Availability of IT Infrastructure and User Awareness in Autonomous Engineering College Libraries in Karnataka.

Abstract

This study looks at the availability of IT infrastructure and the level of user awareness in autonomous engineering college libraries in Karnataka's Bangalore (A+) region. The data were collected through a descriptive survey using structured questionnaires, with 345 responses obtained from a population of 390 users. The response rate was 88.5%, which gives the findings a good level of reliability. The results show that basic facilities such as internet connectivity and Wi-Fi are well available, while advanced services like remote access are only moderately available. Most users rely on personal devices such as laptops and mobile phones to access library resources, and digital library services are the most commonly used. The study also found that internet problems, shortage of computers, and lack of awareness are the main challenges users face. Statistical tests showed no significant differences between male and female users in terms of usage or problems. Overall, the study suggests the need for better training, stronger remote access, and support materials in local language to improve the use of IT resources.

Keywords: *IT infrastructure, user awareness, engineering college libraries, Karnataka, digital resources, OPAC, e-journals, user training, library services, autonomous colleges.*

INTRODUCTION

In recent years, academic libraries have undergone noticeable changes due to the growing use of information technology, particularly in engineering institutions where up-to-date information is essential for study and research. Earlier, libraries mainly depended on printed books and journals, but now they provide a wide range of digital services such as OPAC, e-journals, e-books, institutional repositories, and other online facilities. These changes have made information access quicker and more convenient, allowing users to obtain resources without always visiting the library in person.

Students today often use their own devices, especially mobile phones and laptops, to access library resources. This has increased the importance of good internet facilities and services that can be accessed from outside the campus. Even though many autonomous engineering college libraries have adopted modern systems, not all users are fully aware of

the services available. Because of this, some important resources, including digital libraries and plagiarism checking tools, are not used as much as they could be.

Libraries also face several practical issues. In some cases, there are not enough computers, internet speed may be slow, and technical support may be limited. In addition, users do not always receive enough training to use digital services effectively. Training programmes and orientation sessions can help users understand these services better and use them with more confidence. Language differences and limited digital skills can also affect how well some users, especially undergraduate students, make use of available resources.

The present study focuses on IT infrastructure and user awareness in autonomous engineering college libraries in the Bangalore (A+) region of Karnataka. The study considers a total of 390 users, out of which 345 responses were collected for analysis. It examines how users access library services, the devices they prefer, the availability of facilities, usage patterns, training needs, and the problems they face. The study follows a descriptive survey method and uses statistical techniques to analyse the collected data.

REVIEW OF LITERATURE

Information Technology (IT) has become a central element in modern academic libraries, especially in higher education institutions where access to digital information is essential for learning and research activities. Recent studies highlight that the availability of digital resources and IT infrastructure has improved access to academic materials and enhanced the overall efficiency of library services (Dube et al., 2024). With the growing use of electronic resources, libraries are increasingly shifting towards digital platforms that support faster and more flexible access to information.

However, the effectiveness of these services largely depends on user awareness and the ability to utilize available resources. A recent study on e-resource usage found that although digital services are widely available, many users are not fully aware of them, leading to limited utilization (Gautam& Gulati, 2025). Similarly, research on academic libraries indicates that awareness and training play a significant role in improving user engagement with IT-based services (Tanzin&Atikuzzaman, 2025). These findings show that availability alone is not sufficient without proper user education.

User behaviour has also changed significantly in recent years, with a strong preference for digital access through personal devices. Reports on current trends in academic libraries emphasize the growing importance of digital services, remote access, and personalized information systems (ACRL, 2024). The increasing use of mobile technologies and online

platforms has reduced dependence on traditional library systems and encouraged the use of electronic resources for academic purposes.

Despite these developments, several challenges continue to affect IT-based library services. Studies point out that issues such as inadequate infrastructure, poor internet connectivity, and lack of technical skills among users remain common problems in many academic libraries (Dube et al., 2024). Financial constraints and lack of institutional support also limit the adoption and expansion of advanced technologies in libraries (Cox, 2024). In addition, concerns related to training and digital literacy continue to influence the effective use of IT resources.

To address these challenges, recent research emphasizes the importance of user training, awareness programs, and continuous technical support. Training initiatives, including workshops and online tutorials, have been found to improve user confidence and increase the effective use of digital library services (Gautam& Gulati, 2025). Therefore, strengthening IT infrastructure along with improving user awareness and skills is essential for maximizing the benefits of modern library services.

