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Academic Resource Utilization and IT Gadget Accessibility Among Undergraduate Students in Baltistan

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ABSTRACT

This mixed-methods study investigates academic resource utilization patterns, IT accessibility, and library service satisfaction among undergraduate students studying in higher education institutions of Baltistan region. Data were collected from 148 students selected through multistage sampling across BS Education students using structured questionnaires with closed and open ended questions. The data analysis conducted through both descriptive and thematic approaches. The findings reveal a pronounced digital shift in learning behaviors, with 87.8% of students relying primarily on mobile devices for academic work and a strong preference for electronic resources over traditional print materials. However, this technological adoption contrasts sharply with institutional support systems, as only 56% of respondents had received digital literacy training. Library services emerged as significantly underutilized, with students reporting three key limitations: outdated collections, unreliable internet connectivity, and inadequate orientation programs.

The study also identifies emerging trends in generative AI adoption, with majority of students using tools like ChatGPT for academic assistance and as writing support. These findings highlight critical tensions between student-driven digital adaptation and institutional capacity to support this transition in resource-constrained environments. The research highlights the urgent need for relevant interventions, including: mobile-optimized learning infrastructure, targeted digital literacy programs and library service modernization.

Keyword: *Digital Resources, Library Services, Student Information-Seeking Behavior, Academic Resource Utilization, AI for Learning, Digital Literacy, AI Tools in Education, Academic Research Skills.*

INTRODUCTION

In modern higher education, access to both traditional and digital academic resources is essential for shaping students' learning experiences and academic outcomes. The rapid digitization of education has redefined how students engage with scholarly materials, with electronic resources and IT gadgets becoming indispensable for research, assignments, and self-directed learning (Esiyok et al., 2025; Murniati et al., 2022; Murniati et al., 2023; Yildirim et al., 2023). However, this transition poses unique challenges for institutions in developing regions, where infrastructural limitations and socioeconomic barriers restrict equitable access to technology in Pakistan (Afzal et al., 2023; Waqar, 2024).

Relatively new institutions in remote rural and disadvantaged areas experiences such challenges. They seems to be balancing between traditional learning resources with digital learning resources to address the current market demand (Ali et al., 2025). Observation showed that the students belong to such

communities are reliant on mobile devices and online academic resources to satisfy their information need. But these students are facing challenges like lack of IT training and library facilities, and slow internet connectivity (El Ghazali & Benbrahim, 2024; Khan & Shahzad, 2024; Olanrewaju et al., 2021). To address such gaps, provision of support system is necessary focusing on areas relevant to students' needs (Amjad et al., 2024).

This study investigates how undergraduate students studying in higher education institutions (HEIs) of Baltistan region. This is particularly important for policymakers and educators looking to improve learning environments in geographically isolated universities, which often face unique challenges.

Statement of the Problem

Currently majority of research has primarily focusing on urban and sun-urban institutions of Pakistan. A critical gap can be found in the literature in understanding how these transitions occur in remote, mountainous regions like Baltistan with limited resources. The population, HEIs of Baltistan region represents one such understudied context, where geographical isolation and resource constraints likely create unique challenges for academic resource utilization. This study was initiated due to the complete absence of baseline data about how students in such environments access learning resources, adopt digital tools, and utilize library services.

The lack of prior research on undergraduate students of HEIs of Baltistan region's academic practices means policymakers currently lack evidence to guide decisions about resource allocation, infrastructure development, and digital literacy programs. This study addresses this gap by conducting the first systematic effort on IT gadget usage patterns, library service satisfaction, and digital resource adoption among undergraduate students studying in HEIs of Baltistan region.

Research Objectives

The primary objectives of this study are to:

1. Examine students' use of traditional and digital tools, including IT devices and generative AI applications.
2. Assess the extent to which undergraduate students use library services.
3. Explore students' perceptions of the effectiveness of library services in comparison to emerging technological alternatives.
4. Identify the training needs for both traditional and technology-based academic practices.

Significance of the Study

This study provides crucial insights for multiple stakeholders in remote higher education contexts focusing on HEIs of Baltistan region. It offers the first empirical evidence about students' actual resource utilization patterns and unmet needs for the administration of relevant institutions. The understanding of digital literacy gaps enables faculty members to enhance curriculum design. The findings particularly benefit students by identifying barriers to resource access that hinder their academic success. The evidences in this research also contributes new knowledge to the growing literature on technology integration in developing regions.

