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Use and Impact of Digital Library Services in Higher Education Institutions: A Survey of Faculty and Student Users

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Abstract

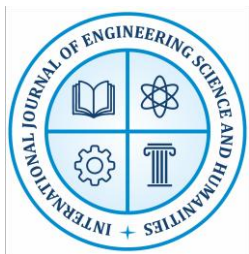
Digital library services have become a central component of the academic information environment, yet their actual use and impact among different categories of users in higher education institutions remain unevenly understood. The present study examines the awareness, frequency of use, perceived effectiveness, and impact of digital library services among faculty members and students of AICTE-approved engineering and management institutions in India. A descriptive and analytical survey design was adopted, and primary data were collected through a structured questionnaire administered to 270 respondents comprising 85 faculty members and 185 students selected through convenience sampling. Data were analysed using percentage analysis and the chi-square test of independence. The findings reveal that students use digital library services far more intensively than faculty members: more than half of the students visit the digital library daily or on alternate days, whereas faculty use is concentrated at weekly intervals. Although awareness of individual services such as e-journals, question banks, and literature search exceeds eighty per cent, actual utilisation of several services remains low. A statistically significant association was found between user type and reliance on web-based information retrieval ($p < 0.05$). Students overwhelmingly rated digital library services as superior to traditional services (91.35%), while faculty opinion was divided. The study concludes that sustained investment in infrastructure, user orientation, and technical support is essential to convert high awareness into effective utilisation.

Keywords: digital library services, higher education, user studies, information use, academic libraries, chi-square analysis

1. Introduction

1.1 The Concept and Evolution of Digital Libraries

The term "digital library" carries different meanings depending on the context and the community using it, but at its core it denotes an organised collection of digital resources—electronic books, journals, databases, multimedia files, archives, and learning materials—made accessible to a defined community of users over a network. A digital library is not merely a



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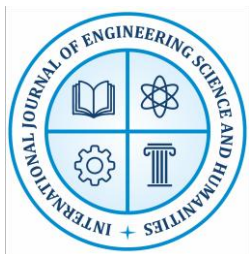
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random accumulation of web pages, just as a random pile of books does not constitute a physical library; rather, it involves deliberate processes of selection, acquisition, organisation, preservation, and service delivery. Early definitional work, including the framing offered at the IEEE workshops on intelligent access to online libraries, described the digital library as an assemblage of digital computing, storage, and communication machinery, together with the content and software required to reproduce, emulate, and extend the services of conventional libraries based on paper. A full-service digital library therefore fulfils all the essential functions of a traditional library while exploiting the distinctive advantages of digital storage, searching, and communication (Bansode, 2019; Nedumaran & Kavitha, 2024).

Over the past three decades, advances in information and communication technology (ICT), falling costs of storage, and expanding network connectivity have transformed early visions of digital libraries into operational reality. Digital library conceptions have evolved from content-centred systems of specialised information delivery towards virtual organisations that comprehensively collect, manage, and preserve rich digital content for the long term and make it available to user communities through sophisticated, quality-controlled, and policy-governed functionality. Reference frameworks such as the DELOS Digital Library Reference Model describe this environment as a three-tier construction consisting of the digital library management system, the digital library system, and the digital library as an institution, resting on six foundational pillars: users, content, functionality, policy, quality, and architecture.

1.2 Digital Libraries in Indian Higher Education

India operates one of the largest higher education systems in the world, encompassing central, state, deemed, and private universities, autonomous colleges, and technical and management institutions regulated by bodies such as the University Grants Commission (UGC), the All India Council for Technical Education (AICTE), and the National Assessment and Accreditation Council (NAAC). The National Education Policy has placed strong emphasis on modernisation, digital learning, and research promotion, and libraries at all levels have been drawn into this agenda (Bharti & Verma, 2021). Academic libraries in India increasingly deliver online catalogues, e-books, e-journals, digital archives, question banks, literature search services, and access to research databases, supported by consortium networks such as INFLIBNET and DELNET that enable resource sharing across institutions. The COVID-19 pandemic dramatically accelerated this transition: with physical access to campuses restricted, university and college libraries turned to e-resources, institutional websites, messaging platforms, and social media channels to sustain information services, and the user community placed unprecedented demands on electronic versions of printed material (Ansari & Ali, 2023; Mehta & Wang, 2020).



