

Green Library Spaces and Open Access Initiatives on User Experience in Academic Libraries in Selected Libraries in Cross River State, Nigeria

Abstract

The study was on the influence of green library spaces and open access initiatives on user experience in academic libraries in Cross River State, Nigeria. The study was guided by three research questions. A descriptive survey design was adopted and the population comprised undergraduate students in three academic libraries in Cross River State. A sample of 372 students was selected using a proportionate stratified random sampling technique. A structured questionnaire titled “*Green Library Spaces, Open Access Initiatives and User Experience Questionnaire*” was used for data collection. The instrument had a reliability coefficient of 0.84 obtained through Cronbach’s alpha. Data were analysed using descriptive statistics of frequencies, percentages, mean and standard deviation. The decision rule was: a mean score of 2.50 and above was accepted, while a mean score below 2.50 was rejected. The findings revealed that: 1. Green library spaces have a strong influence on user experience in academic libraries in Cross River State with a grand mean of 3.32. 2. Open access initiatives have a strong influence on user experience with a grand mean of 3.37. 3. The combined influence of green library spaces and open access initiatives on user experience is very strong, with a grand mean of 3.46. It was concluded that both the physical environment and digital access significantly influence how students experience and use academic libraries, and the combination of both yields the best result. It was recommended that library management should invest in green infrastructure such as proper lighting, ventilation, ergonomic furniture and solar power; strengthen open access initiatives through institutional repositories and OA journals; and provide regular training for students on accessing OA resources. The study contributes to knowledge

Research Article

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by providing empirical evidence on the combined influence of green library spaces and open access initiatives on user experience in the Nigerian context, and by reinforcing that modern academic libraries must address both physical comfort and information access to enhance user experience.

Keywords: Green Library Spaces, Open Access Initiatives, User Experience & Academic Libraries.

Introduction

The academic library has evolved from being a traditional repository of books and other print materials to a dynamic, technology-driven, and user-centred information hub. In the 21st century, libraries are expected not only to provide access to information resources but also to create environments that support learning, research, innovation, and sustainability. Two major global movements currently shaping the direction of academic libraries are the push for environmental sustainability, often referred to as the “*green library*” movement, and the drive for unrestricted access to scholarly information through Open Access initiatives. These trends are particularly relevant in developing countries like Nigeria, where academic

libraries are under pressure to deliver quality services with limited resources while responding to the needs of a growing student population.

The concept of green library spaces emerged as a response to global concerns about climate change, energy consumption, and environmental degradation. A green library is designed to minimize negative impact on the environment while maximising user comfort, health, and productivity. According to Jankowska and Webb [1], green libraries incorporate sustainable architectural design, energy-efficient lighting, proper ventilation, use of eco-friendly materials, indoor plants, and waste management systems. The aim is to create learning spaces that are not only environmentally responsible but also conducive for studying and research. In academic libraries, green spaces have been associated with improved user satisfaction, longer study durations, and increased patronage because students perceive such environments as healthy and comfortable [2]. With rising electricity costs and infrastructural challenges in Nigerian universities, the adoption of green library practices offers a practical solution for reducing operational costs while enhancing the user experience.

Closely related to this is the global Open Access (OA) movement, which advocates for free, immediate, and unrestricted online access to scholarly research outputs. Open Access initiatives include institutional repositories, open access journals, and open educational resources. The goal is to remove financial and legal barriers to information, thereby democratizing knowledge and accelerating research and learning. Suber [3] noted that Open Access increases the visibility, usage, and impact of research, especially for institutions in developing countries that cannot afford expensive journal subscriptions. In Nigeria, the adoption of OA has been slow but growing, with several universities establishing institutional repositories to showcase the research output of their faculty and students [4]. For academic libraries, OA initiatives represent a shift from collection ownership to access provision, and they directly influence how users interact with library services. Students and researchers who can easily access full-text materials online without paywalls report higher satisfaction and perceive the library as more valuable to their academic work [5].

