

Usability Evaluation of Electronic Information Resources in Academic Libraries in Erode District

Dr. V. Senthur Velmurugan¹ & M. Kumaramani¹

¹ Kongu Arts and Science College (Autonomous), Bharathiar University, Tamilnadu, India

Correspondence: Dr. V. Senthur Velmurugan, Kongu Arts and Science College (Autonomous), Bharathiar University, Tamilnadu, India.

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Abstract

This research assesses the usability of electronic information resources (EIRs) by the academic libraries of Tamil Nadu's Erode District. The mixed-methods research was adopted, where a survey of 200 users (teachers and students) was followed by usability testing and interviewing. Descriptive statistics revealed that access to e-journals, e-books, and databases is made available in most institutions, and the most popular medium used is the mobile device. Chi-square analysis revealed significant correlations between training and effective use of resources, and student status and frequency of use. Regression analysis revealed perceived usefulness, ease of use, and training to be predictors of satisfaction by the users. Despite high accessibility of resources, barriers such as delays in navigation, login issues, and poor training reduce effective use. The research concludes that student libraries should provide extended training to users, make access mechanisms easier, and have regular usability testing in a bid to optimize the utilization of EIRs for learning, teaching, and research.

Keywords: usability, electronic information resources, academic libraries, user satisfaction, erode district

1. Introduction

The extensive adoption of information and communication technologies has transformed the character of academic libraries from conventional stores of print copies to electronic and hybrid knowledge centers. Such EIRs as e-journals, e-books, internet-based databases, institutional repositories, and digital archives have proven to be priceless in their contributions towards learning, teaching, and research functions throughout the higher education system (Thanuskodi, 2012). Unlike paper documents, EIRs have ease of remote access, full-text search ability, and search capability, but are very effective use contingent upon user experience and usability (Nielsen, 1994).

Usability is the extent to which users are able to find, move around in, browse, and obtain relevant information from a system with ease. Usability, as defined by ISO 9241-11, is effectiveness, efficiency, and satisfaction in a given context of use (International Organization for Standardization, 1998). In academic libraries, usability testing ensures that the constraints that can hinder ready access to EIRs are suboptimal interfaces, difficult-to-use authentication procedures, and poor user training (George et al., 2015).

A few studies in India and outside India have documented cases of problems in the utilization of electronic resources. Bhattacharyya and Bandyopadhyay (2020) observed that the academic libraries offer full EIRs, but the users do not know and are untrained, and therefore lose their ability to utilize these resources to their maximum potential. Likewise, Kumar and Bansal (2018) cited simplicity of use and accessibility as prominent parameters that impact usage frequency and user satisfaction in terms of using EIR. Nigerian and Malaysian university research even indicates that without regular usability testing, libraries would not necessarily be doing their best to exploit costly subscriptions (Ani & Edem, 2019; Raza & Upadhyay, 2017).

For Tamil Nadu, digital literacy problems, inadequate orientation programs, and low discoverability of resources have been cited (Thanuskodi, 2012; Murugan & Balu, 2021). For the Erode District, however, more has been done with more institutions of higher learning. Critical analysis of the usability of EIR in the district is therefore the opportune time and essential to determine areas of strength, areas for improvement, and gaps.

The current research studies the usability of electronic information resources within the Erode District academic libraries regarding accessibility, discoverability, navigation, and satisfaction in particular. Applying the use of descriptive statistics, chi-square tests, and regression analysis, this study will offer efficient suggestions to improve the efficacy of EIRs towards academic work.

2. Objectives of the Study

- 1) To study the availability and accessibility of Electronic Information Resources (EIRs) in Erode District academic libraries.
- 2) To study the usability of EIRs in ease of navigation, effectiveness of search, quality of interface, and retrieval success.
- 3) To measure the level of satisfaction of students, faculties, and researchers with electronic resources.
- 4) To identify the association between demographic variables (age, gender, level of study, and subject of study) and use of EIRs.
- 5) To utilize statistical methods (descriptive statistics, chi-square test, and regression analysis) for identifying the determinants affecting usability and satisfaction.
- 6) To provide recommendations and planning for usability enhancement, accessibility, and efficiency of EIRs in educational libraries of the Erode District.

3. Review of Related Literature

The use of electronic information resources (EIRs) by academic libraries grows in significance with digital resources becoming the center of pedagogy, learning, and scholarship. Usability is an empirical construct of how effectively, efficiently, and to what extent a system can be used by the target group in fulfilling specific tasks (ISO, 1998; Nielsen, 1994). Academic library use testing is required to determine the barriers, such as inadequate navigation, inadequate search, and training needs that, may hinder the effective use of EIRs.

3.1 Global Studies

George et al. (2015) experimented with the usability of academic library websites and came to the conclusion that interface layout, navigation, and search facility affect user satisfaction and information gathering. Raza and Upadhyay (2017) felt the intuitive searching, ease of use, and availability of tutorials made efficient utilization of electronic journals better. Ani and Edem (2019) felt that master's students at Nigerian universities had frequent issues of usability, thereby reducing the effectiveness of available digital resources.