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1.3 Advantages and Constraints of Digital Library Services

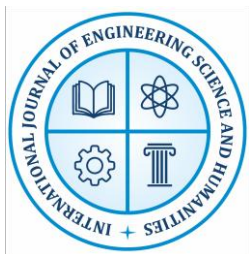
Digital libraries confer distinctive advantages over their print-based predecessors. They dissolve physical boundaries, so users need not visit a building to consult resources; they provide round-the-clock availability; they allow multiple simultaneous users to access the same resource; they support powerful full-text retrieval by word, phrase, author, title, or subject; they economise on physical space; and they enable preservation of fragile materials and value addition such as image enhancement (Stejskal & Hajek, 2015). At the same time, digital libraries impose their own burdens: high infrastructure costs, dependence on reliable electricity and internet connectivity, continuous requirements for hardware and software upgrades and format migration, unresolved questions of intellectual property and licensing rather than ownership, and the need for technically skilled staff and trained users. These constraints are felt with particular force in developing countries, where inconsistent power supply, slow connections, and shortages of experienced library personnel are repeatedly identified as barriers to effective ICT-based service delivery (Zotoo et al., 2022; Oriogu et al., 2020).

1.4 Emerging Technologies and Innovative Library Services

The service landscape of academic libraries is being reshaped by a cluster of emerging technologies. Big data analytics allows libraries to understand patron behaviour and construct user-centric experiences, although limited technical support, inadequate training, and financial constraints have kept much of this potential unrealised (Hussain, 2022; Gruss et al., 2020). Artificial intelligence is already embedded in everyday information tools and offers libraries curated content, personalised recommendation, automated metadata creation, and improved search. Blockchain has been proposed for metadata systems, inter-institutional networks, and digital rights management, while the Internet of Things supports space-utilisation tracking and environmental monitoring of special collections. Social media platforms such as Facebook, WhatsApp, and Twitter have become significant channels for marketing library services and engaging user communities, with community-oriented messaging shown to raise engagement substantially (Kirita & Mwantimwa, 2021; Mensah & Onyancha, 2021). Digital transformation, in short, is altering library products, operational agility, customer relationships, and workforce requirements simultaneously (Savić, 2021).

1.5 Need, Significance, and Objectives of the Study

Although institutions have invested heavily in digital collections and infrastructure, investment alone does not guarantee use, and use alone does not guarantee impact. User studies from different countries report a recurring pattern of high awareness accompanied by uneven utilisation and persistent difficulties with training, access, and support (Yebowaah, 2017; Obeidat, 2020). Against this background, the present study investigates the use and impact of



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digital library services in AICTE-approved engineering and management institutions. Its specific objectives are: (i) to determine the composition and visiting behaviour of digital library users; (ii) to assess user opinion regarding the working hours and accessibility of digital libraries; (iii) to measure awareness and utilisation of special digital library services; (iv) to examine reliance on web-based information retrieval among faculty and students; (v) to elicit user opinion on whether digital libraries will replace, and whether they are superior to, traditional libraries; and (vi) to test the association between type of user and patterns of digital library use.