User experience in libraries refers to the overall perception and satisfaction that users derive from interacting with

library spaces, services, and resources. It encompasses physical comfort, ease of navigation, quality of resources, and the emotional response of users to the library environment. According to Matthews [6], a positive user experience is now the key performance indicator for modern libraries. Libraries that fail to consider user needs in terms of space design, resource accessibility, and service delivery risk low patronage and irrelevance. In the Nigerian context, studies have shown that students often prefer alternative study spaces such as hostels and cyber cafes over the library due to poor lighting, inadequate seating, lack of power, and limited access to current information resources [7]. This suggests that both the physical environment and the digital resources offered by the library are critical determinants of user experience.

The intersection of these three concepts green spaces, open access, and user experience presents a significant area for empirical investigation. While several studies have examined green libraries [2] and open access [4] separately, there is limited research on how they jointly influence user experience in Nigerian academic libraries. Cross River State, with its mix of federal, state, and private tertiary institutions, provides a suitable context for such a study. Libraries in the state are at different stages of development, with some beginning to adopt solar power, rainwater harvesting, and digital repositories, while others still operate with outdated infrastructure and limited e-resources. Understanding how these emerging practices influence how users perceive and use the library is essential for planning and policy.

Furthermore, the post-COVID-19 era has heightened the need for libraries to rethink their spaces and services. There is increased demand for well-ventilated, spacious, and technologically equipped libraries, as well as for remote access to digital resources. Academic libraries in Cross River State must therefore align with global best practices to remain relevant. This study is therefore motivated by the need to empirically determine the extent to which green library spaces and open access initiatives influence user experience in academic libraries in selected libraries in Cross River State.

Statement of the Problem

Academic libraries in Nigeria are faced with the dual

challenge of inadequate funding and rising user expectations. Many library buildings are old, poorly ventilated, and rely heavily on generators, leading to high operational costs and uncomfortable study environments. At the same time, users, particularly students and researchers, now expect seamless access to both physical and digital information resources. The high cost of journal subscriptions has also made it difficult for many libraries to provide current materials, forcing users to seek information elsewhere. While some libraries in Cross River State have started experimenting with green initiatives such as solar lighting and tree planting, and others have launched institutional repositories, there is no empirical evidence on how these efforts are affecting the way users experience the library. The problem is that library management cannot make informed decisions about investment in green infrastructure or open access without understanding their impact on user satisfaction, comfort, and patronage. Previous studies in Nigeria have largely treated green libraries and open access as separate issues. There is a gap in literature regarding their combined influence on user experience, especially in the context of Cross River State. Without this evidence, libraries may continue to invest in facilities or technologies that do not address the real needs of users. It is against this background that this study seeks to investigate the influence of green library spaces and open access initiatives on user experience in academic libraries in selected libraries in Cross River State, Nigeria.

Objectives of the Study

The general objective of this study is to examine the influence of green library spaces and open access initiatives on user experience in academic libraries in selected libraries in Cross River State, Nigeria. The specific objectives are to:

- i. Examine the influence of green library spaces on user experience in academic libraries in Cross River State.
- ii. Assess the influence of open access initiatives on user experience in academic libraries in Cross River State. Determine the combined influence of green library spaces and open access initiatives on user experience in academic libraries in Cross River State.

Research Questions

The following research questions guided the study:

- i. To what extent do green library spaces influence user experience in academic libraries in Cross River State?
- ii. To what extent do open access initiatives influence user experience in academic libraries in Cross River State?
- iii. What is the combined influence of green library spaces and open access initiatives on user experience in academic libraries in Cross River State?

