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ASSESEMENT OF THE IMPACT OF GAMIFICATION IN LIBRARY SERVICES TO ENHANCE USER ENGAGEMENT THROUGH EMERGINING TECHNOLOGIES IN KADUNA STATE ACADEMIC LIBRARIES

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ABSTRACT

Academic libraries in the digital era are increasingly challenged to adapt to evolving user needs and expectations, particularly in contexts where traditional services remain dominant and digital resources are underutilized. This study investigates the role of gamification, supported by emerging technologies, in enhancing user engagement within academic libraries in Kaduna State, Nigeria. Guided by a descriptive survey and case study design, quantitative data were collected through structured questionnaires administered to students, researchers, and library staff across three institutions: Kaduna State University (KASU), Federal University of Education Zaria (FUEZ), and Ahmadu Bello University (ABU Zaria). Descriptive and inferential statistical analyses were employed using SPSS. Findings revealed moderate levels of user interaction, with higher engagement in borrowing print books (68.2%) and using e-resources (81.8%), but lower participation in library events (40.9%) and training (50%). Gamification features—including badges, points, rewards, and quests—were widely perceived as useful (over 70% acceptance across institutions), with ABU Zaria consistently recording the highest receptivity. Emerging technologies such as reliable Wi-Fi were moderately available (63.6%), while advanced tools like mobile apps (36.4%), RFID/NFC (22.7%), and AR/VR (13.6%) were minimally adopted. Respondents acknowledged gamification's potential to increase engagement (72.7%) and motivate resource use (68.2%), but concerns were raised regarding competition anxiety, digital exclusion, and increased staff workload. Based on these insights, the study proposes a phased framework for gamification integration, beginning with infrastructural improvements and simple reward systems, advancing toward mobile applications and competitive features, and culminating in the adoption of immersive technologies. The research concludes that gamification, if inclusively and strategically implemented, can transform academic libraries into interactive, learner-centered environments. It further recommends strengthening digital infrastructure, piloting low-cost gamification strategies, ensuring inclusivity, building staff capacity, and adopting gradual expansion models. Ultimately, the study contributes empirical evidence to the limited body of literature on gamification in Nigerian academic libraries and offers practical pathways for enhancing user engagement through innovative, technology-driven services.

Keywords: academic libraries, gamification, user engagement, emerging technologies, Kaduna State, Nigeria

INTRODUCTION

Academic libraries in the digital age are undergoing significant transformation as they strive to meet the evolving needs and expectations of their users. Traditionally, libraries were primarily viewed as repositories of knowledge, offering conventional services such as book lending, reference assistance, and reading spaces. However, the growing influence of information and communication technologies (ICTs), coupled with changes in user behavior, has compelled libraries to reimagine their roles by integrating innovative approaches to engage users more effectively and to enrich their overall experiences.

One such innovative strategy is **gamification**, which refers to the application of game design principles and mechanics such as points, badges, leaderboards, rewards, and challenges—in non-

game contexts to stimulate user participation, motivation, and loyalty. Gamification has gained increasing global recognition over the past decade and is now widely applied across industries such as education, healthcare, marketing, and corporate training. Its success lies in its ability to promote user interaction, sustain attention, and encourage desired behaviors by making routine activities more engaging and enjoyable.

In the context of academic libraries, gamification provides a unique opportunity to foster active engagement, particularly among students and researchers. By embedding game elements into library services, users can be motivated to explore new resources, participate in literacy programs, and develop stronger information-seeking skills. For instance, libraries may design reward-based challenges that encourage students to use electronic databases, attend workshops, or familiarize themselves with digital resources. This not only enhances learning but also strengthens the role of libraries as dynamic partners in academic development.

Furthermore, the integration of emerging technologies has expanded the possibilities of gamification in libraries. Tools such as mobile applications, artificial intelligence (AI), and virtual reality (VR) now allow for more personalized, interactive, and immersive experiences. Mobile apps can provide gamified platforms where users track their activities and earn rewards, while VR can simulate learning environments that make information discovery more engaging. AI-powered systems can also tailor gamified experiences to individual users' preferences, thereby enhancing inclusivity and effectiveness. These technologies collectively contribute to positioning academic libraries as vibrant, technology-driven learning environments.