OBJECTIVES

1. To study the availability of IT infrastructure in autonomous engineering college libraries in Karnataka.
2. To examine the level of awareness among users about IT-based library resources and services.
3. To analyse how frequently users access and use IT-enabled library resources.
4. To identify the main purposes for which users utilize IT-based library services.
5. To evaluate user satisfaction and the impact of IT facilities on academic work.
6. To find out the major problems faced by users while using IT-based library services.

HYPOTHESES

1. There is no significant difference in the level of awareness of IT-based library services among UG, PG, and research scholars.
2. There is no significant relationship between the availability of IT infrastructure and its usage by library users.
3. There is no significant relationship between training programs and the effective use of IT-based library resources.

4 There is no significant association between user category and their level of satisfaction with IT-based library services.

5 There is no significant relationship between the problems faced by users and their usage of IT-based library services.

METHODOLOGY

The researchers adopted the descriptive survey method with a quantitative approach to assess IT infrastructure availability and user awareness in Karnataka's autonomous engineering college libraries. All users (undergraduates, postgraduates, and research scholars) from autonomous engineering college libraries in the Bangalore (A+) region were targeted as the population for this study. The total population was 390; hence the samples were drawn and the minimum sample size of 345 was determined using Cochran's formula at 95% confidence level with ±5% precision. A well-structured questionnaire was created to gather the primary data on IT access methods, infrastructure availability (using a 5-point Likert scale: HA=5 to NA=1), awareness levels, usage frequency, purposes, satisfaction, training needs, and problems faced. During the study period, 345 printed copies of the questionnaire were distributed to users across these libraries, from which 345 completed responses were collected (100% response rate). MS Excel and SPSS were used to analyze the collected data, employing frequencies, percentages, means, and ranks for descriptive analysis, alongside Chi-square tests (e.g., gender vs. usage/problems) and ANOVA (e.g., group differences in usage/problems) at the 0.05 significance level to test hypotheses.

DATA ANALYSIS AND INTERPRETATION

A total population of 390 users was identified from autonomous engineering college libraries in the A+ Bangalore region. Out of this, 345 filled questionnaires were collected and considered for analysis, representing a high response rate. The sample size of 345 is adequate for the study and provides a reliable basis for interpretation. Among the respondents, 148 (42.9%) are male and 197 (57.1%) are female, indicating a slightly higher participation of female users. The distribution of respondents based on academic category shows that the majority are Undergraduate (UG) students (61.4%), followed by Postgraduate (PG) students (33.9%), while Research Scholars constitute a smaller proportion (4.6%). The study is confined to IT/Engineering college users, ensuring a focused analysis within a specific academic domain. The data reflects that undergraduate students form the largest group of library users, suggesting higher engagement at the undergraduate level. The representation of

postgraduate students is also significant, while research scholars form a comparatively smaller segment.

Table-1: ***Primary IT Access Method***

Access Method	Frequency	Percentage
Library computers	78	22.61%
Personal laptop / mobile	142	41.16%
Both	110	31.88%
None	15	4.35%
Total	**345**	**100%**