LITERATURE REVIEW

The evolution of academic resource utilization in higher education has been greatly influenced by technological advancements, changing teaching methods, and the increasing demand for accessible

information. This chapter reviews existing research on how students use academic resources, incorporate technology in learning, and the challenges faced by institutions in developing regions like Pakistan.

The shift from traditional print materials to digital resources has been a key development in academic research and learning methods. Rahmanova (2025) notes that while digital libraries offer convenience and accessibility, physical libraries continue to provide valued curated collections and personalized services. However, student satisfaction with digital resources depends largely on the relevance, usefulness, and usability of the materials available (Mylapilli, 2023; Ruthven et al., 2023).

In Pakistan, despite the digital shift, university libraries remain central to students seeking both physical and digital research materials (Ahmad, 2024; Akbar, 2024; Jamil, 2021). The spaces in libraries have quite environment which is supportive for learning, even though the e-resources are rapidly replacing the traditional services (Cox, 2021; Zhou, 2022).

Brainstorming, drafting assignments, and understanding complex concepts are the basic students' purposes for using AI chatbots (Baltà-Salvador, 2025; Kim & Cho, 2023; Yilmaz & Yilmaz, 2023). The characteristics of AI chatbots like accessibility and instant help can support students in learning these tools can cause concerns regarding academic integrity (Farhi et al., 2023), highlighting the need for institutional guidelines on their ethical use (Moorhouse et al., 2023).

The extensive use of smartphones, laptops, and IT gadgets by students make their interaction with academic content more interesting and convenient (Mirza et al., 2021). The importance of digital literacy, reliable internet connectivity and relevant support system are the fundamental requirements for students to engage in such relevant activities (Masenya, 2021; Mamabolo & Dorodulo, 2023). Researchers had accessed the students of University of Peradeniya based on indicator of digital resources, their use was limited due to a lack of awareness, training, information-seeking skills (Fernando & Weerakoon, 2023; Gunasekera, 2021). Humbhi et al. (2023) identifies inadequate ICT skills and limited knowledge of e-resource benefits as barriers to effective use.

Research showed that quality of library services are directly related to quality of student satisfaction and outcome. Rahman and Nasrin (2024) found a gap between students' expectations and their perceptions of service quality. Majority of students perceive library resources as outdated, internet connection as slow, and support staff as not trained, insufficient of incompetent to perform their job (Stankovska et al., 2024). Research stressed upon the need for integrating traditional and modern marketing strategies (Allil, 2024), such as social media promotion, email alerts, and university websites, to improve library visibility and resource accessibility (Dutta & Arivazhagan, 2024; Kale et al., 2024). Despite advancements in digital resources, challenges in equitable access and effective use remain. Research point out that while digital libraries can enhance research productivity, their impact is limited by infrastructure deficiencies and lack of user training. Their studies call for strategies, including faculty involvement, to promote and maximize e-resource usage (Adekoya, 2024; Khan & Shahzad, 2024; Mosha, 2025).

Studies mphasize the role of faculty in encouraging students to use electronic resources, noting that academic staff guidance is crucial in influencing student behaviors and resource utilization (Alvi, 2024; Nwuke & Nwanguma, 2024; Zhao et al., 2024). The rise of generative AI tools adds another layer of complexity to resource access. Adelakun (2024) and Sobaih (2024) argue that while AI chatbots can assist in information retrieval, universities must address ethical concerns and emphasize that these tools should complement rather than replace critical thinking and traditional research methods (Feng et al., 2024; Wu, 2024).

Digital resources and IT gadgets provide enhanced accessibility and convenience, but their effective integration requires training, infrastructure development, faculty support, and the creation of ethical policies. Libraries continue to play a vital role in supporting academic work, and ongoing assessment and improvement of their services, along with the careful integration of emerging technologies like AI, are essential to meeting the changing needs of university students.

RESEARCH METHODOLOGY

The explanatory sequential approach was selected to first collect quantitative data through surveys, followed by qualitative analysis of open-ended responses. This design allowed for statistical identification of trends in resource usage and satisfaction levels and contextual understanding of the underlying reasons behind these patterns. The target population comprised undergraduate students studying in HEIs of Baltistan region. Using multistage sampling, initially the education departments of 05 HEIs were selected and then through further stratified sampling technique, 148 students of semester I-IV from identified departments were approached by considering the factor of convenience. Data was collected through validated and piloted online questionnaire through Google From with fixed questions and open-ended questions in period of two weeks by following the protocols of inform consent and other ethical considerations. The data was analyzed using descriptive and thematic analysis approaches.