Kaduna State, which hosts several prominent academic institutions, presents a suitable context for investigating the impact of gamification on library services. Like many other regions, academic libraries in the state face challenges such as limited user engagement, underutilization of electronic resources, and difficulties in sustaining students' interest in library programs. Introducing gamification, supported by emerging technologies, may serve as a practical solution to these challenges by transforming libraries into more interactive and user-centered spaces.

Against this backdrop, this study seeks to evaluate the role of gamification in enhancing user engagement in academic libraries within Kaduna State. Specifically, it examines the extent of gamification adoption, the potential benefits and challenges associated with its use, and user perceptions of its effectiveness. By doing so, the study aims to provide evidence-based recommendations for integrating gamification and emerging technologies into library services, thereby improving user participation, information literacy, and overall satisfaction.

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Statement of the problems

Despite the significant advancements in information and communication technologies, academic libraries in Kaduna State continue to face persistent challenges in sustaining user engagement and promoting active utilization of their resources. Many students and researchers still rely heavily on conventional services, while electronic resources, digital platforms, and other innovative services remain underutilized. This underuse often stems from limited awareness, lack of motivation, and the perception that library services are rigid or monotonous compared to other digital platforms that users interact with daily.

Gamification, when applied strategically, has been shown in various contexts to increase motivation, participation, and user satisfaction by transforming routine activities into engaging experiences. However, its application in academic libraries particularly in Nigeria and specifically Kaduna State remains limited and underexplored. Although some industries such as education, healthcare, and marketing have successfully adopted gamification to drive user engagement, academic libraries in Kaduna State have yet to fully embrace its potential. Consequently,

opportunities to make library services more interactive, enjoyable, and learner-centered are being missed.

Furthermore, the integration of emerging technologies such as mobile applications, artificial intelligence, and virtual reality could provide libraries with new avenues to deliver gamified services. Yet, little is known about how these technologies can be harnessed effectively within the specific context of academic libraries in Kaduna State. There is also a lack of empirical evidence on user perceptions, readiness, and attitudes toward gamification in this environment.

This gap in knowledge underscores the need for a systematic study that assesses the current level of gamification adoption, explores its potential to enhance user engagement, and identifies best practices tailored to the realities of academic libraries in Kaduna State. Without such an inquiry, libraries in the region may continue to struggle with low levels of user interaction and limited impact, thereby hindering their contribution to teaching, learning, and research.

Objective of the study

The overarching aim of this study is to evaluate the impact of gamification on library services with a focus on enhancing user engagement through emerging technologies in academic libraries within Kaduna State. To achieve this aim, the study is guided by the following specific objectives:

1. To examine the current level of user interaction and engagement within academic libraries in Kaduna State.
2. To evaluate the potential of gamification as a strategy for fostering user participation and enhancing engagement with library services.
3. To investigate the role of emerging technologies in supporting and facilitating the effective implementation of gamification in library contexts.
4. To analyze the benefits and challenges associated with the adoption of gamification in academic libraries.
5. To propose a pragmatic framework for the integration of gamification and emerging technologies into library services in Kaduna State academic institutions.

Literature reviews

Literature review examined current studies on gamification and its applications in library and information science and its implications on user engagement. Areas of particular emphasis are:

Gamification in Libraries

Gamification, according to Deterding et al. (2011), refers to the application of game design components in non-game situations to engage and encourage users. Current research by Zhang et al. (2023) has confirmed its possibility of promoting user engagement in academic libraries.

Kim & Lee (2022) explain that gamification can enhance information literacy abilities, enhance resource usage, and promote a sense of community among library patrons.

Emerging Technologies in Libraries

Emerging technologies, such as mobile apps, VR, and AI, are transforming library services by providing interactive and personalized experiences. A study by Adeleke & Emeahara (2023) explores how these technologies can support gamification initiatives in academic libraries.

Oyelude (2022) emphasizes the importance of integrating emerging technologies into library services to meet the evolving needs of users.

Challenges of Gamification Adoption

Despite its potential, the adoption of gamification in academic libraries faces several challenges, including limited resources, lack of technical expertise, and resistance to change. Ajuwon (2021) identifies these barriers as significant obstacles to the successful implementation of gamification initiatives.

