information.

Research limitations: The study was limited to undergraduate students from a single institution, which may restrict the generalizability of the findings. Moreover, the use of self-reported data may introduce response bias.

Key findings: Social media emerged as the most frequently accessed online source, with 73.0% of respondents using it daily, followed by Google search engines (53.7%) and Wikipedia (34.9%). Boolean operators were identified as the most commonly applied search strategy (M = 3.68, SD = 1.34), while truncation and phrase searching were also widely used. Students demonstrated moderately positive perceptions of online information, rating verifiability (M = 3.41, SD = 1.20) and timeliness (M = 3.35, SD = 1.25) relatively high.

Practical implications: The study underscores the need for digital literacy workshops and targeted training on advanced search techniques to enhance students' skills in evaluating, accessing, and effectively utilizing online information sources for academic success.

Keywords: Information-Seeking Behavior, Online Information, Searching Techniques, Digital Literacy, Academic Performance.

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Background of the Study

In this digital age, the ability to seek and search for information online is crucial for undergraduate university students. Availability of extensive scholarly articles and academic materials, and data enables students to enrich their learning experience and improve their academic outcomes. However, the effectiveness of their online information-seeking behaviors can vary and impact their educational outcomes.

This study examines the nuances of behaviors exhibited by undergraduate university students, specifically those in their final year during the 7th and 8th semesters. The reason for this targeted focus is to ensure a more precise understanding of the behaviors displayed by students at a critical stage in their academic journey, where the pressures of educational performance and career preparation are most pronounced. Moreover, the students at this stage are at a more information-intensive level involved in extraordinary search and use of online information to complete their research projects, etc. For the purposes of this study, "undergraduate students" are operationally defined as individuals enrolled in bachelor's degree programs at the accredited University of Peshawar, particularly those in their final year (7th and 8th semesters). This emphasis is based on the recognition that final-year students are more likely to rely heavily on online information sources due to advanced coursework, thesis or capstone projects, and preparation for postgraduate opportunities.

According to Xie et al. (2023), digital literacy significantly influences students' capacity to navigate and evaluate online information, highlighting a broader trend concerning the part of digital literacy in information-seeking behaviors. This finding underscores the necessity of equipping students with strong information literacy skills to optimize their engagement with online sources. Park and Lee (2024) indicate that students prioritize factors such as source credibility, relevance, and timeliness when assessing online information. However, the increasing prevalence of misinformation presents challenges to their ability to discern high-quality resources. Alhassan and Okoro (2024) identify a strong correlation between digital self-confidence and student's ability to assess the reliability of online information. Their findings suggest that students with greater self-efficacy are better equipped to navigate the digital landscape and critically appraise information sources. This insight underscores the importance of fostering technical and critical thinking skills to enhance students' online information-seeking behaviors.

Information-Seeking Behavior is a specialized area within Library and Information Science. It is defined as what people need and how they look for, handle, provide, and use information from various angles (Savolainen, 2007). As stated by Wilson (2000), information seeking behavior refers to how individuals act when engaging with computer systems, online databases, and computer networks. In addition, it also involves how individuals interact with, process, and utilize information. Information can be highly effective and valuable particularly in the academic realm, by learning the information-seeking behavior of students. A thorough understanding, identification, and analysis of ISB helps individuals locate the specific information they require (Zulkifli et al., 2019).

The concept of information search is closely linked to studies on information-seeking behavior. Undergraduate university students engage in the information search process as a deliberate choice to meet their specific needs (Haas, 2003). Ming and Salim (2004) information search is an activity undertaken to obtain pertinent documents. It is emphasized that the success of finding these documents relies on several factors, information search skills and strategies for locating information across various sources. Academic success requires students to gather and analyze extensive, relevant information to study a course effectively. Poyen and Pal (2017) have explored information as key resource for problem-solving. The need for undergraduate university students to search for information is common, whether to solve academic problems or tasks assigned by their teachers (Hjørland, 2013). Shakeel and Vinayagamoorthy (2013) discovered that students often look for sources or methods that are both time and cost-efficient, enabling them to quickly copy, paste, and print information with ease.

Online information search strategies offer key insights into how individuals organize their search process, access information sources, select and discard sources, and finalize their search efforts

(Savolainen, 2016). According to (Kinley et al., 2014), online information searching behaviors consist of various actions, such as formulating search queries, navigating websites, browsing content, and analyzing and evaluating the information gathered. To bridge a knowledge gap, individuals utilize various sources, techniques, and manners to obtain information. This process of acquiring information is known as "information-seeking behavior." When people sense a lack of information, they actively search for details that address their specific information needs (Basch et al., 2018). Information-seeking behavior encompasses intricate patterns of action and interaction that individuals undertake when searching for information, driven by various purposes and motivations (Okocha & Owolabi, 2020). Information-seeking behavior is driven by specific goals, such as completing assignments, attending training sessions and conferences, getting ready for class dialogues, and carrying out research initiatives for final-year obligations (Aldousari & Al-Muomen, 2022). Information-seeking behaviors manifest in various forms, ranging from experimentation to reading printed materials (McGowan, 2019).