RESULTS

The collected data reveals significant insights into academic resource utilization patterns among undergraduate students in Baltistan, with particular emphasis on technological adoption, library service satisfaction, and emerging trends in AI-assisted learning.

Table. 1 Demographic Profile of Participants

Age			**Gender**		**GPA**			**Geography**					
18-22	23-26	>26	Female	Male	>3.00	3.01-3.49	>3.5	SKD	RND	SGR	GHE	KMG	AST
61%	35%	4%	88%	12%	7%	38%	55%	33%	16%	7%	17%	14%	13%

Table. 1 shows that the respondent pool comprised primarily young scholars, with 61% aged 35% between 18-22 years, 23-26 years, and 4% above 26 years. Gender distribution showed near parity, with 88% female and 12% male participants. Academically, half of the students maintained GPAs between >3.5, indicating strong scholastic performance. Geographically, students hailed from Skardu (33%), Roundo (16%), Shigar (7%), Ghanche (17%), Kharmang (14%), and Astore (13%).

Table. 2 Technology Adoption and Digital Literacy

Tools				**IT Training Received**		**Training Received From**	
Mobile	Laptops	University Lab	Internet Cafes	Yes	No	Centers	Online Platform
61%	35%	4%	88%	12%	7%	38%	55%

Table. 2 shows that Mobile devices emerged as the most prevalent academic tool, utilized by 87.8% of respondents. Laptops followed at 51.4%, while university labs (18.9%) and internet cafes (4.1%) represented secondary access points. Notably, only 56% reported receiving formal IT training, predominantly through local computer centers (91.6%) and online platforms (8.4%).

Library Utilization and Service Evaluation

Table. 3 Library Training and Satisfaction Level

Introduction to Library		Rating of Library Collections			Satisfaction Level on Internet Connectivity		
Yes	No	Good	Bad	Uncertain	High	Moderate	Low
65.8%	34.2%	52.6%	34.7%	12.7%	7%	38%	55%

According to Table 3, 65.8% of students received a library introduction during orientation sessions. However, open-ended responses revealed that these sessions were often superficial and lacked meaningful detail. Overall satisfaction with library services remained moderate: only 52.6% of students rated the library as "good," while 44.7% expressed “bad” and 12.7% remained uncertain about the relevancy of available collections, leading many to seek alternatives.

Students shared their frustrations on inefficiencies regarding library use and orientation sessions. One commented, *"The orientation barely covered anything about the library."* Another added, *"When I needed resources, most books were old, and poor internet made it worse."* Another commented on up-datedness of books and internet as, *" Half the books I needed were super old, and the Wi-Fi kept inaccessible when I tried to search online."* Another shared, *"Most books seem irrelevant, so I prefer online journals that are easier to access."*

Internet services were identified as a major concern. Only 7% of students expressed high satisfaction with connectivity, with frequent complaints about weak signals and unstable access. This technological gap likely contributed to underuse of the library.

More student voices reflected these issues. One said, *"The internet in the library is so weak that it’s faster to use my phone outside."* Another explained, *"It’s frustrating to find a book and then have no way to download supporting materials because the Wi-Fi cuts off."* Third remarked, *"Internet connectivity is a big issue; even basic searches can take ages."* Fourth shared, *"Because of poor internet, I rarely stay in the library to work on my assignments."*

Limitations in orientation programs and resource accessibility were highlighted repeatedly. One participant noted, *"The orientation didn’t really help. Later, when I needed something, I had no idea how to find it."* Another group of students missed the sessions and later on got no opportunity to understand the same, one student said, *"We missed the first session, and there was no second chance to learn how to use the library properly."* Third attended the orientation but was still confused, *"Even after attending the orientation, finding relevant materials is still confusing."* Another mentioned, *"Lack of guidance and poor resources pushed me toward online platforms instead."*

The outdated collections, unreliable internet services, and ineffective orientation programs together contribute to the declining use of library facilities. Consequently, students increasingly depend on external digital resources for their academic needs.

Resource Preferences

Table. 4 Resource Preferences

Preferred Format		Preferred Search Engine			Preferred Sources			
Digital	Print	Google Search	Google Scholar	Academic Databases	Articles	Books	Theses	Others

64.9%	35.1%	85.1%	43.2%	9.5%	72.2%	23.1%	36.5%	17.4%

Table 4 shows a clear shift toward digital resources, with 64.9% of students preferring electronic materials, while only 35.1% favored print. Patterns in information-seeking behavior revealed a heavy reliance on general search engines: 85.1% reported using Google, 43.2% used Google Scholar, and just 9.5% accessed academic databases.