Case Studies

The University of Michigan Library's gamification project (2023) demonstrated the effectiveness of gamification in enhancing user engagement and promoting resource utilization.
A study by Alabi & Oyewole (2024) explored the impact of gamification in Nigerian academic libraries, highlighting its benefits for user engagement and learning outcomes.

METHODOLOGY

A quantitative methodology is adopted in this study to investigate the impact of gamification within Kaduna State Academic Library.

Research Design

This study adopts a descriptive survey research design to systematically collect data from both library staff and users. The descriptive survey is appropriate because it enables the collection of quantitative data that captures the perceptions, attitudes, and experiences of a broad group of respondents, thereby providing measurable insights into the impact of gamification (Creswell, 2014). In addition, a case study approach is employed to situate the investigation within the specific context of academic libraries in Kaduna State. The case study method allows for an in-depth, contextualized understanding of how gamification can be implemented, considering institutional variations in infrastructure, staff capacity, and user engagement (Yin, 2018). By combining a descriptive survey with a case study framework, the research ensures both breadth and depth, producing findings that are not only generalizable but also contextually grounded.

Population and Sampling

The target population for this study comprises library staff, students, and researchers drawn from selected academic libraries in Kaduna State. To ensure representativeness across different user categories, a stratified random sampling technique was employed. Stratification is particularly useful in education and social science research as it ensures that sub-groups are proportionally represented, thereby reducing sampling bias and improving reliability (Creswell, 2014; Babbie, 2021).

Data Collection

This study employed a quantitative research design, with data collected through the administration of a structured questionnaire. The questionnaire was developed based on the objectives of the study and organized into sections that addressed key areas such as the existing level of user interaction, perceptions of gamification, the role of emerging technologies, and challenges associated with its adoption. Both closed-ended and Likert-scale questions were utilized to generate measurable responses suitable for statistical analysis.
Prior to the main data collection, the instrument was subjected to a pilot test to establish its reliability and validity. Feedback from the pilot informed necessary adjustments to improve clarity and consistency. During the main exercise, questionnaires were administered directly to respondents, and completed copies were retrieved within an agreed timeframe.
The collected quantitative data were coded and entered into the Statistical Package for the Social Sciences (SPSS) for analysis. Descriptive statistics such as frequencies, percentages, and means were used to summarized the data.

Data Analysis

All data collected through structured questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS). The analysis involved descriptive statistics (such as frequencies, percentages, means, and standard deviations) to summarize responses.

Data presentation analysis and interpretation

Objective 1: Existing Level of User Interaction with the library

The first objective of this study is to assess the existing level of user interaction with the library

services the result are presented in the table below

Interaction Activity	KASU (n=12)	FUEZ (n=8)	ABU Zaria (n=24)	Total (N=44)
Borrowing print books (Always/Sometimes)	8 (66.7%)	5 (62.5%)	17 (70.8%)	30 (68.2%)
Using e-resources (Always/Sometimes)	9 (75.0%)	6 (75.0%)	21 (87.5%)	36 (81.8%)
Attending library training (Always/Sometimes)	6 (50.0%)	4 (50.0%)	12 (50.0%)	22 (50.0%)
Asking librarians for help (Always/Sometimes)	7 (58.3%)	5 (62.5%)	20 (83.3%)	32 (72.7%)
Participating in library events (Always/Sometimes)	5 (41.7%)	3 (37.5%)	10 (41.7%)	18 (40.9%)

Discussion of Finding of objective one

The results of the study reveal varying levels of user interaction with library services across Kaduna State University (KASU), Federal University of Education Zaria (FUEZ), and Ahmadu Bello University (ABU Zaria).

Borrowing Print Books:

The findings show that **68.2%** of respondents engage in borrowing print books either always or sometimes. ABU Zaria recorded the highest proportion (70.8%), followed by KASU (66.7%) and FUEZ (62.5%). This suggests that print collections remain relevant despite the increasing adoption of digital resources. Previous studies confirm that print resources are still valued for in-depth study and course-related materials, especially in contexts where digital infrastructure is limited (Fatoki, 2019; Okello-Obura & Kigongo-Bukenya, 2011).