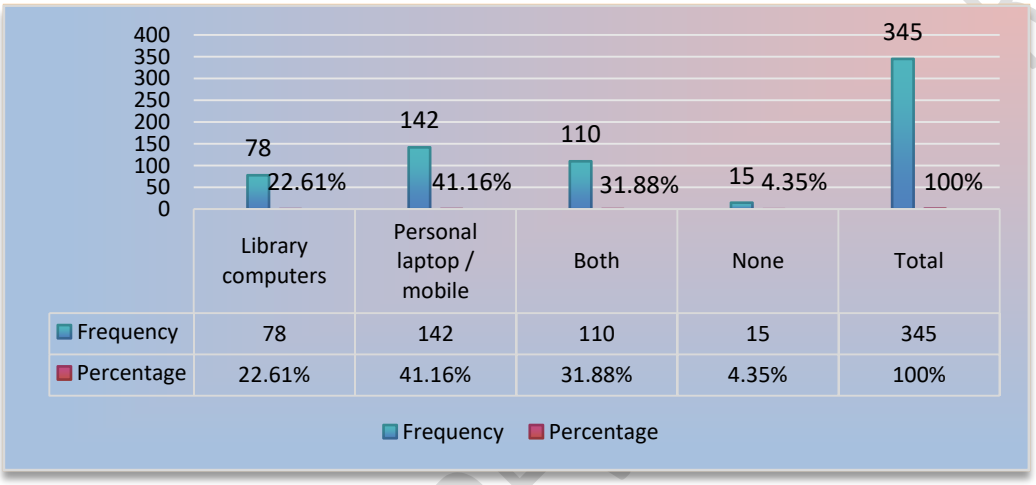

Table 1 illustrates the primary IT access methods among library users in Karnataka's autonomous engineering colleges. Personal laptops/mobiles emerge as the dominant choice, preferred by 41.16% of respondents (142 users), reflecting strong individual tech ownership and demand for mobile, on-demand access to e-resources like OPAC and journals. Hybrid usage—combining library computers with personal devices—ranks second at 31.88% (110 users), indicating flexible strategies that optimize both institutional support and personal convenience. Library computers alone account for just 22.61% (78 users), signaling reduced dependence on shared facilities likely due to constraints in availability or queues, while the minimal 4.35% "None" group (15 users) highlights pockets of digital exclusion. These patterns confirm a clear shift to personal-device ecosystems, with no reported statistical tests; libraries should thus enhance Wi-Fi and remote services to sustain this trend and boost overall IT utilization.

Table-2: ***Availability of IT Infrastructure***

IT Infrastructure	HA	A	MA	L	NA	Mean	Rank
Computers	115	130	60	25	15	3.88	III
Internet	145	120	45	20	15	4.04	I
Wi-Fi	130	125	50	25	15	3.96	II
OPAC	100	135	65	30	15	3.8	IV

E-journals/DB	90	120	80	35	20	3.65	V
E-books	75	110	95	40	25	3.49	VI
Digital Library	70	105	90	50	30	3.39	VII
Print/Scan	65	100	95	55	30	3.33	VIII
Multimedia	60	95	100	60	30	3.28	IX
Remote Access	55	90	105	60	35	3.2	X

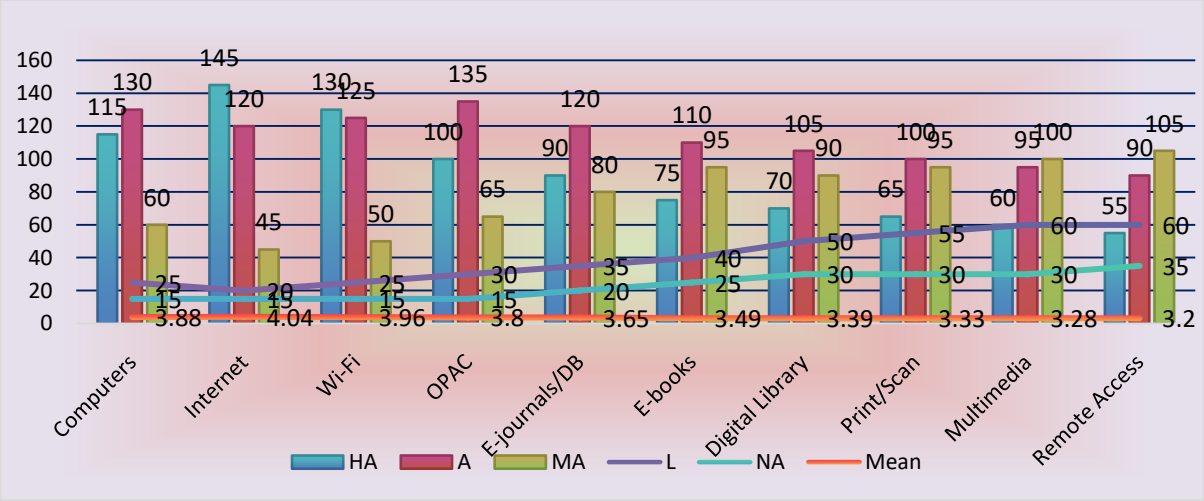

Table 2 presents the availability ratings of IT infrastructure in Autonomous Engineering College libraries in Karnataka, based on a 5-point scale (HA=Highly Available=5, A=Available=4, MA=Moderately Available=3, L=Limited=2, NA=Not Available=1). Internet connectivity ranks highest with a mean score of 4.04 (Rank I), preferred by 145 HA and 120 A responses, underscoring its foundational role in enabling e-resource access for research and assignments. Wi-Fi follows closely at 3.96 (Rank II) with 130 HA ratings, reflecting strong support for mobile device integration among the 73% personal/hybrid users. Computers score 3.88 (Rank III), while OPAC achieves 3.8 (Rank IV), indicating reliable core tools but moderate gaps in advanced services like e-journals/databases (3.65, Rank V) and e-books (3.49, Rank VI). Lower-rated facilities such as digital libraries (3.39, Rank VII), print/scan (3.33, Rank VIII), multimedia (3.28, Rank IX), and remote access (3.2, Rank X) reveal infrastructure priorities, with declining availability for collaborative and off-campus features. Overall, basic connectivity excels, but expanding remote and multimedia options could address the 20-30% limited/not available ratings, enhancing equitable IT impact across user demographics.