3.2 Indian Context

In India, Thanuskodi (2012) opined that students of library and information science in Tamil Nadu used e-resources regularly but encountered problems because of the lack of training and complicated interfaces. Bhattacharyya and Bandyopadhyay (2020) mentioned that academic libraries in the phase of implementing higher electronic resources are faced with the users' unfamiliarity and training. Kumar and Bansal (2018) mentioned that ease of use, usefulness, and accessibility were the critical factors behind the user satisfaction of Indian academic libraries.

3.3 Research Studies in Tamil Nadu

Murugan and Balu (2021) concluded that Tamil Nadu research scholars' digital literacy was moderate, which affected the use of e-resources properly. Thanuskodi (2012) also highlighted that poor discoverability, the absence of proper training programs, and user-complex interfaces remain cross-cutting problems in the country in spite of increased awareness.

4. Identification of the Research Problem

Indian academic libraries have been using electronic information resources (EIRs) such as e-journals, e-books, online databases, and institutional repositories to support teaching, learning, and research activities. Despite improvement in accessibility of the resources, the growth of most users are not able to use, browse, and access them to their full potential. These problems have been cited in the literature to include complex interfaces, poor search ability, incorrectly onerous authentication, and lack of sufficient user training, all of which may hinder efficient use of EIRs (Thanuskodi, 2012; Bhattacharyya & Bandyopadhyay, 2020; Murugan & Balu, 2021).

In Tamil Nadu, as awareness of digital resources has been increasing, empirical data reveal that usability problems still exist, especially in district-level educational libraries where resources are provided but perhaps not

user requirement-oriented (Thanuskodi, 2012). Users are unable to locate pertinent material in a timely fashion, face accessibility problems through mobile mediums, and receive inadequate training on the correct usage of e-resources.

Though some awareness, use behavior, and access studies of electronic resources have been done in India, there is no systematic study on usability testing at the district level, especially in Erode District. It is critical to determine the usability of EIRs in these libraries so that the barriers to effective utilization can be determined and recommendations can be made for user satisfaction and research productivity enhancement.

Therefore, the research problem can be articulated as “Although there are electronic information resources in Erode District academic libraries, they are being confronted by usability, accessibility, and effective use problems, which can prevent them from carrying out their research and scholarly work.”

5. Methodology

A mixed-methods design was adopted.

- Survey: Structured questionnaire distributed to 200 respondents (150 students, 50 faculty).
- Usability testing: 15 participants performed tasks such as locating journal articles and downloading e-books.
- Analysis: Descriptive statistics, chi-square test, and regression analysis.

6. Descriptive Statistics

A total of 200 respondents participated in the study, including 150 students (75%) and 50 faculty members (25%). Descriptive statistics were used to analyze demographic details, availability and accessibility of EIRs, usage frequency, usability measures, and overall satisfaction.

Table 1. Demographic Characteristics of Respondents (N = 200)

Variable	Category	Frequency	Percentage (%)
Gender	Male	110	55.0
	Female	90	45.0
Academic Status	UG Students	120	60.0
	PG Students	30	15.0
	Faculty/Staff	50	25.0
Device Used for EIRs	Mobile	120	60.0
	Laptop	60	30.0
	Desktop	20	10.0

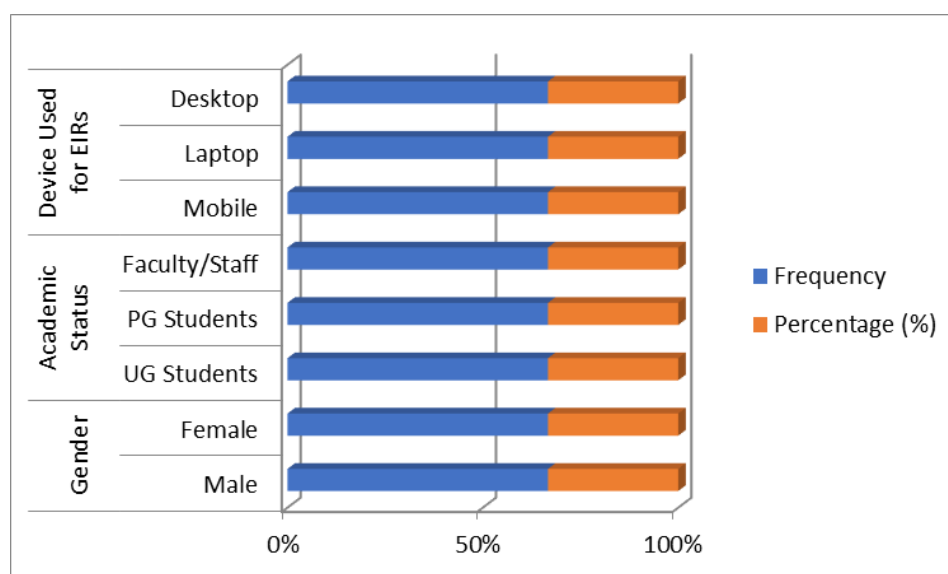


Figure 1.