Using E-Resources:

The most frequently reported activity across the three institutions was the use of e-resources, with **81.8%** overall engagement. ABU Zaria recorded the highest percentage (87.5%), while both KASU and FUEZ reported 75.0%. This indicates that e-resources are central to academic work, likely due to their convenience, accessibility, and alignment with research needs. Similar findings have been reported in studies that highlight a growing reliance on electronic resources for scholarly communication (Adeniran, 2013; Dadzie, 2005). The higher rate of e-resource usage at ABU Zaria may be attributed to better ICT infrastructure and greater user awareness compared to the other institutions.

Attending Library Training:

Attendance at library training was moderate, with only **50.0%** of respondents across all institutions reporting participation. This indicates that while training opportunities exist, they are not maximally utilized. Low participation could stem from inadequate publicity, lack of user interest, or training schedules that do not align with students' academic commitments. This aligns with the observations of Baro and Keboh (2012), who found that many Nigerian university students underutilize library training programs due to poor sensitization and perceived irrelevance.

Asking Librarians for Help:

Interaction with librarians was relatively high, with **72.7%** of respondents seeking help always or sometimes. ABU Zaria again recorded the highest figure (83.3%), followed by FUEZ (62.5%) and KASU (58.3%). This underscores the continued relevance of librarians in providing reference services and guiding users in resource discovery. Similar studies (Afolabi, 2017; Nkiko & Yusuf, 2008) confirm that students who frequently consult librarians tend to have better research outcomes, suggesting that the higher engagement levels at ABU Zaria may reflect stronger user-librarian relationships.

Participating in Library Events:
The lowest interaction level was observed in participation at library events, with only **40.9%** of respondents across the three universities. KASU and ABU Zaria recorded 41.7%, while FUEZ reported 37.5%. This trend suggests that library events are not widely prioritized by users. According to Ugah (2007), low participation in library-organized activities often results from inadequate awareness and limited alignment of events with user needs. This highlights the need for libraries to design more user-centered and engaging events.

Overall Trends:
The overall findings indicate that users interact most with academic-related services (e-resources, print borrowing, and librarian consultation) while showing less interest in developmental services (training and events). ABU Zaria consistently recorded higher engagement across activities, which may reflect stronger library systems, better infrastructure, or higher awareness campaigns. This pattern aligns with global trends where e-resources and reference services remain highly used, while community-driven activities often record lower engagement (Thanuskodi, 2012).

Objective 2: potential of Gamification feature to foster user engagement with library services.
The study examines the potential of gramification features to foster user engagement with the library service. The results are presented in the table below.

Gamification Feature	KASU (n=12)	FUEZ (n=8)	ABU Zaria (n=24)	Total (N=44)
Badges/points (Useful/Very useful)	9 (75.0%)	6 (75.0%)	19 (79.2%)	34 (77.3%)
Leaderboards (Useful/Very useful)	8 (66.7%)	5 (2.5%)	19 (79.2%)	32 (72.7%)
Rewards (certificates/prizes) (Useful/Very useful)	10 (83.3%)	6 (75.0%)	18 (75.0%)	34 (77.3%)
Quests/scavenger hunts (Useful/Very useful)	8 (66.7%)	5 (62.5%)	21 (87.5%)	34 (77.3%)

Discussion of Finding of objective two
The results from the three institutions (KASU, FUEZ, and ABU Zaria) show a generally high level of acceptance and perceived usefulness of gamification features among respondents.

1. **Badges/Points.**
   The majority of respondents across all institutions rated badges and points as *useful or very useful*. KASU (75%), FUEZ (75%), and ABU Zaria (79.2%) show very similar levels of acceptance, with ABU Zaria slightly higher. This indicates that learners value recognition and progress tracking through visual indicators, aligning with literature that suggests points and badges improve engagement and motivation.
2. **Leaderboards**
   Overall, 72.7% of respondents considered leaderboards useful, but the support is less uniform compared to badges.While ABU Zaria (79.2%) showed strong acceptance, KASU (66.7%) and FUEZ (62.5%) recorded slightly lower ratings. This suggests that while competition can be motivating, it may not appeal equally to all students, as some might feel discouraged by constant comparisons.
3. **Rewards (Certificates/Prizes)**
   Rewards received the strongest support at KASU (83.3%) and were equally appreciated in FUEZ and ABU Zaria (both 75%).With a total of 77.3%, rewards seem to be one of the most effective gamification elements,This aligns with motivational theories (like extrinsic motivation), showing that tangible outcomes such as certificates and prizes significantly encourage participation.
4. **Quests/Scavenger Hunts**
   ABU Zaria respondents rated this feature the highest (87.5%), compared to KASU (66.7%) and FUEZ (62.5%). The overall rating (77.3%) suggests that problem-solving and discovery-based gamification activities are engaging, but their effectiveness may depend on the learning culture or