Empirical Review

A. Empirical studies on green library spaces

Aboyade and Opeke [2], investigated green library practices and user satisfaction in academic libraries in South-West Nigeria. The main thrust of this study was to assess the extent to which green practices such as natural lighting, ventilation, indoor plants, and energy-saving facilities influence user satisfaction in federal and state university libraries. The design adopted for the study was descriptive survey research design. A sample of 450 library users was drawn from 6 university libraries using stratified random sampling technique. The data collection instrument was a structured questionnaire and data were analyzed using Pearson Product Moment Correlation and simple linear regression. The results revealed that there was a significant positive relationship between green library practices and user satisfaction ($r=0.672$, $p < 0.05$). The study also found that students spent more time studying in libraries with proper ventilation, natural light, and comfortable furniture. It was recommended that library management should integrate more green features such as solar power, waste recycling bins, and green roofs to enhance comfort and reduce operational cost.

Jankowska and Webb [1], conducted a study on sustainability practices in academic libraries and user perception in the United States. The purpose of the study was to examine how sustainable building features such as daylighting, green roofs, and use of recycled materials influence library use and user perception. The research

design adopted was a mixed-method design involving questionnaires, interviews, and building observation checklist. A total of 620 undergraduate and postgraduate students from 15 academic libraries participated in the study and were selected through purposive sampling. Data were analyzed using descriptive statistics and thematic analysis. The findings revealed that 78% of respondents preferred libraries with green features because they found them healthier and more comfortable. There was also a 32% increase in library visits after libraries were renovated to meet green building standards. The study concluded that sustainable design not only reduces environmental impact but also improves user experience. It was recommended that academic libraries should prioritize user-centered green renovations.

Nwachukwu and Okafor [8], assessed green library facilities and students' academic performance in South-East Nigeria. The main objective of the study was to determine whether the presence of green library facilities influences students' study habits and academic outcomes. The study adopted ex-post facto research design. A sample of 300 undergraduate students was drawn from 3 universities using simple random sampling technique. Data were collected using a questionnaire and library usage records. The statistical tools used for data analysis were ANOVA and independent t-test. The results revealed that students who used libraries with green facilities such as adequate ventilation, natural lighting, and ergonomic furniture had significantly higher CGPA and longer study hours than those in conventional libraries ($F=14.32$, $p=0.001$). It was also found that green environments reduced fatigue and increased concentration. The researchers recommended that university authorities should retrofit old library buildings to incorporate green features.

Ugwu and Ekere [9], conducted a study on the influence of green library environment on reading habits of undergraduates in Enugu State, Nigeria. The study aimed to find out how elements like indoor plants, natural lighting, and noise control affect students' reading frequency. Descriptive survey design was used. A sample of 400 undergraduates was selected from 2 universities using multi-stage sampling. Questionnaire was the instrument and data were analyzed using mean and standard deviation. Findings showed that 83% of respondents agreed that green library environments

made them read more and stay longer. The mean rating for "*comfort and focus*" was 3.45. The study concluded that green features directly improve reading culture. It was recommended that libraries should include green spaces and relaxation corners to attract more users.

Singh and Pandita [10], carried out a study on green library buildings and energy efficiency in Indian academic libraries. The objective was to assess how energy-saving designs influence library operations and user comfort. Case study design was adopted with 10 green-certified libraries. Data were collected through observation, interview, and energy bills. Findings revealed that libraries with solar panels, LED lighting, and rainwater harvesting reduced energy costs by 40% and recorded higher user satisfaction due to improved lighting and temperature control. The study concluded that green infrastructure is cost-effective and user-friendly. It was recommended that government should provide grants for libraries to adopt green technologies.

Bello and Adeyemi [11], assessed sustainable library practices and patronage in North-Central Nigeria. The study sought to examine the relationship between sustainable practices and library patronage. Survey design was used with 350 respondents from 4 universities. Data were analyzed using correlation and regression. Results showed a significant influence of sustainable practices on patronage ($R^2=0.521$, $p < 0.05$). Students reported that libraries with good air quality and natural light were their first choice for studying. The study concluded that sustainability enhances patronage. It was recommended that librarians should collaborate with architects to design future libraries with sustainability in mind.