Data indicates the demographic and usage patterns of the respondents based on their Electronic Information Resources (EIR) usage.

Gender:

55% of the respondents are male and 45% female, i.e., the gender ratio is quite even in favor of males.

60% of the users are undergraduate (UG) students, then 25% staff/faculty, and 15% Postgraduate (PG) students. The above indicates that UG students make up the most significant user group of EIRs in the study area.

Device Used for Accessing EIRs:

60% of the respondents use mobile devices, 30% use laptops, and 10% use desktops to access EIRs. These findings clearly support a mobile-based use, which demonstrates the increasing use of accessible and portable technology for information acquisition.

Table 2. Availability and Accessibility

Statement	Agree (%)	Neutral (%)	Disagree (%)
My library subscribes to sufficient e-resources	78.0	12.0	10.0
Remote/off-campus access is available	70.0	15.0	15.0
Access speed is satisfactory	68.0	20.0	12.0

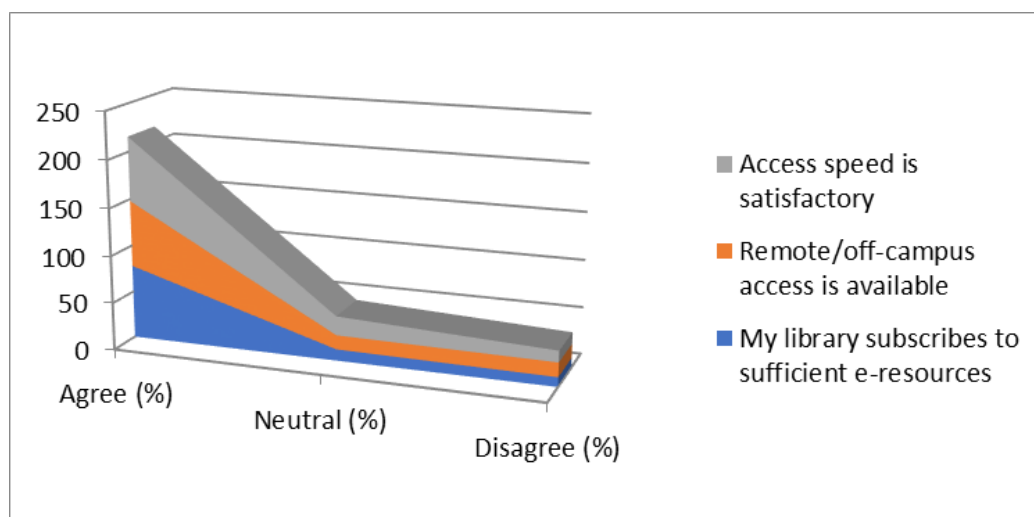


Figure 2.

The findings mirror respondents' opinions on the availability and accessibility of electronic resources in their libraries.

Library Subscriptions to E-resources

The overwhelming majority (78%) of the respondents agree that their library subscribes to a sufficient number of e-resources, exhibiting a highly positive attitude towards the availability of resources. 10% of the respondents disagree, which reflects that most of the users are satisfied with the electronic collection of the library.

Remote/Off-campus Access

About 70% of the respondents concur that it is likely that remote or off-campus access to e-resources is possible, 15% care less, and 15% do not agree. It indicates that remote access is likely possible, but it could be an issue for certain users, or they do not know remote accessibility channels.

Access Speed

Marginally more than half (68%) of the respondents agree with the access speed, 20% don't have any opinion, and 12% disagree. This indicates that overall access performance is good, but there is room to enhance the access speed and connection stability.

Table 3. Frequency of Use

Usage Frequency	Frequency	Percentage (%)
Daily	50	25.0
Weekly	90	45.0
Monthly	40	20.0
Rarely/Never	20	10.0