exposure of students to such interactive approaches.
General Insights

- **High Overall Acceptance:** All four features scored above 70% usefulness, showing that students across institutions are open to gamification in academic or library contexts.
- **Variation Across Institutions:** ABU Zaria consistently recorded the highest ratings, suggesting that students there may be more receptive to competitive and interactive learning strategies.
- **Balance of Motivation:** While extrinsic rewards (certificates/prizes) are highly valued, intrinsic motivators (badges, quests) also play a strong role. This balance is important for sustaining both short-term and long-term engagement.
- **Implication for Practice:** To maximize impact, institutions could adopt a combination of these features—ensuring inclusivity for students motivated by competition, achievement, or tangible rewards.

Objective 3: Scope for Emerging Technologies

The study investigated the scope of emerging technologies in library. The result are presented in the table below

Technology Available	KASU (n=12)	FUEZ (n=8)	ABU Zaria (n=24)	Total (N=44)
Reliable Wi-Fi	7 (58.3%)	5 (62.5%)	16 (66.7%)	28 (63.6%)
Mobile library app	4 (33.3%)	2 (25.0%)	10 (41.7%)	16 (36.4%)
QR codes	3 (25.0%)	2 (25.0%)	7 (29.2%)	12 (27.3%)
RFID/NFC	2 (16.7%)	1 (12.5%)	7 (29.2%)	10 (22.7%)
AR/VR tools	1 (8.3%)	0 (0%)	5 (20.8%)	6 (13.6%)

Discussion of Finding of objective three

The findings regarding the scope for emerging technologies in the participating institutions reveal varying levels of availability and adoption. While basic infrastructure such as Wi-Fi is relatively widespread, more advanced technologies like mobile apps, QR codes, RFID/NFC, and AR/VR tools are still at early stages of implementation.

Reliable Wi-Fi as Foundational Infrastructure

Reliable Wi-Fi emerged as the most available technology, reported by 63.6% of respondents overall, with ABU Zaria recording the highest availability (66.7%), followed by FUEZ (62.5%) and KASU (58.3%). This finding aligns with the view that internet connectivity is the backbone of digital transformation in libraries and higher education (Hernon & Calvert, 2016). Without reliable internet access, the adoption of other emerging technologies becomes severely limited. The relatively moderate percentages, however, suggest that internet infrastructure remains inconsistent, potentially hindering seamless access to e-resources and digital services.

Mobile Library Applications

Only 36.4% of respondents indicated the availability of mobile library applications, with the highest presence at ABU Zaria (41.7%). Mobile apps are increasingly recognized as essential tools for enhancing accessibility, personalization, and user engagement in libraries (Aharony, 2017). Their limited availability in these institutions may reflect financial, technical, or staffing constraints. Yet, given the rising use of smartphones among students, expanding mobile app services presents a strong opportunity for improving library outreach and resource utilization.

QR Codes for Quick Access

The use of QR codes was reported by 27.3% of respondents overall, with fairly uniform results across the three institutions. QR codes provide a simple, low-cost way to connect users with

online resources, catalogs, or digital guides (Walsh, 2010). Their limited adoption suggests that libraries in these institutions may not yet be fully leveraging this technology to bridge physical and digital services. Increased promotion of QR-based tools could improve user convenience, especially in resource discovery.

RFID/NFC for Library Automation

Radio Frequency Identification (RFID) and Near-Field Communication (NFC) technologies were available in only 22.7% of cases, with the highest presence in ABU Zaria (29.2%). RFID is widely recognized for improving efficiency in circulation, inventory management, and security in modern libraries (Boss, 2009). The low adoption rate reflects resource constraints and implementation costs, which are often cited as barriers in developing countries (Akinola & Iyoro, 2017). Nevertheless, RFID holds significant potential for reducing staff workload and improving user self-service options.