Academic performance is typically quantified through metrics like grade point average, test scores, or rankings in class. These metrics provide a numerical representation of a student's success in their courses or educational programs. According to McCoach (2002), academic performance can be objectively measured using grade-point averages or standardized test scores. Academic performance reflects the extent to which students achieve specific educational objectives set by institutions, through which a student meets educational goals, often measured through grades (GPA), test scores, and overall academic achievement. The performance of students is essential for institutions, as they play an important role in advancing education in the country for future generations (Buzdar et al., 2016). In this study, academic performance will be measured through cumulative grade point average and test scores.

Understanding how undergraduate university students navigate the online information landscape is essential for educators, librarians, and policymakers. It allows for the identification of key factors that contribute to effective information-seeking practices and highlights areas where students may require additional support or training. This study seeks to investigate the online information-seeking and searching behaviors of undergraduate university students and its effect on their academic performance. The research will investigate various aspects of online information-seeking and searching behaviors, including the use of online information sources, searching strategies, and perception of information quality. Additionally, it will assess the effect of these on academic performance, providing insights into the link between proficient information-seeking skills and students' academic successes.

Theoretical Framework of the Study

Online information-seeking behavior is a complex action/ process continuing various elements, which individuals follow for different reasons and purposes. The elements of online information-seeking and searching behaviors are adopted from various theories and model discussed previously (Savolainen, 2007; Wilson, 2000; Zulkifli et al., 2019). Independent variables consist of the use of online information sources, searching strategies, and perception of information quality. The dependent variable will be the academic performance. Thus, the framework shown in Fig.1.

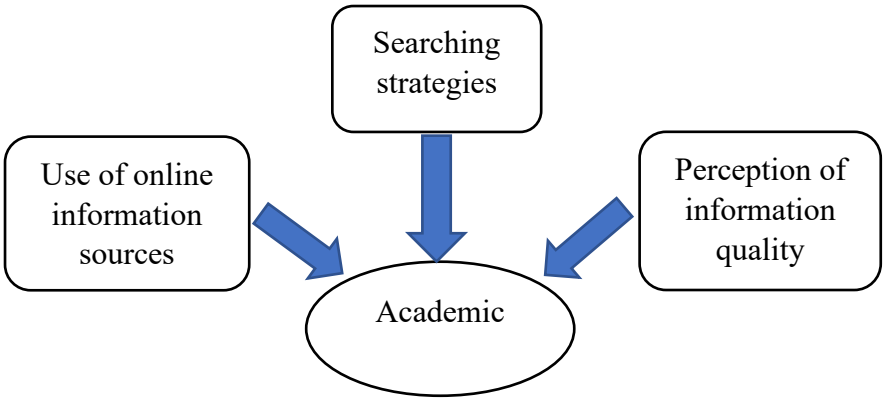

Figure 1: *Proposed Theoretical Framework* performance *adopted from Previous Studies (Wilson, 2000; Savolainen, 2007; Zulkifli et al., 2019).*

Statement of the Problem

The swift progression of digital innovation has revolutionized how undergraduate university students seek and use information for their academic pursuits. However, the effectiveness of students' information-seeking behaviors significantly affects their academic performance, despite the abundance of online resources. Undergraduate university students demonstrate various online information-seeking and searching behaviors, influenced by elements such as using various online information sources, employing different searching strategies, and perceptions of information quality. The problem lies in the potential disconnect between the vast availability of online information and students' ability to effectively find, evaluate, and apply relevant information in their academic work. Moreover, student's online information-seeking and searching behaviors is not uniform and may vary across academic disciplines, leading to discrepancies in academic outcomes. To address these challenges, it is crucial to understand the common behaviors and strategies employed by students, as well as the factors that impact the effectiveness of their online searches. Additionally, studying the effect between student's perceptions of online resources quality and their academic success can provide valuable insights for improving their online information-seeking skills. Identifying and addressing these issues is essential for enhancing students' academic performance and ensuring their ability to effectively utilize online information in their educational pursuits.

Research Objectives

This study was a part of a larger research study conducted for earning M. Phil degree. The following are the research objectives:

1. To examine the use frequency of online information sources by undergraduate university students.
2. To analyze the search strategies employed by undergraduate university students.
3. To assess undergraduate university students' perception of online information quality.
4. To examine the effects of online information-seeking and searching behaviors on the academic performance of undergraduate university students.

Research Hypotheses

The hypotheses are as follows:

- H_1: The use of online information sources has a significant effect on the academic performance of undergraduate university students.
- H_2: The search strategies have a significant effect on the academic performance of undergraduate university students.
- H_3: The perception of information quality has a significant effect on the academic performance of undergraduate university students.

LITERATURE REVIEW

Overview and Studies of Online Information Seeking Behavior

Information-seeking behavior refers to the strategies and actions individuals adopt to locate, evaluate, and use information to satisfy a perceived knowledge gap (Given & Case, 2016). Online information-seeking, in particular, involves accessing digital platforms such as databases, search engines, or social media to retrieve relevant content. It typically begins when students recognize inadequacy in their existing knowledge and attempt to bridge this gap (Sheeja, 2010). With universities increasingly integrating the internet and digital databases into academic services, online information-seeking has become central to student learning and research (Esew et al., 2014; Koh et al., 2015). Research consistently shows that undergraduate students rely heavily on commercial search engines, particularly Google, while underutilizing academic databases and library resources (Jalali et al., 2020; Rosario et al., 2020; Warwick et al., 2009). While databases offer higher-quality resources, search engines remain preferred for convenience. Social media platforms also play a growing role, serving

both academic and social purposes (Hamid et al., 2016; Dadaczynski et al., 2021). Nevertheless, print materials continue to retain relevance due to perceived accuracy and depth (Naveed et al., 2020).