Table-3: ***Awareness of IT Infrastructure***

IT Service	HA	A	MA	SA	NA	Mean
OPAC	140	125	45	25	10	4.04
Digital Library Services	95	120	75	35	20	3.68
E-journals	120	130	55	25	15	3.91

E-books	105	125	65	30	20	3.77
Remote Access Services	80	110	85	45	25	3.51
Website	115	135	55	25	15	3.9
Institutional Repository	75	105	95	45	25	3.46
Plagiarism Tools	155	120	40	20	10	4.13

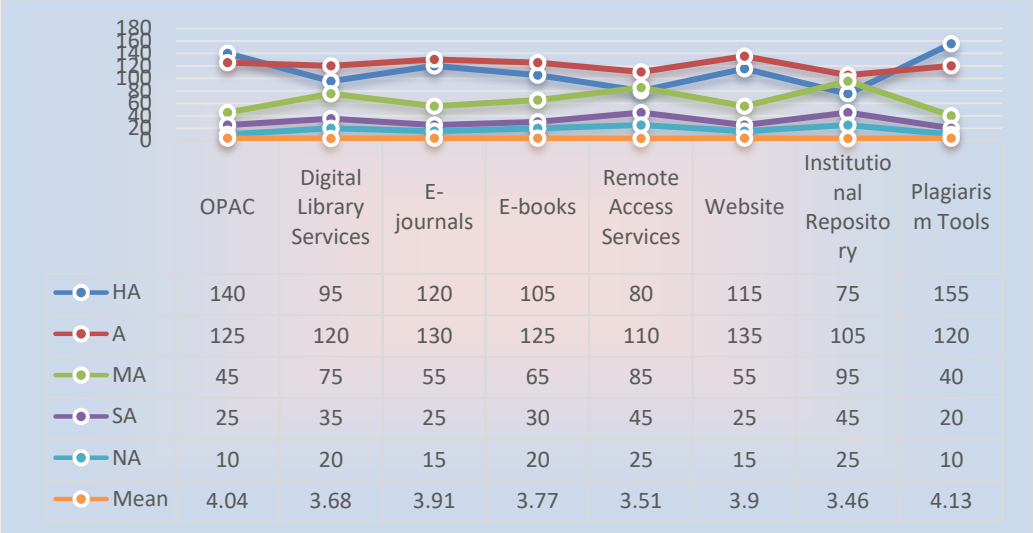

Table 3presents the level of availability of various IT-based library services as perceived by the respondents, and the mean scores indicate that most services are available at a satisfactory to high level. Among them, plagiarism tools have the highest mean score (4.13), showing that they are highly available and widely accessible. This is followed by OPAC (4.04) and e-journals (3.91), which also reflect a high level of availability, while the library website (3.90) indicates good accessibility and usability. Services such as e-books (3.77) and digital library services (3.68) fall within the moderate to high availability range, suggesting that although they are generally accessible, there is still room for improvement. In contrast, remote access services (3.51) and the institutional repository (3.46) have comparatively lower mean scores, indicating limited availability or lower user awareness. Overall, the findings suggest that core digital services are well established, while certain services require further enhancement to improve accessibility and effective utilization.

Table-4: ***Preferred Device for Accessing IT Resources***

Device	Frequency	Percentage
Mobile	155	44.93%
Laptop	120	34.78%
Desktop	50	14.49%
Tablet	20	5.80%
Total	**345**	**100%**

Table 4 The table shows the distribution of respondents based on their preferred devices for accessing IT-based library resources. It is observed that mobile devices are the most preferred, with 155 respondents (44.93%) using them for accessing digital resources. This indicates the growing importance of mobile technology and the convenience it offers for quick and easy access to information.The laptop is the second most preferred device, used by 120 respondents (34.78%). This suggests that a significant number of users still rely on laptops for academic and research-related activities, likely due to better functionality and ease of handling detailed tasks. A smaller proportion of respondents use desktops (14.49%), indicating a gradual decline in dependence on fixed computing systems within the library environment. The tablet is the least preferred device, with only 20 respondents (5.80%), showing limited usage among users.