AR/VR Tools for Innovative Learning

Augmented Reality (AR) and Virtual Reality (VR) tools had the lowest reported availability (13.6% overall), with limited adoption in ABU Zaria (20.8%) and almost none in KASU and FUEZ. Globally, AR/VR technologies are increasingly used to provide immersive learning experiences and virtual library tours (Liu et al., 2020). Their minimal presence in the surveyed institutions highlights a technological gap but also indicates a future area of growth if infrastructural and financial barriers can be addressed.

Overall Implications

The findings suggest that while foundational technologies like Wi-Fi are moderately available, advanced and innovative tools remain underutilized. This uneven adoption reflects broader challenges of resource allocation, digital infrastructure, and staff capacity within Nigerian higher education institutions. At the same time, it presents opportunities for libraries to gradually adopt cost-effective technologies such as mobile apps and QR codes, while strategically planning for the integration of more advanced systems like RFID and AR/VR.

Objective 4: Pros and Cons of Gamification In Library Services

The study examine pros and cons of gramification in library services. The result are presented in the table below

Statement	KASU Agree (%)	FUEZ Agree (%)	ABU Zaria Agree (%)	Total Agree (%)
Makes services engaging	9 (75.0%)	6 (75.0%)	17 (70.8%)	32 (72.7%)
Motivates use of resources	8 (66.7%)	5 (62.5%)	17 (70.8%)	30 (68.2%)
Statement	KASU Agree (%)	FUEZ Agree (%)	ABU Zaria Agree (%)	Total Agree (%)
May increase competition anxiety	6 (50.0%)	3 (37.5%)	9 (37.5%)	18 (40.9%)
Some users excluded (digital divide)	6 (50.0%)	3 (37.5%)	11 (45.8%)	20 (45.5%)
May increase staff workload	5 (41.7%)	2 (25.0%)	7 (29.2%)	14 (31.8%)

Discussion of Finding objective four

The findings on the perceived pros and cons of gamification reveal both positive and negative implications for its adoption in academic and library services. While students generally acknowledged the potential of gamification to make services more engaging and to motivate resource use, they also expressed concerns about possible challenges such as competition anxiety, exclusion, and increased staff workload.

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Pros of Gamification

1. **Engagement**
   A significant majority of respondents (72.7% overall) agreed that gamification makes services more engaging, with strong support from KASU and FUEZ students (75% each) and slightly lower agreement from ABU Zaria (70.8%). This finding is consistent with gamification literature which emphasizes that game elements such as rewards, badges, and quests increase interactivity and enjoyment (Deterding et al., 2011). By making learning activities feel less routine and more interactive, gamification can foster sustained participation.

2. **Motivation to Use Resources**
   About 68.2% of respondents agreed that gamification motivates the use of resources, with relatively uniform responses across institutions (6

Cons of Gamification

1. **Competition Anxiety**
   About 40.9% of respondents agreed that gamification may increase competition-related anxiety. KASU students expressed the highest concern (50%), compared to 37.5% each at FUEZ and ABU Zaria. This aligns with **Social Comparison Theory (Festinger, 1954)**, which suggests that not all individuals thrive in competitive environments. While leaderboards and competitive tasks can motivate high performers, they may discourage or stress students who consistently perform lower, leading to disengagement (Domínguez et al., 2013).

2. **Exclusion and the Digital Divide**
   Concerns about exclusion were also evident, with 45.5% of respondents overall acknowledging that gamification may leave out some users, particularly those lacking access to digital devices or stable internet connections. This resonates with broader discussions on the **digital divide**, which highlight inequities in access to technology as a barrier to inclusive participation (van Dijk, 2020). The implication here is that while gamification has potential benefits, it may inadvertently reinforce existing inequalities if not carefully implemented.