When asked why they preferred certain search engines, students shared varied reasons. Majority of students stated Google search as free, fast and easy to use tool for their academic work. One student said, *"Google is my first choice because it's free and easy."* Another explained, *"I use Google Scholar mainly because my teachers recommend it for research papers."* A third noted, *"Google search gives a variety of sources on any topic and it's free and easy to use, so it's more flexible for assignments."* Meanwhile, another student remarked, *"I use Google Scholar only to find APA references because most full articles are behind a paywall."*

Regarding preferred types of sources, 72.2% of students selected journal articles, 23.1% selected books, 36.5% chose theses and dissertations, and 17.4% preferred other types. Students emphasized the credibility of scholarly materials. One participant shared, *"Journal articles are easier to find online on Google Scholar and are usually updated versions can be found via a simple filter."* Some of the participants were preferring journal articles because of their trustworthiness, as one of them said, *"I believe journal articles are more trustworthy than random websites."* Another mentioned, *"Our teachers always advise us to use journal articles and books for serious research."* Another added about theses, *"Finding dissertations online helps me understand research methods and provides ready-to-use ideas for assignments."*

Summarizing the preference for digital resources, one student commented, *"I prefer online sources because I can access them anytime without worrying about library hours."* Another added, *"Digital materials are cheaper and easier to find than printed books."* Among a group of same responses on fast access to information, one mentioned, *"With digital tools, searching and retrieving information is much faster."* Another highlighted, *"Online resources offer a wider range of content at my simple search."*
Therefore, it is established that students strongly favored digital information sources, driven by convenience, constant availability, cost-effectiveness, and the ease of finding comprehensive material online.

Generative AI for Learning

Table. 5 AI Tool Utilization

AI Tool Utilization		**Purpose of Utilization**		
Yes	No	Research Assistance	Writing Support	Study Aids
83.4%	16.6%	62.1%	54.3%	49.7

The results in Table 5 revealed 83.4% of undergraduate students use AI tools for academic purpose, with ChatGPT emerging as the most frequently cited application. Students reported employing AI technologies for a variety of academic tasks, including research assistance (62.1%), writing support (54.3%), and the generation of study aids (49.7%).

Several students shared the advantages they found in using AI tools like ChatGPT. One participant noted, *"ChatGPT saves a lot of time when starting research, but I worry about missing deep learning."* Another added, *"It helps me get going fast, though sometimes I feel I'm not truly processing the material."* A third

student said, *"Starting a project feels less overwhelming, but it's easy to stay surface-level."* Meanwhile, another commented, *"I like the quick access to ideas, but it sometimes shortcuts my thinking."*

Specifically, students used AI for literature searches and understanding concepts. One student shared, *"ChatGPT explains difficult topics easily, but it makes me less patient to explore on my own."* Another stated, *"It's quick for clarifying ideas, though I rely on it more than I should."* A third reflected, *"I can clear doubts instantly via AI chatbots, sometimes I skip reading textbooks and switch to these chatbots for instant response and summaries of same books."* A fourth added, *"AI simplifies things, but not always in a way that builds real understanding."*

In writing support, students showed mixed feelings. One participant remarked, *"It's great for first drafts, but I don't always think critically about them."* Another said, *"Initial writing is easier, but I get lazy with edits."* A third mentioned, *"It helps polish my work, yet I question if it's truly my own effort."* A fourth student explained, *"Sometimes I accept AI's version too quickly without deeper review and my teacher caught the work causing me to repeat the same process again and again."* These shows a broader concern: while AI boosts productivity, it may unintentionally weaken students' critical thinking if not used with care.

Regarding study aids, students reported creating practice questions and guides. One shared, *"Custom study guides generated by AI are super helpful, but I have to fact-check with the genuine sources."* Another said, *"It's fast to get help for preparation of exams, but accuracy isn't guaranteed."* A third mentioned, *"Study guides generated by AI save time, though they sometimes lack points and updated information from restricted versions of information."* A fourth added, *"AI-made materials are handy, but double-checking is a must."*

While most students praised the ease and speed AI offers, their comments revealed important concerns about over-reliance, reduced personal effort, and risks to academic honesty. These findings suggest that institutions must actively teach students how to use AI tools critically and ethically.