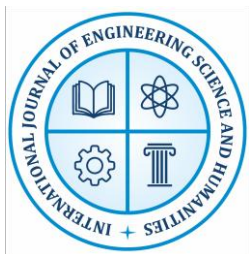
2. Literature Review

2.1 Use and Utilisation of Digital Library Services

A substantial body of research documents the patterns by which students and faculty use digital library services. Chinnasamy et al. (2023) studied digital library services and their utilisation among students and found that e-books and subject-specific databases were the most sought-after services, even though a majority of users continued to prefer printed learning materials when both formats were available; users, they argue, need digital resources as alternatives rather than replacements. Nedumaran and Kavitha (2024) surveyed the applications of digital library services in the Indian information age and catalogued their concepts, components, and processes alongside their advantages and disadvantages. Bansode (2019) similarly characterised digital libraries as subject-focused, metadata-rich collections whose precise descriptors yield more relevant search results and faster access to full text than general-purpose search portals. Studies of specific institutional settings reinforce these patterns: Ansari and Ali (2023) examined the digital services provided by the libraries of the Indian Institutes of Management during the COVID-19 closures and concluded that all such libraries should continue and institutionalise digital service delivery, using the pandemic experience to build crisis-preparedness plans; Mehta and Wang (2020) provided a detailed account of one university library that digitised services from March 2020 onwards to support fully online teaching. Tokiran (2024) investigated Malaysian university students' perceptions of digital library services and linked information quality, system quality, and service quality to satisfaction, while Syam (2024) reported that digital service quality explained 52 per cent of the variance in student satisfaction at an Indonesian state university, a positive and statistically significant effect.

2.2 Impact on Satisfaction, Academic Performance, and Research Productivity

A second stream of literature addresses the outcomes of digital library use. Khan and Ahmed (2016) surveyed engineering students in Khyber Pakhtunkhwa, Pakistan, and demonstrated that both the frequency and the purpose of digital library resource use significantly predicted user satisfaction and research productivity, with all hypothesised relationships supported; they urged the Higher Education Commission and university librarians to use such evidence when framing



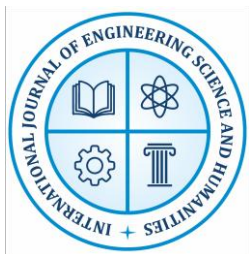
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e-resource policy. Rafi et al. (2018) measured the efficiency of academic research through searches of digital databases and, using linear regression on data from fifty-two university databases available through the Higher Education Commission, established a positive relationship between digital database use and research productivity. Bhaskar (2024) collected data from 531 postgraduate students in Uttarakhand, India, and showed that digital library overall quality—comprising service, system, and information quality—shapes perceived usefulness, which in turn drives satisfaction and continuous-use intention. At the level of public provision, Stejskal and Hajek (2015) applied a cost-benefit framework to the remotely accessible digital services of the Municipal Library of Prague and estimated that every unit of investment generated 4.02 units of benefit, illustrating that impact can be quantified in economic as well as academic terms. Collectively, these studies indicate that well-designed digital library services yield measurable gains in satisfaction, learning efficiency, and scholarly output.

2.3 ICT, Emerging Technologies, and Challenges in Service Delivery

A third strand concerns the technological and organisational conditions under which digital services succeed or fail. Zotoo et al. (2022) compared ICT-enabled service delivery at the University of Ghana and Jiangsu University and found reference, digital, and circulation services effective at both, while social media services were not; inconsistent power supply, slow internet, and shortage of experienced staff were the principal obstacles. Oriogu et al. (2020) reported that Nigerian library personnel relied chiefly on Facebook, Twitter, and WhatsApp to publicise services, and that social media use correlated significantly with service effectiveness, despite challenges of slow connectivity, inadequate training, and time demands. Mensah and Onyancha (2021) argued from survey evidence in Ghana that academic libraries require a deliberate social media strategy—platform selection, audience connection, and engagement management—rather than ad hoc presence, and Kirita and Mwantimwa (2021) documented how the absence of such strategy, together with unstable internet and outdated content, undermined marketing at two Tanzanian universities. Gruss et al. (2020), analysing 51,760 posts from one hundred academic libraries, showed that community-belonging appeals raised likes by 60 per cent, comments by 100 per cent, and shares by 39 per cent. On the broader technology front, Hussain (2022) found that limited understanding, weak technical support, and financial constraints kept big data underexploited in libraries, while Savić (2021) analysed how digital transformation is reshaping library products, processes, customer-centricity, and workforce requirements. Bharti and Verma (2021) examined emerging technologies in university libraries under India's NEP-2020 and highlighted librarians' attitudes and technological compatibility as decisive factors. The literature therefore converges on a consistent conclusion: infrastructure, skills, strategy, and user training



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jointly determine whether digital investments translate into effective services—precisely the relationship the present study examines empirically.