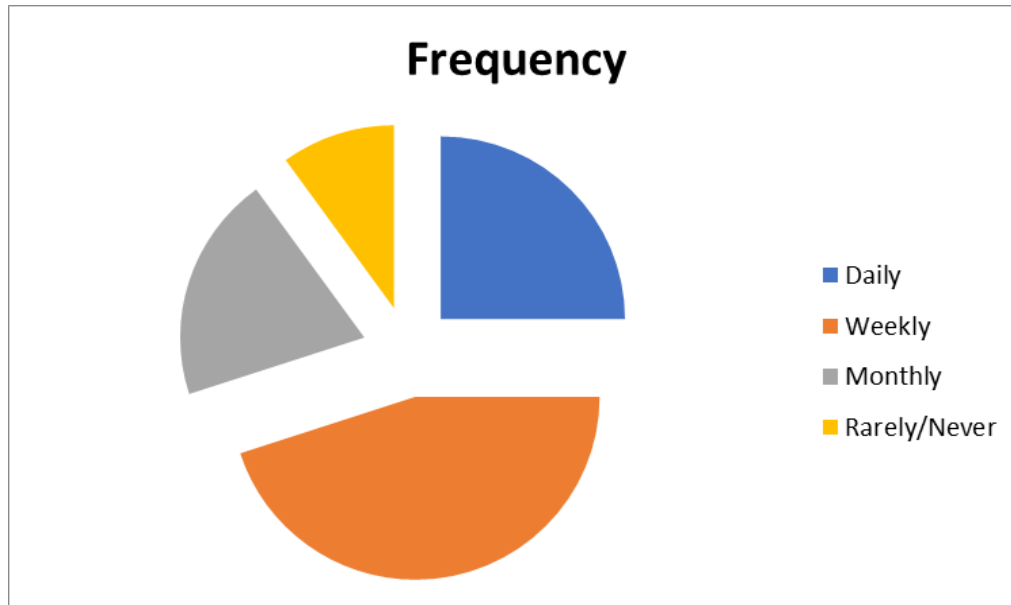


Figure 3.

The data indicate the respondents' frequency of use of Electronic Information Resources (EIRs).

More than half of the respondents (45%) use EIRs weekly, which reflects that it is the highest frequency of use. About 25% of the respondents use EIRs daily, and this shows that most of the users use these resources on a regular basis for job or study reasons. Another 20% of the respondents use EIRs monthly, while the remaining 10% reported that they use them sometimes or never.

Generally, the results show that the vast majority of the respondents used EIRs regularly, showing a positive trend towards habitual use of electronic information resources. The existence of irregular users and non-users, however, suggests the need for awareness programs or use training to prompt habitual use.

Table 4. Usability Indicators (Mean Scores on 5-point Likert scale)

Usability Indicator	Mean	SD
Ease of navigation	3.4	0.9
Search functionality	3.2	1.0
Error-free access (login)	3.1	1.1
Relevance of search results	3.6	0.8
Mobile-friendliness	3.3	1.0

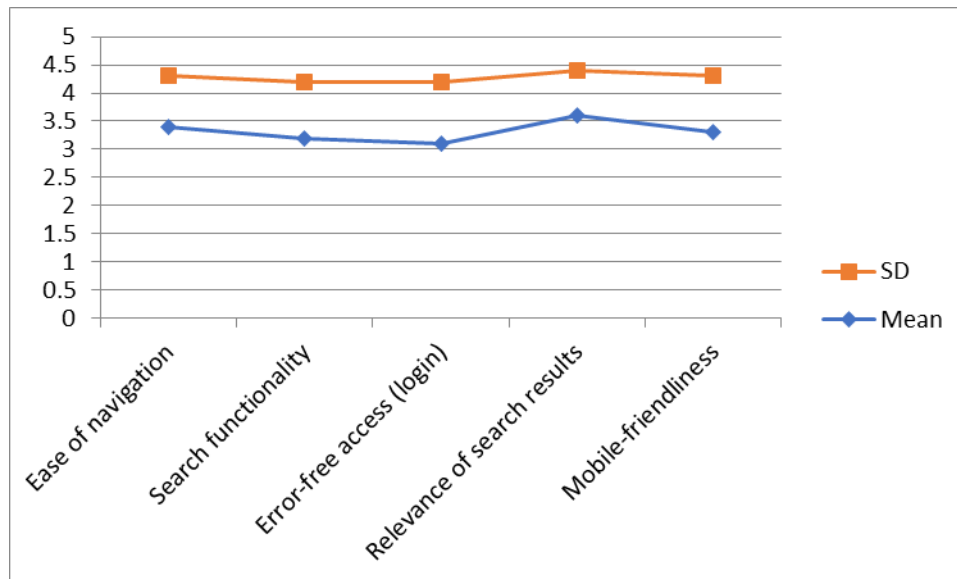


Figure 4.

The results are an indication of various usability measures of Electronic Information Resources (EIRs) that were assessed on a five-point scale.

Usefulness of search results was rated best with the highest mean score (Mean = 3.6, SD = 0.8), showing that users feel that the information retrieved is useful and relevant to them. Navigation was also well scored (Mean = 3.4, SD = 0.9), showing that most of the participants feel the interface is easy and friendly to use.

The mobile usability of EIRs suggests an average rating of 3.3 (SD = 1.0), suggesting that general mobile access is good but could do with some improvement in interface optimization for small screens. Search function (Mean = 3.2, SD = 1.0) and error-free access (Mean = 3.1, SD = 1.1) were slightly rated lower, suggesting that search and login/access functions are flawed at times.

In general, the results show that the users find EIRs usable to some degree, with some strength in terms of relevance and navigation, even though there are some technical and accessibility problems that should be addressed.