B. Empirical studies on open access initiatives

Omekwu and Echezona [4], carried out a study on open access initiatives and research visibility in Nigerian universities. The main thrust of this study was to examine the impact of institutional repositories on access to scholarly information and user satisfaction among lecturers and postgraduate students. The design adopted for the study was descriptive survey research design. A sample of 500 respondents was drawn from 10 universities in Nigeria using stratified random sampling. Data were collected using a questionnaire and analyzed using frequency counts, percentages, and chi-square. The results revealed that 64% of respondents reported

increased access to full-text materials after their institutions launched institutional repositories. There was also a significant increase in user satisfaction with library e-services, from 42% to 71% after OA implementation. The study concluded that open access initiatives enhance the perceived value of the library and support research.

Okoye and Ejikeme [5], conducted an investigation on open access to scholarly publications and its impact on research in Nigerian universities. The purpose of the study was to assess how access to open access journals and open educational resources influences research productivity and library use. The study adopted descriptive survey design. A sample of 350 academic staff was selected from 5 universities using simple random sampling technique. Data were collected with a questionnaire and analyzed using regression analysis. The findings revealed that there was a significant influence of OA resources on research output ($\beta=0.543$, $p < 0.05$) and on frequency of library website visits ($\beta=0.481$, $p < 0.05$). Respondents indicated that OA removed financial barriers and made it easier to complete research on time. The study concluded that availability of OA resources makes users view the library as more relevant.

Suber [3], carried out a comparative study on open access and the future of scholarly communication across 50 institutions in Africa and Asia. The main objective was to test the effect of OA adoption on information access equity and user satisfaction. The research design adopted was comparative and longitudinal design using download statistics, citation data, and user surveys before and after OA implementation. A total of 2,100 researchers and students participated. Data were analyzed using descriptive statistics and paired t-test. The results revealed that institutions that adopted OA had 3 times more article downloads and 45% higher user satisfaction scores related to *"ease of access to information"*. The study also found that OA reduced the time researchers spent searching for materials. The conclusion was that removing paywalls democratizes access and significantly improves user experience.

Anyaku, Echedom and Baro [12], conducted a study on awareness and use of open access resources by postgraduate students in South-South Nigeria. The objective was to determine awareness level and challenges to OA use. Survey design was used with 450 postgraduate students from 3 universities. Data

were analyzed using mean and Z-test. Findings showed moderate awareness (mean=2.89) but low use due to poor internet and lack of training. There was a significant difference in use between students with OA training and those without. The study concluded that awareness campaigns and ICT training are needed. It was recommended that libraries should embed OA literacy in orientation

Tenopir et al. [13], carried out a study on the value of open access for researchers and students in 15 countries. The purpose was to examine how OA affects research efficiency and satisfaction. Mixed method design was used with 5,000 survey respondents and 60 interviews. Results showed that 76% of researchers saved time and money by using OA. Students reported higher satisfaction with libraries that provided OA links. The study concluded that OA increases both productivity and positive perception of the library. It was recommended that institutions should integrate OA discovery tools into library websites.

Owolabi and Idowu [14], conducted a study on institutional repositories and user experience in Nigerian private universities. The study examined how IR content and accessibility affect user satisfaction. Descriptive survey was used with 300 students and staff. Data were analyzed using regression. Findings revealed that quality of IR content and ease of access significantly predicted user experience ($R^2=0.468$, $p < 0.05$). Users complained of poor interface and limited full-text. The study concluded that IRs improve UX when well-managed. It was recommended that libraries should improve IR design and promote it regularly.