Student Perspectives on Desired Training Opportunities

When asked about training needs, student responses grouped around three major areas. First, many students stressed the importance of advanced digital literacy, especially for academic and research purposes. One student shared, *"We need real training for research tools, not just basic computer use."* Another said, *"We got training on use of MS Office, knowing Word and PowerPoint isn't enough; we need training on emerging tools and skills."* A third added, *"Workshops on academic databases and digital libraries would help a lot for us to work on academic assignments."* A fourth student noted, *"I can use a laptop, but researching properly online is hard for me as I generally use laptop to see videos and write assignments."*

Second, there was a strong interest in structured guidance on using AI technologies, both technically and ethically. One participant remarked, *"We need training on how to use AI for learning. Not just focusing on general techniques of using AI, but also on how to use it for academic work and when it's appropriate."* Another stated, *"It would be helpful if we get training about limits and risks associated with AI use."* Another student said, *"Teaching ethical AI use should be a part of every undergraduate program."* Another commented on ethical side of AI use that, *"many of us don't know the difference between smart help seeking from AI and crossing ethical lines with AI."*

Finally, students called for training that blends traditional research methods with modern digital strategies. One student explained, *"Learning both old and new research methods would make our work stronger."* Another said, *"We should be taught how to use books, AI, and databases together effectively."* A third shared, *"Modern research skills shouldn't replace traditional ones because it is technological era and change is inevitable, so we must embrace it. Our institution must implement AI in every aspect of learning."* Another remarked, *"Combining manual research with AI support would really sharpen our skills."* The findings show that students are highly aware of the evolving academic environment and are eager for holistic, future-ready training that prepares them for responsible and effective scholarly work.

DISCUSSION

This study provides insights into how academic resources are utilized in HEIs across the Baltistan region. By highlighting both the potential and challenges of digital learning in an underdeveloped context. The data reveals three major trends: a) the predominance of mobile technology, b) the underutilization of library services, and c) the increasing adoption of new digital tools in students' academic practices.

Smartphones have become the primary academic device for students, with 87.8% of undergraduate students relying on them for their studies despite slow internet connectivity and other associated challenges. This aligns with the global shift toward mobile learning (Yasan-Ak & Yildirim, 2024), but in Baltistan, economic constraints make smartphones a more feasible option than laptops or desktop computers. Despite this high accessibility, a lack of digital literacy remains a concern with 56% of undergraduate students report having no formal training on use of technological tools and plaforms by forcing them to depend on basic search engines rather than specialized academic databases. These matters restricts the quality of their learning.

Libraries in the higher educational instructions of these region are struggling to meet student expectations. Students highlight problems which are hindering their engagements with these libraries, such as outdated collections of academic resources, slow or no internet connectivity, and lack of proper assistance in finding resources. As a result of such problems many of undergraduate students prefer online sources by reflecting them as more up-to-date and accessible. These challenges reflect broader issues seen in similar regions related to the financial and infrastructural barriers preventing libraries from modernizing effectively (Ahmad & Rafiq, 2024; Oyedokun, 2024).

A significant trend is the use of digital tools for academic tasks. Some of students use online platforms for research as writing assistance without any prior formal training or institutional policies. These tools have both pros and cons for students such as these tools improve efficiency of student work but it can hinder research, creative, and critical abilities of students when they become overly dependent of these tools. Such trends demand a proper support system that can enable exposures for integration to support student learning not hinder their academic growth. The demographical data reveals that half of the respondents maintain high academic performance in term of GPA within the circumstances associated.

CONCLUSION

This study reveals how students in Baltistan's HEIs are adapting to digital learning despite limited institutional support. Mobile devices and digital resources have become the primary academic tools for students in the region. This shift has occurred without proper training or adequate technological support. University libraries remain physically accessible but they fail to address key student needs due to outdated collections, lack of technical assistance, and inconsistent services. Furthermore, generative AI tools are rapidly being integrated into academic work by presenting both opportunities for learning and challenges to academic integrity.

These findings suggest that Baltistan's HEIs are at a pivotal stage. Students are embracing digital learning meanwhile institutional systems have not kept pace. These challenges can be mitigated by placing strategic interventions in digital infrastructure, combined with structured digital literacy programs. Clear policies are needed to guide the ethical use of contemporary technologies like AI tools because integrating or addressing these inevitable changes can ensure development of relevant critical thinking and independent research skills in students. Therefore, this study is concluded with the argument that with relevant contextualized interventions for improvements in resource accessibility and skill development, the educational outcomes in the region can be improved.

RECOMMENDATIONS

Based on the study findings, we recommend to;

1. enhance digital infrastructure in relevant campuses,
2. modernize the library services in relevant campuses,
3. provide training on effective integration of generative AI for learning,
4. develop digital literacy workshops for students, and
5. establish policies on the ethical use of AI in academic work.

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