Studies highlight persistent gaps in students' ability to distinguish between scholarly and non-scholarly content, as well as in applying advanced search techniques such as Boolean operators or truncation (Brindisi et al., 2013; Daei et al., 2020). Many students begin research with Google or Wikipedia (Brindisi et al., 2013; Warwick et al., 2009) and rarely verify reliability (Weber et al., 2019). Information literacy training has been widely recommended to address these challenges, equipping students with skills to navigate databases, evaluate sources, and refine search queries (Singh & Mahapatra, 2016; Guay & Reynolds, 2018). Multiple barriers hinder effective online information use. Common obstacles include poor internet connectivity, lack of ICT infrastructure, limited awareness of library services, and restricted access to global resources (Khan & Khan, 2020; Marouf & Anwar, 2010; Humbhi et al., 2022). Cultural, linguistic, and psychological barriers, such as library anxiety, also influence behavior (Al-Muomen et al., 2012). In many contexts, copyright restrictions, outdated resources, and inadequate staff training remain persistent issues (Ullah et al., 2025; Anmol et al., 2021).

Several studies demonstrate strong positive correlations between effective information-seeking behavior and academic success. For instance, Miraj et al. (2021) found information-seeking and IT skills to be significant predictors of performance, explaining 75% of the variance. Similarly, Gkorezis et al. (2017) confirmed that exploratory behavior and academic self-efficacy mediate the link between information-seeking and achievement. These findings emphasize the critical role of online information use in supporting student learning outcomes.

Overall, the literature indicates that while undergraduate students are enthusiastic users of online information sources, their practices remain shaped by convenience rather than quality. Heavy reliance on search engines, limited use of databases, and inadequate verification of information quality highlight gaps in information literacy. Barriers such as poor infrastructure, lack of training, and cultural constraints further complicate access. Evidence consistently shows that strengthening information literacy and digital skills can significantly enhance academic performance, underscoring the need for structured interventions such as digital literacy workshops and enhanced library services.

Overview and Studies of Online Information Searching Behavior

Online information searching involves an individual's knowledge of effective search strategies and the ability to follow a specific approach or have a clear understanding of how to conduct a search while accessing information (Black & Park, 2007). In the literature, information search experience is defined based on factors such as weekly internet usage, expertise in educational technology, and knowledge and experience with search strategies (Tu, Shih, & Tsai, 2008). Scholars have sought to determine whether users' search behaviors and performance differ according to their experience with online information retrieval. Findings from these studies reveal that experienced users adopt more structured search strategies (Ihadjadene et al., 2003), employ foundational approaches (Aula & Nordhausen, 2006), complete tasks more efficiently in less time (Park & Black, 2007), commit fewer errors, utilize more keywords, and critically assess website information (Tabatabai & Shore, 2005), ultimately achieving more effective results (Tu et al., 2008). In contrast, beginners often rely on trial-and-error methods, use metacognitive strategies less frequently, and tend to abandon searches more quickly (Tabatabai & Shore, 2005).

Nhung and Sinh (2012) examin users' search behaviors, including their responses, challenges, and expectations regarding library support when using online databases. Similarly, Aula (2003) identified several factors influencing information searches, including environmental aspects (e.g., databases and search topics), searcher characteristics (e.g., experience), the search process (e.g., commands used), and search outcomes (e.g., precision and recall). Sinh and Nhung (2012) further revealed that studying was the primary purpose of database searching. Vilar and Žumer (2011) highlighted that digital scholars, researchers who predominantly use digital tools for information

activities, preferred simpler interfaces resembling web search engines and expressed frustration with overly complex options. In the same vein, Zimerman (2012) survey on digital natives concluded that their search behaviors differ from older generations, as they prefer search engines like Google, Yahoo, and Bing due to their flexibility and simplicity, which enable both experts and novices to complete various tasks successfully.

Recent studies continue to shed light on online search behaviors. Reisoglu and Bahcekapılı (2022) found that task complexity, experience, and cognitive style influenced students' search strategies. Experts made greater use of advanced tools and problem-solving approaches than novices, while field-independent students were more effective than their peers in both problem-solving and multitasking. Similarly, Makondo et al. (2018) studied 65 library and information science students in Zambia and found that although most had over two years of internet experience, few used advanced searches or were aware of e-resources, often relying on trial and error. This highlighted the need for training in effective search strategies.

Coklar et al. (2017) emphasized that information literacy (r = .63) and digital nativity (r = .17) significantly affect online search strategies. Structural equation modelling confirmed both as predictors, with information literacy being the strongest. Tseng et al. (2014) showed that self-regulated learning and evaluative standards also influence search strategies. Basic SRL predicted behavioral and procedural strategies, while advanced SRL predicted metacognitive strategies, with evaluative standards (e.g., multiple sources, content accuracy) mediating these effects. Similarly, Sinh and Nhung (2012) reported that students primarily used databases for study and research purposes. Their preferred methods were simple keyword searches and full-text content, but their efficiency was often limited by technical barriers and inadequate search skills.