3. Research Methodology

Research Design. The study adopted a descriptive and analytical survey design to investigate the awareness, use, effectiveness, and impact of digital library services among users of higher education libraries. The descriptive component profiles the current state of digital library services and usage patterns among students and faculty, while the analytical component examines relationships between variables such as frequency of use, accessibility, awareness of services, and user category.

Hypotheses. The study was guided by three hypotheses: H1, there is an association between the benefits of digital library services and the degree of automation; H2, there is an association between the degree of automation and the effectiveness of digital library services; and H3, there is an association between the degree of utilisation of digital library services and the type of user. The present paper reports principally on H3, testing whether faculty and students differ significantly in their use of digital library services.

Population and Sample. The population comprised faculty members and students of selected AICTE-approved engineering and management institutions, all of which follow common AICTE norms and regulations. A non-probability convenience sampling method was employed. Of 300 questionnaires distributed, 270 usable responses were obtained—85 from faculty members and 185 from students—yielding a response rate of 90 per cent.

Data Collection. Primary data were collected through a structured questionnaire administered to librarians, faculty, and students of the selected institutions, supplemented by structured interviews with college administration. The questionnaire covered visiting frequency, opinion on working hours, awareness and utilisation of thirteen special services (e-journals, audio-visual resources, catalogue search, e-mail, competitive examination preparation, literature search, e-books, e-abstracting and indexing, e-newspapers, downloading, table-of-contents service, question banks, and digital library websites), reliance on web search, willingness to pay for services, and opinions on the superiority of digital versus traditional libraries. Utilisation items employed a five-point scale ranging from 0 (not at all) to 4 (very large extent). Secondary data were drawn from books, journal articles, dissertations, institutional websites, and the AICTE portal.

Data Analysis. Responses were tabulated and analysed using percentage analysis, mean, and standard deviation for description, and the chi-square test of independence to examine associations between user type (faculty versus student) and patterns of use, applying a 5 per cent level of significance.



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4. Results and Discussion

4.1 Composition of Respondents

Table 1 shows the distribution of the 270 respondents. Students constitute the clear majority of digital library users at 68.52 per cent, with faculty members accounting for the remaining 31.48 per cent. This composition mirrors the population structure of the surveyed institutions and establishes the two user categories compared throughout the analysis.

Table 1. Status of Respondents (N = 270)

Sl. No.	Category	No. of Respondents	Percentage (%)
1	Faculty members	85	31.48
2	Students	185	68.52
	Total	270	100.00

4.2 Frequency of Visits to the Digital Library

Table 2 presents visiting frequency. Students are markedly more intensive users: 32.43 per cent visit daily and a further 30.27 per cent every two days, so more than three-fifths of students use the digital library at least on alternate days. Faculty use is more sporadic, with the largest single group (36.47%) visiting once a week and only 17.65 per cent visiting daily. Notably, no student reported never using the digital library, whereas 5.88 per cent of faculty did. The pattern confirms that students, whose coursework, assignments, and examination preparation depend heavily on electronic resources, have integrated the digital library into their daily academic routine to a degree that faculty—constrained by teaching and laboratory schedules during institutional hours—have not.

Table 2. Frequency of Visits to the Digital Library

Sl. No.	Frequency	Faculty (n)	Faculty (%)	Students (n)	Students (%)	Total (%)
1	Daily	15	17.65	60	32.43	27.77
2	Once in two days	14	16.47	56	30.27	25.93
3	Once in a week	31	36.47	44	23.78	27.77
4	Once in a month	15	17.65	10	5.41	9.26
5	Rarely	5	5.88	15	8.11	7.41
6	Never	5	5.88	Nil	Nil	1.86



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	Total	85	100.00	185	100.00	100.00
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4.3 Opinion on Digital Library Working Hours

Table 3 records opinion on working hours. A small overall majority (51.85%) finds the timings convenient, but the aggregate conceals a sharp divergence between the two groups: 56.22 per cent of students find the hours convenient, whereas 57.65 per cent of faculty find them inconvenient. Faculty members typically devote institutional hours to class preparation, teaching, and laboratory supervision, leaving little time to use the digital library within its scheduled hours. The finding argues for extended or flexible access—longer evening hours, remote log-in facilities, and campus-wide Wi-Fi access to licensed resources—so that faculty can reach digital collections outside the standard timetable.