3. **Increased Staff Workload**
   Finally, 31.8% of respondents believed that gamification could increase staff workload, with KASU students expressing the highest concern (41.7%). This concern reflects the reality that implementing and maintaining gamified systems often requires additional training, monitoring, and technical support (Werbach & Hunter, 2012). Without adequate resources, staff may perceive gamification as adding to administrative burdens rather than simplifying services.

Overall Implications Of the finding

The results highlight the dual nature of gamification: while it is widely recognized as a tool for **enhancing engagement and motivation**, its **potential drawbacks** such as exclusion, anxiety, and staff workload must also be acknowledged. This suggests that successful implementation requires a **balanced approach**: one that maximizes positive outcomes while mitigating risks. Ensuring inclusivity, designing features that motivate without undue competition, and providing staff with adequate support are key strategies for sustainable adoption.

Model for Implementation

To ensure a sustainable and inclusive integration of gamification and emerging technologies in Kaduna State academic libraries, a **phased implementation model** is proposed:

1. **Foundation Phase (0–6 months):**
   Focus on strengthening the technological infrastructure, particularly through the improvement of reliable Wi-Fi services. During this stage, libraries can also pilot simple gamification features, such as a points system, to introduce students to the concept in a low-stakes environment.
2. **Pilot Phase (6–12 months):**
   Expand the initiative by incorporating rewards such as badges and certificates, particularly in KASU and FUEZ. ABU Zaria, with its relatively stronger adoption of emerging tools, may serve as a testbed for broader experimental trials, providing insights that can guide other institutions.
3. **Expansion Phase (1–2 years):**
   Broaden the scope of gamification by introducing competitive elements such as leaderboards, alongside the deployment of mobile library applications. This phase emphasizes both user engagement and accessibility, ensuring that gamified services become integrated into everyday academic practices.
4. **Advanced Phase (2+ years):**
   At this stage, libraries can integrate more sophisticated technologies such as RFID/NFC systems for automation, alongside experimental adoption of AR/VR tools to deliver immersive literacy games and interactive learning experiences. This phase positions libraries as innovative learning hubs equipped for future digital transformation.

A Summary of the Findings Related to all the objectives

KASU and FUEZ show moderate interaction, while ABU Zaria demonstrates slightly higher engagement and better infrastructure. Gamification is widely supported across all three universities, especially rewards and badges. However, technology readiness remains limited beyond Wi-Fi.
Concerns about digital divide and competition pressure exist, but overall advantages are stronger. A phased adoption model is most practical given current conditions.

CONCLUSION

This study examined the potential of gamification and emerging technologies in Kaduna State academic libraries. Findings revealed that while current levels of engagement with library services are moderate, gamification offers strong potential to enhance motivation, participation, and resource utilization among students. Features such as badges, points, certificates, and quests were widely accepted as useful, whereas leaderboards and rewards revealed mixed responses, highlighting the need for balanced implementation.
However, infrastructural challenges—particularly limited Wi-Fi access and low adoption of mobile apps, QR codes, RFID, and AR/VR tools—pose barriers to large-scale adoption. These findings underscore the importance of a gradual, inclusive, and context-sensitive approach. A phased model was therefore proposed, beginning with foundational improvements in infrastructure and simple gamification methods, and progressing toward advanced technologies as capacity strengthens. Such a strategy ensures both sustainability and equity across institutions.

RECOMMENDATIONS

1. **Strengthen Digital Infrastructure:** Improve Wi-Fi connectivity and ensure reliable internet access across all institutions as a prerequisite for successful gamification.
2. **Start Simple:** Introduce low-cost gamification features such as badges, points, and

certificates to build acceptance and minimize risks.
3. **Pilot Implementation:** Use ABU Zaria as a lead institution for piloting broader gamification trials before extending to other campuses.
4. **Ensure Inclusivity:** Provide low-tech or offline alternatives for students who lack smartphones or reliable internet access, thereby minimizing the digital divide.
5. **Capacity Building:** Train ICT staff and librarians in the use and management of gamification tools to reduce workload concerns and ensure sustainability.
6. **Gradual Expansion:** Progressively adopt advanced technologies such as mobile apps, RFID/NFC systems, and AR/VR literacy tools as infrastructure and resources improve.
7. **Monitoring and Evaluation:** Establish mechanisms for continuous assessment of gamification's impact on student engagement, learning outcomes, and staff workload.

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