Other investigations provide further nuance. Tsai et al. (2012) observed that students applied more behavioral and metacognitive strategies in daily life searches compared to academic tasks, with males showing higher disorientation and females demonstrating greater control and evaluation skills. Daqing et al. (2011) found that undergraduates favored Wikipedia (57.1%) and Google Scholar (62.3%) for information retrieval, while still relying on library catalogs (68.5%) for books. U.S. students preferred databases (76.1%), whereas Chinese students leaned toward catalogs (73.4%). Relevance and credibility were the most important criteria (81.7% and 85.2%, respectively). Nicholas et al. (2008), in their large-scale analysis of academic database use, noted that undergraduates accounted for a significant portion of sessions and page views, but their engagement was often shallow, with only 7% of sessions showing deep activity. Professors, by contrast, downloaded more PDFs and spent less time per document, reflecting more targeted and efficient search behaviors.

METHODOLOGY

This study employed a quantitative research design, with descriptive analysis considered the most appropriate approach due to the large population size. Quantitative research, particularly through surveys, has been regarded as the most effective method for studies involving vast and widely dispersed populations (Connaway & Powell, 2017). Similar approaches have been effectively adopted in previous studies (Savolainen, 2007; Wilson, 2000; Zulkifli et al., 2019). A structured survey was therefore used to gather the required data and address the research questions.

The study population consisted of undergraduate students enrolled in the University of Peshawar who were in their final year (7th or 8th semester) during the 2024–2025 academic session. According to the Directorate of Admissions, the total number of students meeting this criterion was 523. To ensure fair representation, a stratified random sampling technique was applied, with faculties serving as strata. From each of the six faculties, two departments were randomly selected through the lottery method to ensure proportional representation, leaving it to a total of twelve departments. The study sample was further restricted to students in the 7th semester only. The details of enrolled undergraduate students in each department this semester are given in below:

Table 1
Enrolled Undergraduate Students (7th Semester) in each Department

S. No	Departments	Enrolled Students (7th Semester)
1	BS Geology	45
2	BS Geography	40
3	BS Computer Science	59
4	BS Statistics	31
5	BS Journalism & Mass Communication	50
6	BS Library & Information Sciences	34
7	BS Economics	65
8	BS Sociology	35
9	BS English & Applied Linguistics	91
10	BS History	11
11	BS Islamiyat	38
12	BS Urdu	24
	Total	**523**

Data Collection Tool Development and Description

For data collection, a self-designed questionnaire was developed with the help of an extensive literature review of three scales adopted from (Zulkifli et al., 2019) and (Oyedeyi, 2014). The questionnaire consisted of four parts. The 1st part was about the demographic information of the respondents. the 2nd part covered the use frequency of online information sources. The 3rd part of the questionnaire was regarding search strategies. The 4th part was about the perception of information quality.

Pilot Test and Result of Reliability Analysis

Nunally and Bernstein, (1978) stated, "Reliability is often associated with the assertion that instrument used in basic research should have reliable of .70 or better". Prior to data collection, the revised questionnaire was pilot tested on undergraduate students at the University of Peshawar, who were not part of the study sample. To validate the questionnaire, it was distributed to 25 undergraduate students, with 19 returning completed responses. Cronbach's alpha was calculated using SPSS (Version 30.0) to assess the reliability of the scale employed in this study. The analysis of the pilot test data yielded a Cronbach's alpha value of .944, indicating strong reliability at 94%. At this stage, pilot test participants suggested no further modifications; thus, the questionnaire was finalized and administered for data collection. The question-wise reliability values are shown following:

Table 2
Reliability Statistics

S.No	Scale	No of Items	Cronbach's Alpha Value
1	Total variables (Overall Variables)	75	.944
2	Use Frequency	14	.800
3	Searching Strategies	14	.844
4	Online Information Quality	10	.829

Data Analysis

After data collection, the responses from the questionnaire were coded and entered into IBM SPSS Version 30.0. Descriptive statistics were applied to analyze various values, such as frequency and percentage, and were calculated accordingly. The data were then presented in table format. To assess the reliability and consistency of the scale, Cronbach's alpha value was calculated. For the effects of

departmental test scores, independent sample t-tests were used because only two variables were in the hypotheses. Moreover, for CGPA, one-way ANOVA tests were used; here, 3 groups were mentioned. These tests were appropriate, more commonly used in previous studies, and easy to understand and interpret.

Findings

Demographic Information of the Respondents

The returned questionnaires were assessed for accuracy and completeness before data processing. Out of the 523 questionnaires distributed, 430 were returned. Each response was thoroughly reviewed to ensure completeness and accuracy. Among them, 115 were incomplete and therefore excluded from the study. The remaining questionnaires, accounting for a response rate of 60.2%, were finalized for analysis.