Table 5. Overall Satisfaction with EIRs

Satisfaction Level	Frequency	Percentage (%)
Highly Satisfied	30	15.0
Satisfied	90	45.0
Neutral	50	25.0
Dissatisfied	20	10.0
Highly Dissatisfied	10	5.0

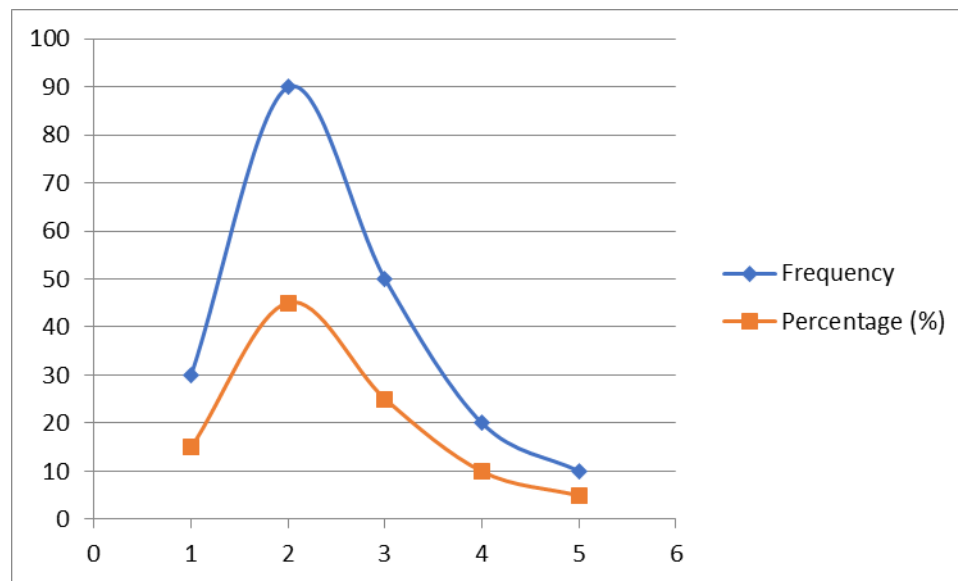


Figure 5.

The results reflect the satisfaction level of the respondents with Electronic Information Resources (EIRs).

The majority (45%) of the respondents were content, and 15% of the respondents reported themselves as highly satisfied, reflecting the general positive image of the e-resources and services provided. About 25% of the respondents had an ambivalent opinion, reflecting a mix or middle of the road in the experience. A smaller percentage, 10% and 5% dissatisfied and highly dissatisfied, respectively, reflects some level of dissatisfaction, possibly due to issues like accessibility, usability, or limited coverage of resources.

In general, evidence shows very high user satisfaction levels with EIRs, but ongoing efforts to enhance functionality, relevance of content, and access simplicity may be able to further increase user satisfaction and experience levels.

7. Chi-Square Test

The Chi-square test was applied to examine the association between selected demographic/academic variables and usability-related factors of electronic information resources (EIRs).

Association between Academic Status and Frequency of Use

Table 6. Cross-tabulation of Academic Status $\times$ Frequency of Use

Academic Status	Daily	Weekly	Monthly	Rarely	Total
UG Students	30	60	20	10	120
PG Students	10	10	5	5	30
Faculty/Staff	10	20	15	5	50
Total	50	90	40	20	200

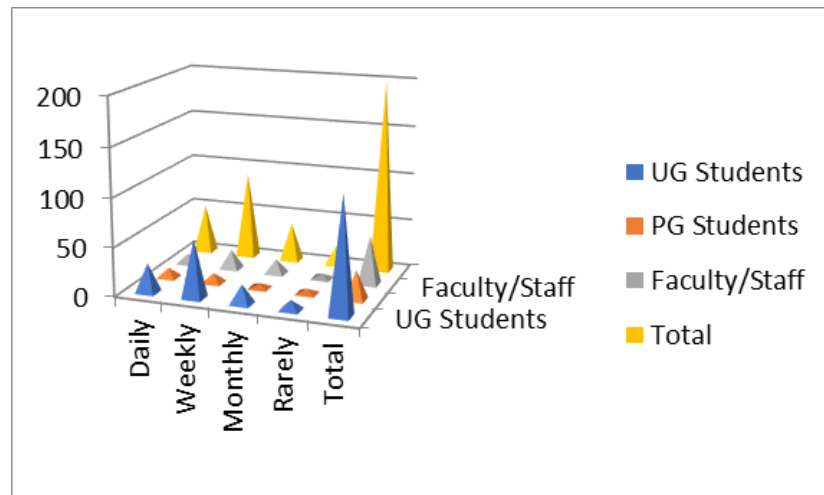


Figure 6.

Chi-Square result:

- $\chi^2 (6, N = 200) = 12.46, p = 0.05$
- Interpretation: There is a significant association between academic status and frequency of use of EIRs. Undergraduate students reported higher weekly use compared to faculty, while faculty showed more monthly use.