Table-5: ***Use Pattern of Digital Services***

Service	VF	F	O	R	N	Mean	Rank
Digital library access	110	115	70	30	20	3.77	I
Remote access services	85	95	90	45	30	3.46	IV
Multimedia resources	75	90	95	50	35	3.35	V
Mobile library services	90	105	80	45	25	3.55	II
SMS alerts	60	75	95	65	50	3.08	VII
AI bots	50	60	90	70	75	2.83	VIII
Self-service facilities	70	90	95	55	35	3.3	VI
Virtual reference	85	100	85	45	30	3.48	III

Chi-Square Result

Variable	df	p-value	Result
Gender vs Frequency of Use	4	0.17	Not Significant

ANOVA Result

Source	SS	df	MS	F
Between Groups	2.84	2	1.42	2.31
Within Groups	210.5	342	0.61	
Total	213.34	344		

Table 5 shows how often different IT-based digital services are used, along with their mean scores and rankings. Among all the services, digital library access has the highest mean value (3.77) and is placed in the first rank, which indicates that it is the most commonly used

service by the respondents. Mobile library services (Mean = 3.55) and virtual reference services (Mean = 3.48) follow next, showing that users prefer services that are easy to access and convenient to use. Remote access services (Mean = 3.46) and multimedia resources (Mean = 3.35) fall in the middle range, suggesting that they are used by users but not as frequently as the top services. Self-service facilities (Mean = 3.30) also show a moderate level of usage. On the other hand, services like SMS alerts (Mean = 3.08) and AI-based tools (Mean = 2.83) are used less frequently, which may be due to limited awareness or lower preference among users. Overall, the results suggest that users mainly rely on basic and easily accessible digital services rather than newer or less familiar ones.

Interpretation of Chi-Square Result

The Chi-square test was conducted to examine the relationship between gender and frequency of use of IT-based services. The result shows a p-value of 0.17, which is greater than the significance level of 0.05. Hence, there is no significant association between gender and frequency of use. This indicates that both male and female users exhibit similar usage patterns of IT-based services.

Interpretation of ANOVA Result

The ANOVA test was performed to determine whether there is a significant difference in the usage of IT-based services among different groups. The calculated F-value (2.31) is relatively low, indicating that there is no significant variation between the groups. This suggests that the usage of IT-based services is fairly consistent across different categories of users.

Table-6: ***Main Purpose of Using IT Resources***

Purpose	Frequency	Percentage
Research	139	40.29%
Assignments	87	25.22%
Current awareness	63	18.26%
Skill development	41	11.88%
Other	15	4.35%
Total	**345**	**100%**

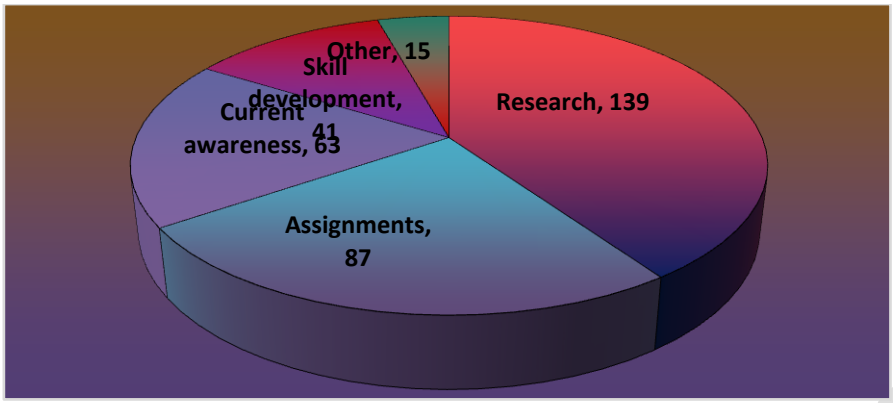

Table 6 The table presents the main purposes for which respondents use IT-based library resources. It is observed that research is the primary purpose, with 139 respondents (40.29%) using IT resources for research-related activities. This indicates the significant role of digital resources in supporting academic research.The second major purpose is assignments, with 87 respondents (25.22%), showing that students rely on IT resources for completing academic work. Current awareness accounts for 63 respondents (18.26%), suggesting that users also access IT resources to stay updated with recent developments in their field. A smaller proportion of respondents use IT resources for skill development (11.88%), while only a few respondents (4.35%) use them for other purposes.