Table 3. Opinion about Digital Library Working Hours

Sl. No.	Opinion	Faculty (n)	Faculty (%)	Students (n)	Students (%)	Total (%)
1	Convenient	36	42.35	104	56.22	51.85
2	Inconvenient	49	57.65	81	43.78	48.15
	Total	85	100.00	185	100.00	100.00

4.4 Awareness and Utilisation of Special Services

Respondents were asked about thirteen special services. Awareness is generally high: over 80 per cent of faculty are aware of current e-journal access (90.59%), catalogue search (83.53%), audio-visual resources (82.35%), and literature search (82.35%); among students, awareness is highest for downloading facilities (91.35%), literature search (90.81%), e-books and competitive-examination support (88.65% each), and question banks (83.78%). Awareness is weakest, for both groups, of table-of-contents services, e-abstracting and indexing, and digital library website services, for which between a quarter and nearly half of respondents could not even answer. Utilisation, however, lags well behind awareness: although roughly 80 per cent of users know of the services, only about 30 per cent use them to a meaningful extent. Underutilisation of audio-visual services was traced to inadequate furniture, ambience, and headphones; underuse of e-books by faculty to a shortage of seating and terminals occupied primarily by students. A chi-square test of the thirteen services found significant differences between faculty and students in seven: audio-visual services, competitive examination preparation, e-books, e-abstracting and indexing, e-newspapers, table-of-contents services, and question bank services. Awareness, in other words, does not translate automatically into use, and the gap is patterned by user category.



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4.5 Reliance on Web-Based Information Retrieval

Table 4 examines the extent to which respondents obtain needed information through web searches. Over 70 per cent of both groups rely on web search to a large or very large extent, confirming that internet-based retrieval is now the dominant mode of information seeking. Faculty are more concentrated at the highest level of reliance (34.12% "very large extent" against 14.05% of students), while students cluster at "large extent" (56.22%). The chi-square test of independence returned a p-value of 0.00, below the 0.05 threshold, so the null hypothesis of no association is rejected: user type and extent of web-based information retrieval are significantly associated, supporting hypothesis H3 that utilisation patterns differ by category of user.

Table 4. Opinion about Obtaining Information from Web Search

Sl. No.	Extent	Faculty (n)	Faculty (%)	Students (n)	Students (%)	Total (%)
1	Very large extent	29	34.12	26	14.05	20.37
2	Large extent	36	42.35	104	56.22	51.86
3	Some extent	12	14.12	33	17.84	16.66
4	Very little extent	8	9.41	22	11.89	11.11
	Total	85	100.00	185	100.00	100.00

Chi-square test of independence: $p = 0.00 < 0.05$; the difference between faculty and students is significant at the 5% level.

4.6 Will Digital Libraries Replace Traditional Libraries?

Table 5 reports opinion on whether digital libraries will eventually supplant traditional libraries. Students answer emphatically in the affirmative (77.30% yes), while faculty are almost evenly split (49.41% yes, 50.59% no). The overall figure of 68.52 per cent expecting replacement reflects the numerical weight of the student majority. The generational contrast is instructive: younger users, raised in a digital-first information environment, view the transition as both natural and desirable, whereas faculty—more invested in print collections and the consultative functions of the physical library—remain ambivalent. The result echoes the wider literature's conclusion that digital resources are wanted as alternatives to, rather than outright replacements of, print (Chinnasamy et al., 2023).

Table 5. Opinion about Digital Libraries Replacing Traditional Libraries

Sl. No.	Opinion	Faculty (n)	Faculty (%)	Students (n)	Students (%)	Total (%)
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1	Yes	42	49.41	143	77.30	68.52
2	No	43	50.59	42	22.70	31.48
	Total	85	100.00	185	100.00	100.00

4.7 Perceived Superiority of Digital Library Services

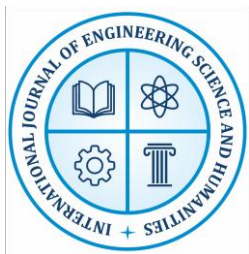
Table 6 captures the sharpest divergence in the entire survey. Asked whether digital libraries provide better services than conventional libraries, 91.35 per cent of students said yes, against only 36.47 per cent of faculty; nearly two-thirds of faculty (63.53%) denied superiority. Since students constitute the majority of users, the aggregate view (74.08% yes) is strongly favourable, but the faculty response signals that digital services, as currently delivered, are not meeting the more specialised needs of teaching and research staff—consistent with the working-hours inconvenience and lower service utilisation documented above. Improving remote access, research-oriented services such as e-abstracting and indexing, and faculty-targeted orientation would help close this perception gap.