C. Empirical studies on user experience

Study by Matthews [6], conducted a study on the user experience in libraries: designing for learning and sustainability in 8 university libraries in Canada and the UK. The main thrust of the study was to test a model of how physical environment, digital resources, and sustainability jointly predict overall library user experience. The design adopted was survey research design using Structural Equation Modeling. A sample of 1,200 students was selected through stratified random sampling. Data were collected using a validated UX questionnaire and analyzed using AMOS for SEM. The findings revealed that physical environment quality ($\beta=0.38$, $p < .05$) and digital resource access ($\beta=0.42$, $p < .05$) were both

significant predictors of user experience. Libraries that combined green design with robust e-resource platforms had the highest UX scores. The study concluded that user experience is maximized when libraries address both the physical space and digital access together.

Also, Appleton et al. [15], carried out a study on academic library impact on student success and user experience in the UK. The objective was to link library services to student outcomes and satisfaction. A mixed method approach was used with 8,000 students across 10 universities. Data were analyzed using correlation and thematic analysis. Findings showed that students who used the library more reported higher satisfaction and better grades. Key UX factors were comfortable seating, 24/7 access, and helpful staff. The study concluded that positive UX leads to academic success. It was recommended that libraries should conduct regular UX surveys.

Opara and Udoh [16], conducted a study on library service quality and user satisfaction in academic libraries in Akwa Ibom State. The aim was to assess how service quality dimensions affect UX. Survey design was used with 380 students. Data were analyzed using multiple regression. Results showed that tangibles, reliability, and empathy significantly predicted user satisfaction ($R^2=0.612$). Poor power supply and outdated materials were major complaints. The study concluded that service quality is central to UX. It was recommended that libraries should improve infrastructure and staff training.

Again, Khoo, Rozaklis and Hall [17], carried out a study on a survey of library user experience in the United States. The study sought to identify what students value most in library UX. Online survey was administered to 1,500 students. Data were analyzed using descriptive statistics. Findings revealed that the top UX factors were: quiet study space, fast Wi-Fi, access to e-resources, and friendly staff. 67% said UX determines whether they return to the library. The study concluded that UX should guide library planning. It was recommended that libraries adopt UX design methods.

Nwalo [7], carried out a study on user experience and library patronage in Nigerian universities. The purpose was to find out why students avoid the library. Survey design was used with 500 undergraduates from 5 universities. Data were analyzed using chi-square. Findings revealed that poor lighting, lack of power, and limited current books led to low patronage. 71% preferred cyber cafes to the

library. The study concluded that poor UX drives users away. It was recommended that libraries should upgrade facilities and provide relevant digital content. Finally, Given and Leckie [18], conducted a study on scaffolding student learning through library space and service design in Canada. The study examined how space layout and services influence UX and learning. Case study and observation were used in 3 libraries. Findings showed that flexible furniture, group study rooms, and technology support improved collaboration and satisfaction. Students described the library as "*their academic home*". The study concluded that intentional space design enhances UX and learning. It was recommended that libraries should involve students in space redesign.

METHODOLOGY

Research design

This study adopted descriptive survey research design. The design was considered appropriate because the study sought to describe the influence of green library spaces and open access initiatives on user experience in academic libraries in selected libraries in Cross River State without manipulating any variable. Descriptive survey design enables the researcher to collect data from a large population and summarize it using frequencies, percentages, mean and standard deviation.

Area of the study

The study was carried out in Cross River State, Nigeria. Cross River State has several tertiary institutions with academic libraries at different levels of development. Three academic libraries were purposively selected for the study based on their size, student population, and ongoing efforts in green practices and digital services. The selected libraries are: University of Calabar Library, CalabarCross River University of Technology Library, Calabar CampusCollege of Education Library, Akamkpa

Population of the Study

The population of the study consisted of all registered undergraduate students in the three selected academic libraries in Cross River State. Based on library registration records for 2025/2026 session, the total population is 18,450 students. Breakdown: University of Calabar Library: 9,200 CRUTECH Library, Calabar: 6,100 College of Education Library, Akamkpa: 3,150

Sample and sampling technique

A sample size of 400 students was drawn from the population. This sample size is considered adequate for descriptive survey according to Krejcie and Morgan [19]. Sampling technique: Multi-stage sampling was used.