Table-7: *Training and User Orientation*

Statement	SA	A	N	D	SD	Mean
Adequate IT training workshops	78	112	69	54	32	3.43
Orientation programmes useful	91	124	63	42	25	3.62
Online tutorials available	66	108	82	54	35	3.34
Staff provide IT support	74	118	71	51	31	3.44
Confidence after training	70	115	77	49	34	3.4
Additional training needed	108	96	61	48	32	3.58
Training covers digital tools	63	104	84	58	36	3.29
Hands-on sessions effective	82	119	69	46	29	3.52
Certification training useful	71	111	75	55	33	3.38
Kannada training materials available	52	96	85	67	45	3.12

Table 7 presents respondents' opinions on various aspects of training and support related to IT-based library services, and the mean scores indicate a generally moderate level of agreement among users. Among the statements, orientation programmes are useful has the highest mean score (3.62), showing that users find initial guidance sessions helpful for understanding library services. This is followed by additional training needed (Mean = 3.58) and hands-on sessions are effective (Mean = 3.52), indicating that users value practical and continuous training opportunities. Statements such as staff provide IT support (Mean = 3.44),

adequate IT training workshops (Mean = 3.43), and confidence after training (Mean = 3.40) reflect a moderate level of satisfaction, suggesting that while support systems are in place, there is still scope for improvement. Lower mean scores are observed for online tutorials available (Mean = 3.34) and training covers digital tools (Mean = 3.29), indicating some dissatisfaction with the availability and coverage of digital training resources. The lowest mean score is for Kannada training materials available (Mean = 3.12), highlighting the need for more localized language support to improve accessibility and user understanding.

Table-8: ***Most Frequent Problem***

Problem	Male	Male %	Female	Female %	Total	Total %
Internet	52	35.14	63	31.98	115	33.33
Computers	33	22.3	41	20.81	74	21.45
Awareness	27	18.24	36	18.27	63	18.26
Support	21	14.19	29	14.72	50	14.49
Other	15	10.14	28	14.21	43	12.46
Total	**148**	100	**197**	100	**345**	100

Table 8 The table shows the major problems faced by respondents while using IT-based library services, along with gender-wise distribution. It is observed that internet-related issues are the most frequently reported problem, with 115 respondents (33.33%). Among them, 35.14% of male respondents and 31.98% of female respondents have reported this issue, indicating that connectivity remains a key concern for both groups. The second major problem is related to computers, reported by 74 respondents (21.45%), followed by lack of awareness with 63 respondents (18.26%). The percentages for male and female respondents in these categories are quite similar, suggesting that these challenges are commonly experienced across genders. Issues related to technical support account for 50 respondents (14.49%), showing that some users face difficulties in getting adequate assistance. The category of other problems represents 43 respondents (12.46%), with a slightly higher percentage among female users.

Table-9: ***Problems and Constraints***

Problem Statement	SA	A	N	D	SD	Mean
Internet connectivity unreliable	86	112	69	49	29	3.51
Not enough computers	74	108	81	52	30	3.42
Lack of awareness of IT services	79	104	75	55	32	3.41
Compatibility issues	63	97	93	58	34	3.28
Technical support unavailable	58	92	95	62	38	3.2
Cost of IT services high	49	84	92	72	48	3.04
Power interruptions affect services	81	109	70	55	30	3.45
Language barriers in digital resources	46	78	98	71	52	2.96

Table 9 presents respondents' opinions on various problem statements related to IT-based library services, and the mean scores indicate a moderate level of agreement with most of the issues. Among the problems, unreliable internet connectivity has the highest mean score (3.51), making it the most significant issue faced by users. This is followed by power interruptions affecting services (Mean = 3.45) and insufficient number of computers (Mean = 3.42), highlighting concerns related to infrastructure and resource availability. The lack of awareness of IT services (Mean = 3.41) also shows notable agreement, indicating that many users are not fully informed about available digital resources. Compatibility issues (Mean = 3.28) and lack of technical support (Mean = 3.20) fall within the moderate range, reflecting operational difficulties in accessing and using IT services. Lower mean scores are observed for high cost of IT services (Mean = 3.04) and language barriers in digital resources (Mean = 2.96), suggesting that these are comparatively less critical issues, although they still affect some users. Overall, the findings show that infrastructure-related challenges are the most prominent concerns in the effective use of IT-based library services.