Gender, Departments, CGPA, Test Score, Assignments Submission, Attendance Ratio-Wise Analysis

Table 3 presents the demographic and academic profile of the respondents (N = 315) across multiple variables. The majority of the participants were male (n = 219, 69.5%), while females accounted for 30.5% (n = 96). Participants were drawn from various departments, with the highest representation from Computer Science (n = 46, 14.6%) and English and Applied Linguistics (n = 42, 13.3%), followed by Economics (n = 31, 9.8%) and Journalism and Mass Communication (n = 28, 8.9%). The smallest groups came from History (n = 11, 3.5%) and Urdu (n = 18, 5.7%). Regarding academic performance, most respondents had a CGPA between 3.4–4.0 (n = 174, 55.2%), followed by 3.0–3.39 (n = 129, 41.0%), and only a few had a CGPA between 2.0–2.9 (n = 12, 3.8%). Test scores were predominantly within the 11–20 range (n = 285, 90.5%), with a small portion scoring between 1–10 (n = 30, 9.5%). A vast majority of students reported submitting assignments (n = 305, 96.8%), while only 3.2% (n = 10) did not. Attendance ratios showed that most respondents had attendance above 75% (n = 244, 77.5%), while 13.0% (n = 41) had below 75%, and 9.5% (n = 30) reported exactly 75% attendance.

Table 3
Gender, Departments, CGPA, Test Score, Assignments Submission, Attendance Ratio-Wise Frequency Distribution of the Respondents (N=315)

Gender	Frequency	Percentage
Male	219	69.5
Female	96	30.5
Departments		
Sociology	20	6.3
Economics	31	9.8
Library and Information Science	27	8.6
Journalism and Mass Communication	28	8.9
History	11	3.5
English and Applied Linguistics	42	13.3
Islamiyat	22	7.0
Urdu	18	5.7
Geography	27	8.6
Geology	22	7.0
Computer Science	46	14.6
Statistics	21	6.7
CGPA		
2-2.9	12	3.8
3-3.39	129	41.0
3.4-4	174	55.2

Test Score		
1-10	30	9.5
11-20	285	90.5
Assignment Submission		
Yes	305	96.8
No	10	3.2
Attendance Ratio		
75%	30	9.5
Above 75%	244	77.5
Below 75%	41	13.0
Total	**315**	**100.0**

Major Findings

Use Frequency Online Information Sources

To assess the use frequency of various online information sources by undergraduate students, the same 14 information sources were provided in the questionnaire while studying their online information-seeking behaviors. The most frequently used sources are social media platforms, with respondents (73.0%, n=230) using them daily, followed by Google search engines, used daily by (53.7%, n=169), and Wikipedia, accessed daily by (34.9%, n=110). These results indicate a strong preference for easily accessible and general information sources. News websites also have moderate engagement, with (34.3%, n=108) using them daily, while Google Scholar is used daily by (22.2%, n=70), showing that some respondents rely on them for academic research, but many do not. Similarly, HEC Digital Library and electronic books have moderate engagement, with (19.4%, n=61) and (10.2%, n=32) using them daily, respectively, while a considerable percentage uses them only occasionally. On the other hand, online databases such as JSTOR, PubMed, and Elsevier are used daily by only (17.1%, n=54), while (38.7%, n=122) rarely use them, indicating a lack of widespread engagement with scholarly sources. E-journals and library catalogs show even lower daily usage at 4.4% and 7.6%, respectively, with nearly half of the respondents rarely using them. Online course platforms like Coursera have very low daily engagement (3.2%), with respondents (46.3%, n=146) rarely using them.

Table 4

Use Frequency Online Information Sources (N=315)

S.No	Information Sources	Daily F(%)	Weekly F(%)	Fortnightly F(%)	Once a Month F(%)	Rarely F(%)
01	Online Databases such as JSTOR, PubMed, Elsevier, Springer, Taylor & Francis, SAGE, Emerald, etc.	54 (17.1%)	97 (30.8%)	32 (10.2%)	10 (3.2%)	122 (38.7%)
02	Google Scholar	70 (22.2%)	95 (30.2%)	41 (13.0)	24 (7.6%)	85 (27.0%)
03	Google Search Engines	169 (53.7%)	48 (15.2%)	30 (9.5%)	8 (2.5%)	60 (19.0%)
04	Wikipedia	110 (34.9%)	54 (17.1%)	50 (15.9%)	25 (7.9%)	76 (24.1%)
05	Online Course Platforms such as Coursera	10 (3.2%)	61 (19.4%)	48 (15.2%)	50 (15.9%)	146 (46.3%)
06	Social Media Platforms (e.g., YouTube, Facebook, LinkedIn etc.)	230 (73.0%)	33 (10.5%)	19 (6.0%)	2 (0.2%)	31 (9.8%)

07	E-Library	26 (8.3%)	88 (27.9%)	63 (20.0%)	30 (9.5%)	108 (34.3%)
08	Electronic books	32 (10.2%)	125 (39.7%)	57 (18.1%)	39 (12.4%)	62 (19.7%)
09	News Websites	108 (34.3%)	72 (22.9%)	63 (20.0%)	33 (10.5%)	39 (124%)
10	HEC Digital Library	61 (19.4%)	39 (12.4%)	97 (30.8%)	55 (17.5%)	63 (20.0%)
11	E-Journals	14 (4.4%)	64 (20.3%)	50 (15.9%)	41 (13.0%)	146 (46.3%)
12	Special Websites	18 (5.7%)	39 (12.4%)	73 (23.2%)	16 (5.1%)	169 (53.7%)
13	Online Reference Materials	35 (11.1%)	64 (20.3%)	52 (16.5%)	80 (25.4%)	84 (26.7%)
14	Library Catalogs	24 (7.6%)	55 (17.5%)	58 (18.4%)	25 (7.9%)	146 (46.3%)

Overall Use of Online Information Sources

Table 5 shows the overall use of online information sources. The mean value of 3.06 indicates that, on average, respondents rated their use of online information sources slightly above the midpoint of the scale. This suggests a moderate level of engagement with these sources. The standard deviation of 0.692 reflects the variability in responses, showing that while most participants provided ratings close to the mean, there was some degree of variation in their usage patterns.