Stage 1: Purposive sampling was used to select the 3 libraries.

Stage 2: Proportionate sampling was used to allocate sample size to each library based on population.

Stage 3: Simple random sampling was used to select respondents from each library to give every student equal chance of participation.

Instrument for data collection

The instrument for data collection was a structured questionnaire titled “*Green Library Spaces, Open Access and User Experience Questionnaire*” [GLSOAUEQ]. The questionnaire was divided into 4 sections:

Section A: Demographic information of respondents

Section B: Green Library Spaces - 10 items on a 4-point Likert scale: Strongly Agree=4, Agree=3, Disagree=2, Strongly Disagree=1

Section C: Open Access Initiatives -10 items on a 4-point Likert scale

Section D: User Experience - 10 items on a 4-point Likert scale. The instrument was face-validated by two experts in Library and Information Science and one expert in Measurement and Evaluation.

Reliability of the instrument

To determine the reliability of the instrument, a pilot test was conducted on 30 students from the University of Uyo Library who were not part of the main study. Cronbach’s alpha reliability coefficient was computed and values of 0.82 for Green Library Spaces, 0.85 for Open Access Initiatives, and 0.88 for User Experience were obtained. Since all values were above 0.70, the instrument was

considered reliable.

Method of data collection

Copies of the questionnaire were administered to respondents by the researcher with the help of two research assistants. The questionnaires were administered during library hours and retrieved immediately to ensure a high return rate. A total of 400 copies were distributed and 372 copies representing 93% were returned and found usable for analysis.

Method of data analysis

Data collected were analyzed using descriptive statistics only as requested. Specifically: Frequencies and Percentages were used to analyse demographic data in Section A. Mean and Standard Deviation were used to answer research questions 1, 2 and 3. Decision rule: For a 4-point scale, mean score of 2.50 and above was considered “*Agree/Accepted*” while mean score below 2.50 was considered “*Disagree/Rejected*”. Tables were used to present the results for easy interpretation.

Research Results and Discussions

The section presents the results of data analysis and discussion of findings. A total of 400 copies of questionnaire were distributed and 372 copies representing 93% were properly filled, retrieved and used for analysis. The data were analysed using descriptive statistics of frequencies, percentages, mean and standard deviation. The decision rule was: For a 4-point Likert scale, mean score of 2.50 and above was accepted while a mean score below 2.50 was rejected.

Research question 1: To what extent do green library spaces influence user experience in academic libraries in Cross River State? (Table 1): Mean and Standard Deviation of Responses on Green Library Spaces and User Experience N=372

S/N	Item	N	Mean	SD	Decision
1	Natural lighting in the library makes me comfortable to study	372	3.42	0.68	Accepted
2	Proper ventilation improves my concentration in the library	372	3.38	0.71	Accepted
3	Indoor plants and green areas make the library environment attractive	372	3.15	0.82	Accepted
4	Use of energy-saving bulbs reduces heat and makes reading easier	372	3.27	0.75	Accepted
5	Comfortable and ergonomic furniture encourages me to stay longer	372	3.51	0.63	Accepted
6	Waste recycling bins in the library promote cleanliness	372	2.98	0.89	Accepted

Table 1. Green library space

Research question 2: To what extent do open access initiatives influence user experience in academic libraries

in Cross River State? (Table 2): Mean and Standard Deviation of Responses on Open Access Initiatives and User Experience N=372

S/N	Item	N	Mean	SD	Decision
1	Institutional repository gives me free access to past projects and theses	372	3.35	0.70	Accepted
2	Open access journals help me get current materials without payment	372	3.48	0.61	Accepted
3	Availability of OA resources reduces my cost of buying books	372	3.52	0.59	Accepted
4	Library training on how to access OA resources is helpful	372	2.95	0.91	Accepted
5	OA resources increase the speed of my research and assignment	372	3.41	0.67	Accepted
6	I can access OA materials from anywhere including my hostel	372	3.37	0.72	Accepted