Hypothesis Testing

Gender vs Most Frequent Problem (H1)

Gender	Internet	Computers	Awareness	Support	Other	Total
Male	15	9	7	5	3	39
Female	11	7	6	4	4	32
Total	26	16	13	9	7	71

$\chi^2 = 1.64$

df = 4

p> 0.05

Result:

No significant association between gender and type of problems experienced.

Hypothesis Testing (H1: Gender vs Most Frequent Problem)

The Chi-square test was applied to examine the relationship between gender and the type of problems experienced. The calculated χ^2 value is 1.64 with 4 degrees of freedom, and the p-value is greater than 0.05. Hence, the result is not significant and the null hypothesis is accepted. This indicates that there is no significant association between gender and the type of problems experienced, meaning that both male and female respondents face similar kinds of issues while using IT-based library services.

ANOVA Test

Gender vs Problem Perception Score

Source	SS	df	MS	F	p-value
Between Groups	0.22	1	0.22	0.71	0.400
Within Groups	105.78	343	0.308		
Total	106	344			

$p > 0.05$

Result:

There is no significant difference between male and female respondents regarding problems and constraints in IT-based library services.

ANOVA Test (Gender vs Problem Perception Score)

The ANOVA test was conducted to determine whether there is a significant difference between male and female respondents in their perception of problems. The obtained F-value is 0.71 with a p-value of 0.400, which is greater than 0.05. Therefore, the result is not significant, and the null hypothesis is accepted. This shows that there is no significant difference between male and female respondents regarding their perception of problems and constraints in IT-based library services, and both groups share similar views about the challenges faced.

DISCUSSION

The findings of the study show that basic IT infrastructure, such as internet facilities (Mean = 4.04) and Wi-Fi (Mean = 3.96), is widely available in autonomous engineering college libraries in Karnataka, supporting users in accessing digital resources. However, services like remote access (Mean = 3.20) and multimedia resources (Mean = 3.28) are available only at a moderate level, indicating certain limitations in providing off-campus access and advanced digital services, especially for users who depend on personal devices. In terms of awareness, users are more familiar with core services such as plagiarism tools (Mean = 4.13) and OPAC (Mean = 4.04), while awareness of institutional repositories (Mean = 3.46) is comparatively lower, suggesting the need for better promotion of specialized resources. The usage pattern clearly shows a shift towards personal devices, with a significant number of users accessing services through laptops and mobile phones, and digital library access (Mean = 3.77) emerging as the most frequently used service. The results of the Chi-square test ($p > 0.05$) and ANOVA ($F = 0.71$, $p = 0.400$) indicate that there is no significant difference in usage and perception based on gender, showing uniform adoption of IT services among users. Training and support services are rated at a moderate level, with orientation programmes (Mean = 3.62) and hands-on sessions (Mean = 3.52) being found useful, while there is a clear need for more online tutorials (Mean = 3.34) and regional language materials such as Kannada (Mean = 3.12). Among the problems faced, internet connectivity issues (33.33%) are the most significant, followed by lack of computers (21.45%), reflecting common infrastructure-related challenges. Overall, the study indicates that although IT infrastructure is

available, its effective use depends on improving user awareness, strengthening remote access services, and providing better training and support to users.

CONCLUSION

The study shows that autonomous engineering college libraries in Karnataka have a strong foundation of IT infrastructure, especially in terms of internet connectivity and Wi-Fi, which supports access to digital resources for academic work. The findings indicate that users, particularly undergraduate students, increasingly rely on personal devices such as laptops and smartphones, and digital library services are the most frequently used resources. However, the availability of advanced services like remote access and multimedia resources is only moderate, and awareness of specialized tools such as institutional repositories is relatively low, pointing to the need for better promotion and development of these services. Training programmes are useful but need to be strengthened through more online tutorials and the inclusion of Kannada language materials to improve accessibility and digital skills. The study also identifies internet connectivity issues and limited availability of computers as the major challenges faced by users. Overall, while IT facilities are available, their effective use depends on improving user awareness, expanding advanced services, and providing better training and technical support. The results further show no significant difference in usage patterns based on gender, indicating that IT-based services are equally accepted by all users when proper access is ensured.

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