Table 5
Descriptive Statistics Overall Using Online of Information Sources (N=315)

Statement	Minimum	Maximum	Mean	Std. Deviation
Using Online Information Sources	2	4	3.06	.692

Online Information Searching Behaviors

To analyze the search strategies employed by undergraduate university students, 13 sources were mentioned in the questionnaire. The result shown in Table 6 represents the various search strategies used in online information sources. Descriptive statistics from a sample of 315 undergraduate students revealed varying use of online information search strategies. Boolean operators were the most commonly employed (M = 3.68, SD = 1.34), followed by truncation (M = 3.43, SD = 1.30) and phrase searches (M = 3.22, SD = 1.34). Moderate use was observed for bibliography-based (M = 3.12, SD = 1.35), object (M = 3.09, SD = 1.30), and citation searches (M = 3.09, SD = 1.41). Lower means were noted for basic searches (M = 2.86, SD = 1.50), one-term (M = 2.82, SD = 1.43), and title word searches (M = 2.76, SD = 1.30). Least used were keyword (M = 2.74, SD = 1.25) and author name searches (M = 2.71, SD = 1.28). The overall mean score for searching strategies was moderately high (M = 3.07, SD = 0.83), indicating a general preference for more advanced techniques over basic ones.

Table 6
Descriptive Statistics of Online Information Searching Behavior (N=315)

S.No	Searching Strategies	Mean	Std. Deviation
1	Boolean operators	3.68	1.341
2	Truncation	3.43	1.303

3	Phrase search	3.22	1.337
4	Provided bibliography	3.12	1.347
5	Object	3.09	1.297
6	Citations	3.09	1.411
7	Abstract	3.08	1.282
8	New terms/initial results	3.08	1.316
9	Basic Search	2.86	1.495
10	One term	2.82	1.432
11	Title words	2.76	1.302
12	Keywords	2.74	1.247
13	Author name	2.71	1.281
14	Overall Searching Strategies	3.071	0.826

Perception of Online Information Quality

To assess undergraduate university students' perception of online information quality, 10 statements were mentioned in the questionnaire. Table 7 presents the descriptive analysis of responses from 315 undergraduate students, revealing a moderately positive perception of online information quality (M = 3.14, SD = 0.72). The highest-rated item was the ease of verifying online information (M = 3.41, SD = 1.20), followed by perceptions of information being up-to-date (M = 3.35, SD = 1.25) and relevant to users' needs (M = 3.28, SD = 1.30). Reliability (M = 3.20, SD = 1.08) and clarity (M = 3.14, SD = 1.23) were also viewed somewhat positively. Lower mean scores were reported for accuracy (M = 2.99, SD = 1.33), credibility of sources (M = 2.96, SD = 1.20), and sufficiency for decision-making (M = 2.93, SD = 1.28). Perceptions of freedom from bias (M = 2.89, SD = 1.25) and consistency of trustworthiness across platforms (M = 2.57, SD = 1.06) were the lowest, indicating students' concerns about objectivity and source consistency in online information.

Table 7
Descriptive Statistics of Online Information Quality (N=315)

S.No	Statements	Mean	Std. Deviation
1	Online information is easy to verify.	3.41	1.203
2	Online information is up-to-date.	3.35	1.254
3	Online information is relevant to my needs.	3.28	1.300
4	Online information is reliable.	3.20	1.078
5	Online information is presented in a clear and understandable way.	3.14	1.230
6	Online information is accurate.	2.99	1.328
7	Online information comes from credible sources.	2.96	1.196
8	Online information provides sufficient detail for decision-making.	2.93	1.280
9	Online information is free from bias.	2.89	1.247
10	Online information is consistently trustworthy across different platforms.	2.57	1.058
11	Overall Perception of Online Information Quality	3.139	0.722

Departmental Test Score-Based t-test Result of the Use of Online Information Sources

Table 8 presents the results of an independent samples t-test comparing departmental test scores with undergraduate students' use of online information sources. Levene's test for equality of variances indicated that the assumption of equal variances was met, F (1, 306) = 0.233, p = .629. The t-test showed no statistically significant difference in departmental test scores between users and non-users of online information sources when assuming equal variances, t (306) = 1.678, p = .094. The mean difference was 0.251 (SE = 0.150), with a 95% confidence interval ranging from -0.043 to 0.546. When equal variances were not assumed, the t-test indicated no statistically significant difference, t (27.04) = 1.909, p = .067. The mean difference remained 0.251 (SE = 0.132), with a 95% confidence interval ranging from -0.019 to 0.521. The p-values in this case exceed the conventional significance level of .05, the alternative hypothesis is that the use of online information sources significantly affects the academic performance of undergraduate university students.