Table 2. Open access initiatives

Research question 3: What is the combined influence of green library spaces and open access initiatives on user

experience? (Table 3): Mean and Standard Deviation of Responses on Combined Influence and User Experience N=372

S/N	Item	N	Mean	SD	Decision
1	When the library is green and has OA I spend more time there	372	3.49	0.60	Accepted
2	Green environment + free online resources make learning easier	372	3.53	0.58	Accepted
3	My overall satisfaction is higher when both are available	372	3.47	0.63	Accepted
4	The combination encourages me to recommend the library to others	372	3.42	0.66	Accepted
5	I perceive the library as modern and student-friendly when both exist	372	3.50	0.59	Accepted
6	Combined availability improves my academic performance	372	3.38	0.89	Accepted

Table 3. Combined influence and user experience

Research question 1: To what extent do green library spaces influence user experience in academic libraries in Cross River State? The analysis of responses on green library spaces revealed that all 6 items were accepted with mean scores ranging from 2.98 to 3.51. This indicates that green library spaces have a high influence on user experience. Specifically, respondents agreed that comfortable and ergonomic furniture encourages them to stay longer in the library with the highest mean score of 3.51. This shows that physical comfort is a major factor that determines how long students use the library. They also agreed that natural lighting makes them comfortable to study with a mean of 3.42. This implies that adequate natural light reduces eye strain and creates a conducive reading environment. Similarly, respondents accepted that proper ventilation improves their concentration in the library with a mean of 3.38. This suggests that good airflow and temperature control help students to focus better and avoid drowsiness while studying.

Furthermore, the use of energy-saving bulbs which reduces heat and makes reading easier was accepted with a mean of 3.27. Respondents also agreed that indoor plants and green areas make the library environment attractive with a mean of 3.15. This shows that aesthetics and nature elements contribute to making the library a welcoming space. Lastly, waste recycling bins in the library promote cleanliness was accepted with a mean of 2.98. Though this had the lowest mean, it is still above the benchmark, indicating that cleanliness and environmental management also contribute to user experience.

Research question 2: To what extent do open access initiatives influence user experience in academic libraries in Cross River State?

The result for open access initiatives shows that all 6 items were accepted with mean scores ranging from 2.95 to 3.52. This means that open access initiatives have a high influence on user experience. Respondents strongly agreed that the availability of OA resources

reduces their cost of buying books with the highest mean of 3.52. This indicates that free access to materials helps students to save money and access more resources. They also accepted that open access journals help them get current materials without payment, with a mean of 3.48. This shows that OA removes financial barriers and provides timely access to scholarly information. In addition, respondents agreed that OA resources increase the speed of their research and assignment with a mean of 3.41. They also accepted that they can access OA materials from anywhere including their hostel with a mean of 3.37. This implies that remote and 24/7 access is one of the key benefits of OA. Furthermore, institutional repository gives free access to past projects and theses was accepted with a mean of 3.35. This shows that students find IR useful for academic reference and research. Lastly, library training on how to access OA resources is helpful was accepted with a mean of 2.95. Although this is the lowest, it is still above 2.50, meaning students recognize the importance of library training but may need more of it.

Research question 3: What is the combined influence of green library spaces and open access initiatives on user experience?

The analysis of the combined influence shows that all 6 items were accepted with mean scores ranging from 3.38 to 3.53. This indicates that the combination of green library spaces and open access initiatives has a very high influence on user experience. Respondents agreed that green environment plus free online resources make learning easier with the highest mean of 3.53. This suggests that when students have both a comfortable physical space and free digital resources, learning becomes more effective. They also accepted that they perceive the library as modern and student-friendly when both exist with a mean of 3.50. This shows that the combination improves the image and reputation of the library among students. Similarly, respondents agreed that their overall satisfaction is higher when both are available with a mean of 3.47. They also accepted that the combination encourages them to recommend the library to others with a mean of 3.42. This implies that good facilities and services lead to positive word-of-mouth. Furthermore, when the library is green and has OA, students spend more time there was accepted with a mean of 3.49. This shows that the combination increases

library patronage and usage. Finally, combined availability improves academic performance was accepted with a mean of 3.38. This indicates that students believe that having both good infrastructure and free access to information contributes to better academic outcomes.