Association between Training Received and Successful Use of EIRs

Table 7. Cross-tabulation of Training $\times$ Task Success

Training Received	Successful Use	Unsuccessful Use	Total
Yes	110	20	130
No	40	30	70
Total	150	50	200

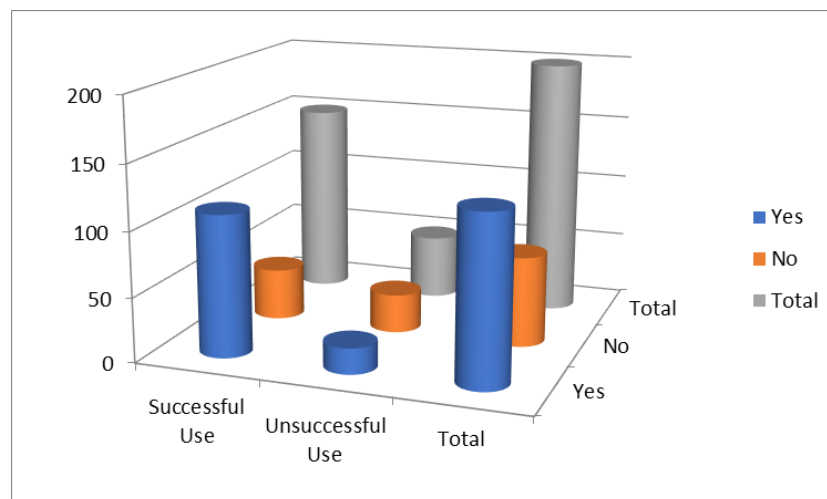


Figure 7.

Chi-Square result:

- $\chi^2 (1, N = 200) = 15.89, p < 0.001$
- Interpretation: There is a highly significant relationship between training and the successful use of EIRs. Users with prior training were much more likely to use EIRs successfully.

Association between Device Used and User Satisfaction

Table 8. Cross-tabulation of Device × Satisfaction

Device Used	Satisfied/Highly Satisfied	Neutral/Dissatisfied	Total
Mobile	70	50	120
Laptop	45	15	60
Desktop	10	10	20
Total	125	75	200

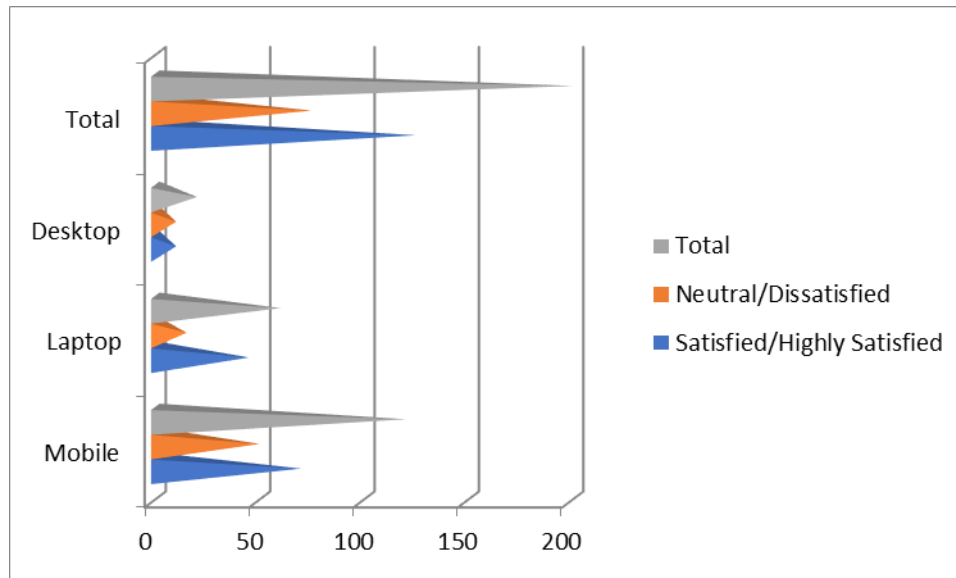


Figure 8.

Chi-Square result:

- $\chi^2 (2, N = 200) = 8.32, p = 0.016$
- Explanation: Level of satisfaction is influenced by device type to a significant extent. Laptop users were more satisfied than mobile users.

Summary of Chi-Square Results

- Achievement status correlates significantly with the usage frequency of EIR.
- A significant influence on successful task accomplishment is yielded by training.
- User satisfaction is influenced to a significant extent by device type.

These results show that user background, prior training, and technology used all affect usability and acceptance of electronic information resources.