Table 6. Opinion about Superiority of Digital Library Services

Sl. No.	Opinion	Faculty (n)	Faculty (%)	Students (n)	Students (%)	Total (%)
1	Yes	31	36.47	169	91.35	74.08
2	No	54	63.53	16	8.65	25.92
	Total	85	100.00	185	100.00	100.00

4.8 Discussion

Taken together, the results describe a digital library system that has achieved broad awareness and heavy student adoption but incomplete penetration among faculty and uneven conversion of awareness into use. The significant chi-square results across seven of thirteen services and for web-based retrieval confirm H3: utilisation is systematically associated with user type. The satisfaction-driving factors identified in prior research—information quality, system quality, and service quality (Bhaskar, 2024; Tokiran, 2024; Syam, 2024)—map directly onto the deficiencies respondents reported: inadequate furniture and headphones for audio-visual use, insufficient terminals, limited awareness of value-added services, and inconvenient hours. Conversely, the strong daily use by students and their overwhelmingly positive evaluation reproduce the satisfaction-productivity linkage established by Khan and Ahmed (2016) and Rafi et al. (2018): where access is convenient and resources match academic tasks, use is frequent and appraisal is favourable.



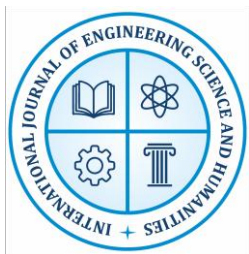
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5. Conclusion

This study examined the use and impact of digital library services among 270 faculty members and students of AICTE-approved engineering and management institutions using a descriptive-analytical survey design. The findings show that digital library services have become integral to academic life: a majority of respondents use them daily or weekly, awareness of core services exceeds eighty per cent, more than seventy per cent rely substantially on web-based retrieval, and users credit digital resources with saving time, supporting independent learning, improving research quality, and raising academic output. At the same time, the study exposes three persistent gaps. First, an awareness-utilisation gap: although about eighty per cent of users know of the special services on offer, only around thirty per cent use them meaningfully, with e-abstracting and indexing, table-of-contents, and digital library website services particularly neglected. Second, a category gap: faculty and students differ significantly in visiting frequency, service use, and reliance on web search, and faculty find working hours inconvenient and are far less persuaded of the superiority of digital services. Third, an infrastructure and support gap: slow internet connections, insufficient terminals and seating, missing accessories, limited technical skills, and inadequate user training constrain effective use.

The recommendations follow directly. Institutions should upgrade digital infrastructure—computers, bandwidth, campus-wide connectivity, and remote access—so that resources are reachable at all times and from all locations; conduct regular orientation, workshops, and training programmes to raise awareness of underused services and build digital literacy among students, faculty, and researchers; enrich collections of e-books, e-journals, databases, and institutional repositories and keep them current; strengthen technical support with qualified staff to resolve login, access, and software problems promptly; promote services actively through notices, institutional websites, and social media; and develop simple, user-friendly interfaces with sound classification, effective search tools, and, where appropriate, multilingual support. With such measures, the high goodwill that digital library services already command—especially among students—can be converted into fuller, more equitable utilisation and correspondingly greater academic impact. Future research may extend the inquiry to comparative national and international settings, to the role of artificial intelligence, cloud computing, and mobile applications in service delivery, and to the experience of distance learners and users with disabilities.

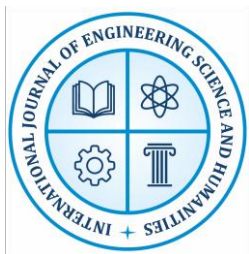


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