Table 8
Effect of Online Information Sources Usage Based on Departmental Test Score

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.233	.629	1.678	306	.094	.251	.150	-.043	.546
Equal variances not assumed			1.909	27.040	.067	.251	.132	-.019	.521

CGPA-Based ANOVA Test Result of the Use of Online Information Sources

A one-way analysis of variance (ANOVA) was conducted to examine whether the use of online information sources had a significant effect on students' CGPA. The Table 9 results indicate no statistically significant difference in CGPA across different levels of online information sources usage, F (2, 305) = 1.523, p = .220. The between-group variance was 1.456 (df = 2, MS = 0.728), while the within-group variance was 145.745 (df = 305, MS = 0.478), leading to a total variance of 147.201. Since the p-value (.220) is greater than the conventional significance level of .05, the use of online information sources does not have a statistically significant effect on students' CGPA.

Table 9
Effect of Online Information Sources Usage Based on CGPA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	1.456	2	.728	1.523	.220
Within Groups	145.745	305	.478		
Total	**147.201**	**307**			

Departmental Test Score-Based Independent Sample t-test Result of Searching Strategies

An independent samples t-test was conducted to examine whether searching strategies had a significant effect on departmental test scores. Levene's test for equality of variances was significant, F (1, 299) = 14.119, p < .001, indicating that the assumption of equal variances was violated. Therefore, the t-test results not assuming equal variances were interpreted. The results in Table 4.23 show a statistically significant difference in departmental test scores between groups using different searching strategies, t (29.316) = 2.171, p = .038. The mean difference was 0.202 (SE = 0.093), with a 95%

confidence interval ranging from 0.012 to 0.393. When equal variances were assumed, the difference was not statistically significant, t (299) = 0.954, p = .341. The mean difference remained 0.202 (SE = 0.212), with a 95% confidence interval ranging from -0.215 to 0.620.

Since the more robust Welch's t-test (not assuming equal variances) indicates a statistically significant difference (p = .038), these results suggest that searching strategies may have a small but significant effect on departmental test scores.

Table 10
Effect of Searching Strategies Based on Departmental Test Score

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	14.119	.000	.954	299	.341	.202	.212	-.215	.620
Equal variances not assumed			2.171	29.316	.038	.202	.093	.012	.393

CGPA-Based ANOVA Test Result of the Searching Strategies

A one-way analysis of variance (ANOVA) was conducted to determine whether searching strategies had a significant effect on students' CGPA. Table 10 results show that there was no statistically significant difference in CGPA across different searching strategies, F (2, 298) = 3.002, p = .051. The between-group variance was 4.042 (df = 2, MS = 2.021), while the within-group variance was 200.667 (df = 298, MS = 0.673), leading to a total variance of 204.709.

The p-value (.051) is slightly above the conventional significance level of .05, the result is marginally significant, suggesting that searching strategies may have a small effect on CGPA.

Table 11
Effect of Searching Strategies Based on CGPA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	4.042	2	2.021	3.002	.051
Within Groups	200.667	298	.673		
Total	**204.709**	**300**			

Departmental Test Score-Based Independent Sample t-test Result of Perception of Information Quality

An independent samples t-test was conducted to examine whether the perception of information quality had a significant effect on departmental test scores. Table 11 shows that Levene's test for equality of variances was not significant, F (1, 298) = 1.283, p = .258, indicating that the assumption of equal variances was met. The t-test assuming equal variances showed no statistically significant difference in departmental test scores based on perception of information quality, t (298) = 1.329, p = .185. The mean difference was 0.208 (SE = 0.156), with a 95% confidence interval ranging from -0.100 to 0.516. When equal variances were not assumed, the results remained non-significant, t (26.516) = 1.428, p = .165. The mean difference was 0.208 (SE = 0.146), with a 95% confidence interval ranging

from -0.091 to 0.507. The p-values in this case exceed the conventional significance level of .05, the perception of information quality does not have a statistically significant effect on departmental test scores.

Table 12
Effect of Perception of Information Quality Based on Departmental Test Score

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	1.283	.258	1.329	298	.185	.208	.156	-.100	.516
Equal variances not assumed			1.428	26.516	.165	.208	.146	-.091	.507

CGPA-Based ANOVA test Result of Perception of Information Quality

A one-way analysis of variance (ANOVA) was conducted to determine whether perception of information quality had a significant effect on students' CGPA. The Table 12 results showed that the effect of perception of information quality on CGPA was not statistically significant, $F(2, 297) = 2.533$, $p = .081$. The analysis revealed a between-groups sum of squares of 2.615 (df = 2, MS = 1.308) and a within-groups sum of squares of 153.291 (df = 297, MS = 0.516), leading to a total sum of squares of 155.906. The p-value (.081) is greater than the conventional significance level of .05, the perception of information quality does not have a statistically significant effect on students' CGPA.

Table 13
Effect of Perception of Information Quality Based on CGPA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	2.615	2	1.308	2.533	.081
Within Groups	153.291	297	.516		
Total	**155.906**	**299**			

Discussion

The current study aimed to explore undergraduate university students' online information-seeking behavior, search strategies, and perceptions of online information quality, and how these factors influence academic performance measured by CGPA and departmental test scores.