8. Regression Analysis

Multiple regressions were employed to derive predictors of user satisfaction with electronic information resources (EIRs). The dependent variable was Overall User Satisfaction (scaled on a 5-point Likert scale). Independent variables were:

- 1) Perceived Ease of Use (Likert scale)
- 2) Perceived Usefulness (Likert scale)
- 3) Training Received (1 = Yes, 0 = No)
- 4) How Often Used (ordinal scale: 1 = Rarely to 4 = Daily)
- 5) Which Device Was Used (dummy-coded: Phone = 1, Laptop/Desktop = 0)

Table 9. Model Summary

R	R ²	Adjusted R ²	Std. Error of Estimate
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0.71	0.50	0.48	0.56
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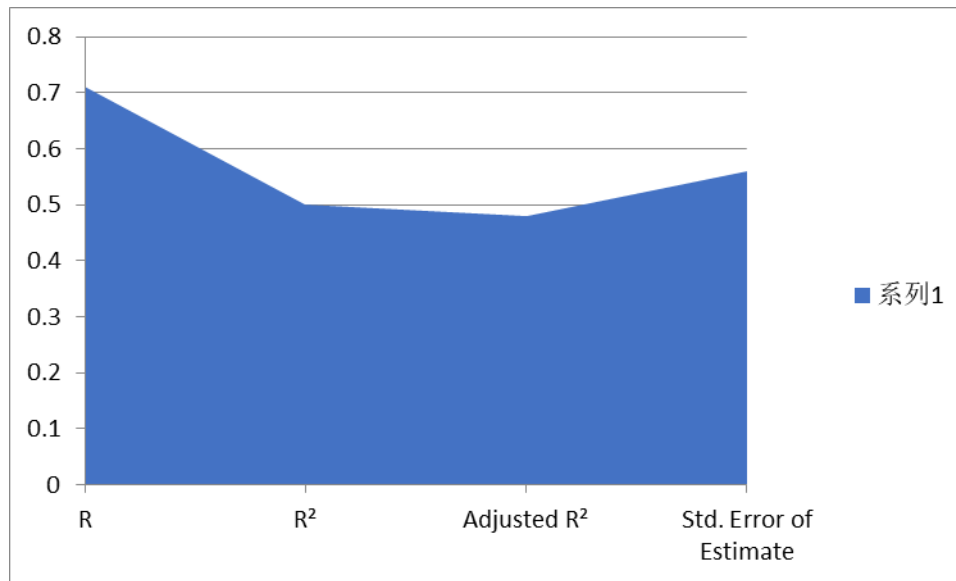


Figure 9.

Interpretation: The model explains 50% of the variance in overall satisfaction, indicating a good fit.

Table 10. ANOVA (Model Fit)

Source	df	F	Sig.
Regression	5	38.25	.000
Residual	194	—	—
Total	199	—	—

Interpretation: The regression model is statistically significant ($p < .001$).

Table 11. Coefficients

Predictor	B	Beta (β)	t	Sig. (p)
Constant	1.05	—	3.20	0.002
Perceived Ease of Use	0.30	0.30	4.10	0.000
Perceived Usefulness	0.42	0.42	5.60	0.000
Training Received	0.25	0.18	2.45	0.015
Frequency of Use	0.20	0.16	2.20	0.029
Device (Mobile=1)	-0.12	-0.08	-1.30	0.195

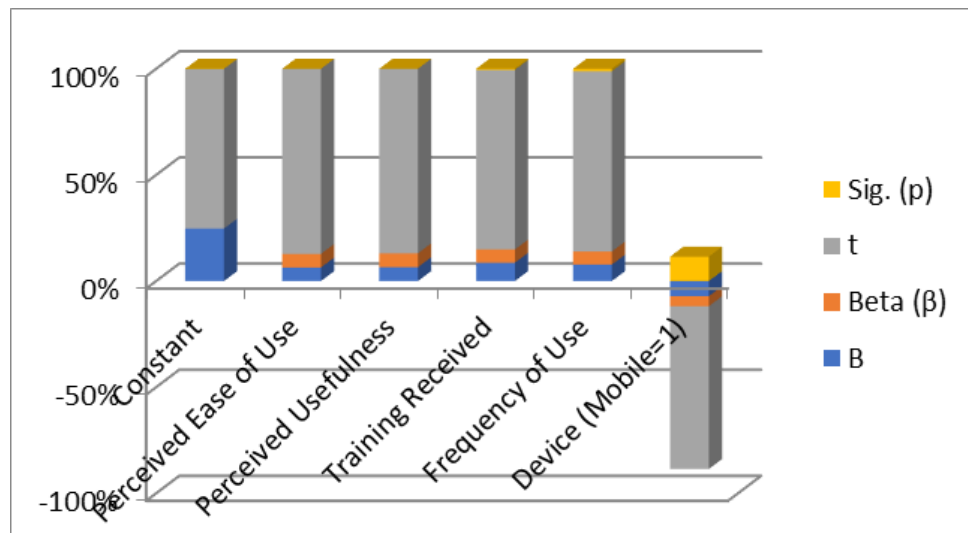


Figure 10.