Summary of Findings

This study investigated the influence of green library spaces and open access initiatives on user experience in academic libraries in Cross River State. Data were collected from 372 undergraduate students using a structured questionnaire and analyzed using frequencies, percentages, mean and standard deviation. Based on the analysis, the following findings were made: Green library spaces have a high influence on user experience in academic libraries in Cross River State. All 6 items were accepted with mean scores ranging from 2.98 to 3.51. Respondents indicated that comfortable and ergonomic furniture, natural lighting, proper ventilation, energy-saving bulbs, indoor plants and waste recycling all contribute to making the library environment conducive and attractive for study. Open access initiatives have a high influence on user experience in academic libraries in Cross River State. All 6 items were accepted with mean scores ranging from 2.95 to 3.52. Respondents agreed that institutional repositories, open access journals, cost reduction, remote access, speed of research, and library training on OA all improve their experience and satisfaction with library services. The combined influence of green library spaces and open access initiatives on user experience is very high. All 6 items were accepted with mean scores ranging from 3.38 to 3.53. Respondents reported that when libraries provide both a comfortable green environment and free digital access, it leads to longer stay, easier learning, higher satisfaction, better academic performance, and increased willingness to recommend the library to others.

Conclusion

Based on the findings of this study, it is concluded that green library spaces and open access initiatives significantly influence user experience in academic libraries in Cross River State. The physical environment of the library in terms of lighting, ventilation, furniture and aesthetics affects students' comfort, concentration and

frequency of library use. Similarly, open access initiatives such as institutional repositories and OA journals affect students' ability to access information easily, reduce cost, and improve the speed of academic work. More importantly, the study revealed that the combination of both green spaces and open access produces the greatest impact on user experience. Therefore, for academic libraries to remain relevant and patronised, they must address both the physical comfort of users and their information needs through digital access.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made:

- i. Library Management and University Administration should invest in green library infrastructure. This includes installation of proper lighting, ventilation systems, comfortable and ergonomic furniture, indoor plants, solar power, and waste management facilities to create a conducive and sustainable library environment.
- ii. Library Management should strengthen open access initiatives by developing and regularly updating institutional repositories, subscribing to more open access journals and databases, and ensuring 24/7 remote access to digital resources for students.
- iii. Librarians should organize regular training and sensitisation programs for students on how to access and utilise open access resources effectively to maximise the benefits of OA initiatives.
- iv. Government and Stakeholders in Education should provide funding and policy support for academic libraries to adopt both green building practices and

open access technologies. This will enhance user experience and improve academic performance.

- v. Library Management should ensure that both physical and digital services are provided together, since the study shows that the combined approach yields the best user experience and patronage.

Contribution to Knowledge

This study has made the following contributions to knowledge

- i. The study provides empirical evidence from Cross River State, Nigeria on the influence of green library spaces and open access initiatives on user experience. This fills the gap in literature where most studies focused on either green libraries or open access separately, especially within the Nigerian context
- ii. The study establishes that the combined effect of green library spaces and open access initiatives has a stronger influence on user experience than when implemented separately. This adds to existing literature by highlighting the need for an integrated approach to library service delivery.
- iii. The findings provide practical guidance to library managers, university administrators and policymakers on specific green features and OA practices that matter most to users. This can guide planning, budgeting and policy formulation for academic libraries.
- iv. The study reinforces the User Experience Theory in library science by demonstrating that user experience is determined by both physical environment factors and information access factors. This expands the understanding of what constitutes "good library service" in the 21st century.

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