The Use of Online Information Sources findings show that social media platforms (73.0%) and Google search engines (53.7%) are the most frequently used online information sources among students, while scholarly databases (17.1%) and e-journals (4.4%) see considerably lower engagement. This aligns with the findings of Makondo et al. (2018), who reported that the majority of LIS students preferred Google over academic databases due to ease of use and familiarity, despite having over two years of online experience. Similarly, Daqing et al. (2011) found that students favoured sources like Wikipedia and search engines for quick lookups but underutilized scholarly resources. These findings are further supported by Omini (2024), who reported that undergraduate students' information-seeking behavior is significantly influenced by their use of internet search engines, often prioritizing convenience over academic depth.

The Online Information Searching Strategies study revealed a moderately high overall use of search strategies (M = 3.07, SD = 0.83), with Boolean operators (M = 3.68, SD = 1.34) and truncation (M = 3.43, SD = 1.30) being the most frequently used. This supports Coklar et al. (2017), who emphasized that students with higher information literacy are more adept at using purposeful and controlled search strategies. Students also showed a preference for phrase and citation-based searches, suggesting an awareness of advanced techniques. Tsai et al. (2012) similarly observed that metacognitive and behavioral strategies were more effectively employed in non-academic contexts, suggesting a need for further instruction in academic settings.

Students' perception of online information quality was moderately positive (M = 3.14, SD = 0.72). Verifiability (M = 3.41, SD = 1.20), timeliness (M = 3.35, SD = 1.25), and relevance (M = 3.28, SD = 1.30) were the most highly rated aspects. However, concerns were noted regarding trustworthiness (M = 2.57, SD = 1.06) and bias (M = 2.89, SD = 1.25). These concerns reflect findings by Tseng et al. (2014), who emphasized the importance of evaluative standards such as credibility and accuracy in predicting effective online academic searching. Students in the current study, however, appear to struggle with consistently evaluating the credibility of sources.

Academic Performance and Statistical Outcomes, despite the high usage of general search platforms and moderate use of advanced strategies, no significant relationship was found between the use of online information sources and departmental test scores ($t(306) = 1.678$, $p = .094$) or CGPA ($F(2, 305) = 1.523$, $p = .220$). This outcome echoes Nicholas et al. (2008), who found that students often engage in shallow search behaviors, which may not translate into academic performance gains. Similarly, Ahmed et al. (2024) reported mixed and conflicting findings regarding the impact of information-seeking behavior and electronic information resource utilization on academic performance, attributing this to limited engagement with scholarly EIRs.

However, a significant effect was observed between search strategy use and departmental test scores when assuming unequal variances (Welch's $t(29.316) = 2.171$, $p = .038$), suggesting that students employing advanced strategies may perform slightly better. This finding aligns with Reisoglu and Bahcekapılı (2022), who found that expert searchers completed tasks more efficiently and accurately than novices. On the other hand, perception of information quality had no significant impact on departmental test scores ($t(298) = 1.329$, $p = .185$) or CGPA ($F(2, 297) = 2.533$, $p = .081$), indicating that favourable perceptions alone do not necessarily lead to improved academic outcomes. This contrasts with Tseng et al. (2014), who found that online evaluative standards predicted academic searching success, though this may depend on actual application rather than perception alone.

Conclusion

The present study explored undergraduate students' use of online information sources, their search strategies, and perceptions of online information quality, and examined how these factors influence academic performance. The findings revealed a strong reliance on general platforms such as social media and Google, while the use of academic resources like scholarly databases and e-journals remained limited. Despite this, students reported moderately advanced searching behaviors, with Boolean operators and truncation being the most frequently employed strategies, indicating some level of information literacy.

However, students' perception of the quality of online information, while moderately positive, revealed concerns about credibility, bias, and consistency across platforms. Importantly, the statistical analysis showed no significant relationship between the use of online information sources or perceptions of quality and academic performance (CGPA and departmental scores). Nonetheless, a significant relationship was found between the use of effective searching strategies and departmental test scores, suggesting that skilful search behavior may contribute to better academic outcomes. These findings underscore the need for structured training and enhanced digital literacy programs to bridge the gap between resource usage and academic benefit.

These findings underscore a critical disconnect between students' familiarity with digital tools and their ability to translate this access into academic success. The heavy reliance on general platforms like social media and Google, combined with only a moderately critical perception of online information, suggests that digital fluency does not inherently equate to academic information literacy. While advanced search strategies show a promising link to performance, their low adoption highlights a key area for educational intervention. Ultimately, the study concludes that simply using online information is insufficient; fostering deliberate, skilled, and critical engagement with scholarly sources is essential for improving academic outcomes.

Recommendations

To develop the effect of online information-seeking and searching behaviors on the academic performance of undergraduate university students, here are some recommendations:

1. Conduct training programs for students on effective online searching techniques, including Boolean operators, citation searches, and advanced search strategies.
2. Integrate digital literacy workshops into the university curriculum to improve students' ability to assess the quality of online information.
3. Universities should organize sessions to teach advanced search strategies and the effective use of scholarly databases.
4. Increase visibility and access to institutional databases like HEC Digital Library and e-journals through campus campaigns.
5. Provide instruction on assessing credibility, accuracy, and bias to improve critical thinking and decision-making skills.
6. Academic advisors and librarians should guide students to prioritize peer-reviewed and evidence-based sources for coursework.

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