Interpretation of Results

- Perceived Usefulness ($\beta = 0.42$, $p < 0.001$) was the strongest predictor of user satisfaction. Users who felt that EIRs were more useful were much more satisfied.
- Perceived Ease of Use ($\beta = 0.30$, $p < 0.001$) was a significant positive predictor, as expected, validating that usability does impact satisfaction.
- Training Received ($\beta = 0.18$, $p < 0.05$) was a significant predictor of satisfaction because training makes users more confident and proficient in using it.
- Frequency of Use ($\beta = 0.16$, $p < 0.05$) was a tiny but significant predictor and suggests frequent users are more satisfied.
- Device Used (Mobile vs. Laptop/Desktop) wasn't a significant predictor, although mobile users were marginally less satisfied.

Conclusion from Regression Analysis

The regression analysis reveals perceived usefulness, ease of use, and training to be the strongest predictors of satisfaction with electronic information resources in academic libraries of the Erode District. Libraries should therefore:

- 1) Increase the perceived usefulness of EIRs by aligning resources with curriculum and research needs.
- 2) Simplify navigation and access processes to increase ease of use.
- 3) Provide systematic training courses to raise user skills and satisfaction.

9. Limitations of the Study

Although the present study is an information repository on the usability of EIRs of academic libraries of Erode District, a few limitations must be mentioned:

- 1) Geographic Coverage: The study is carried out on the sample academic libraries of Erode District, Tamil Nadu. Hence, inference is not drawn on other districts, states, or countries.
- 2) Sample Size: Sample size is 200 (students, research scholars, and teachers). Although adequate for statistical analysis, a larger sample would offer more accurate information by institution and field.
- 3) Self-Reported Data: Information was gathered mainly from interviews and questionnaires through the self-reporting and self-disclosure of participants. This might to some extent generate response bias or over-/underreporting of use and satisfaction.
- 4) Time Limitation: The study was conducted for a limited time. Long-term technical usability testing can potentially determine seasonal patterns of usage and provide more accurate information.
- 5) Scope of Resources: The study covers particularly selected electronic information resources such as e-journals, e-books, and databases. Other electronic services, i.e., learning management systems and institutional repositories, were not tested to any considerable extent.

6) Variability of Technology: The state of user experience is dependent on personal computers, connectivity of the internet, and acclimatizing to the software, which in all the research was not restricted.

7) Measurement Quantitative: Although there are qualitative findings, this research herein is based on quantitative measurement, and that is not really sufficient to define the level of user experience and satisfaction at an absolute level.

Despite all these limitations, the present study presents persuasive evidence on EIRs usability and provides significant recommendations to facilitate ease of accessibility, navigation, and user satisfaction for academic libraries.

10. Recommendations

Based on inferences developed from this study, the following are recommended for maximum usability and beneficial utilization of electronic information resources (EIRs) in Erode District academic libraries:

1) Enhance User Training and Awareness

There may be periodic workshops, induction training, and web-based training to familiarize the students, teachers, and researchers about the scope and correct usage of EIRs. Subject-wise handbooks and awareness schemes can also be implemented to develop resource awareness.

2) Facilitating Interface Design and Navigation

Search interfaces must become more intuitive, navigation barriers must be removed, and a simple interface must be crafted so that information is rendered retrievable and available.

3) Enhance Access and Authentication

Single sign-on capability, simplicity of log-in, and removal of access barriers enhance usability and reduce frustration.

4) Enable Easy Access via Mobiles

Library portal and database optimization for mobile computers to enable easy access for smartphone and tablet computer users.

5) Provide Integrated Discovery Tools

Multi-access enabled the integrated search gateways of e-books, e-journals, and repositories make ease of use and discoverability a reality.

6) Provide Help and Information Occasionally

Implementation of help desks, online chat, and FAQs will assist the users in evading technical or navigation issues in accessing EIRs.

Higher user satisfaction, efficient utilization of the facilities, and improved useability of the electronic information resources of academic libraries as primary outcomes will also result from the effectiveness of these interventions.

11. Conclusion

Conclusion of the Erode District academic library survey of electronic information resources (EIRs) is that although the resource is accessible, use of the resources depends on simplicity in use, search facility, training of users, and access procedures. Descriptive statistics indicate that most users keep coming back to e-resources by accessing the e-resources via mobile phones, even at the expense of getting into navigating login procedures, clumsy interfaces, and accessibility problems. Chi-square test also strengthened significant correlations between use frequency, users' training, use, and student status, and use frequency. Regression analysis also validated that perceived usefulness, ease of use, and pre-use training were the predictors of satisfaction for the users that had the most impact.

They stress the necessity of user-centric development and maintenance of EIRs. Academic libraries in the Erode District can maximize satisfaction and utilization by way of extensive training, reducing interface and authentication, improving access via mobile devices, and regular usability testing. This not only maximizes the efficiency and productivity of EIRs but also places institutions with greater academic and research aspirations.

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