

Building Academic Integrity and Scholarly Reputation: An Emphasis on Institutional Repositories

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Abstract

The importance of institutional repositories in upholding academic integrity has been explored in this study to bridge the gap between intellectual content and ethical conduct in the pursuit of scholarly reputation by major Nigerian universities. Through a case-based methodology, an i-Repo architecture abstracting institutional repository services was proposed with mechanisms that deter academic misconduct and promote a culture of originality in academic content, using the University of Benin as a case study. The study evaluation established core repository and integrity services via a semi-automated quality assurance tool – TestRail. The results and findings showed that the projected i-Repo solution demonstrated an efficiency rate of 91% for digital repository services of preserving academic content (thesis, dissertations, articles, and scholarly communications), with implications that it also serves as a deterrent to plagiarism and a tool for the credibility and integrity of scholarly reputation.

Keywords: *Academic integrity, Intellectual outputs, Similarity checker, Institutional repository, Scholarly reputation.*

1. INTRODUCTION

The notion of academic integrity has been well-established, as several studies highlight its significance in the maintainability of academic works with specific markings to quality, originality, and credibility (Coric, 2023). Within the educational landscape, the importance of this notion plots academic integrity as the cornerstone of scholarly pursuit, ensuring that the creation of knowledge and

its dissemination remains ethical and credible (Jamieson and Howard, 2019; Loban et al., 2023; Orim and Awala-Ale, 2023).

In specific bookmarks to academic thesis and dissertations, the relationship between their preservation and integrity is nonsymbiotic (Jamieson and Howard, 2019) for students and faculties in some Nigerian universities (Solmon, 2018). Nigeria, being the most populous country in Africa, shares the continent's challenges and opportunities concerning knowledge generation and dissemination (Alhaji, 2007; AL Salmi, 2008; Ezema and Ugwu, 2013). Despite being home to a vibrant academic community, it has been reported that Nigerian universities' theses and dissertations encounter difficulties in gaining widespread recognition beyond the national borders, due to a lack of adequate methods of preservation and dissemination (Ezema and Ugwu, 2013; Cox, 2018). Highlighting the obvious, Eromosele et al. (2022) pinpointed that, most Nigerian universities (tertiary institutions) are confronted with a pressing challenge that hinders the integrity of intellectual content preservation, dissemination, and scholarly communication within their walls. At its core, the challenge revolves around a repository that potentially degrades scholarly communications and academic integrity: the cumbersome storage, management, and preservation of an ever-expanding trove of theses, dissertations, and other critical scholarly artifacts (Loan and Shah, 2020; Cramer et al., 2022).

In the ever-evolving landscape of academia, tertiary institutions continue to experience growth and the strain on physical libraries becomes increasingly apparent as they were initially designed to cater to a smaller academic community but now find themselves grappling with the monumental task of accommodating the burgeoning wealth of intellectual output generated by students and faculty (Coric, 2023). This strain compromises the symbiotic relationship between academic works and integrity (Jamieson and Howard, 2019; Loan and Shah, 2020), emphasizing the potential for plagiarism and academic misconduct due to the lack of availability of electronic theses and dissertations (ETDs). A far cry from the digitized method of storing academic outputs – Institutional Repository (IR).

Contemporarily, Institutional Repositories (IRs) have emerged as custodians of academic works, offering a platform for the secure and transparent storage of academic works and scholarly contents (Larezenko et al., 2022). IRs are web-based platforms specifically developed for institutions to properly store and disseminate scholarly outputs such as theses, dissertations, and articles (Njogu and Mutwiri, 2022). Their benefits include increased visibility, preservation of academic research content, and accessibility. With the advent of IRs, institutions can preserve their cherished wealth of scholarly resources and share their intellectual wealth with the world (Saini 2018), establishing and increasing their

academic footprints on the academic landscape. Sadly, in the absence of IRs, the multifaceted challenges encountered by students and researchers in accessing resources or conducting original research of intellectual interests may lure them to resort to unethical practices to meet academic requirements for thesis, dissertations, or publications of scholarly artifacts. This can further amplify the potential for plagiarism since previous works can be copied and redone to avoid the rigours of genuine research (Jamieson and Howard, 2019). Furthermore, it not only undermines the integrity of academic pursuits but also jeopardizes the educational ethos of the institution, where intellectual exchange, research collaboration, and academic integrity can neither thrive nor be fostered (Njogu and Mutwiri, 2022).

IRs have played significant roles in preserving and disseminating intellectual outputs via different dimensions including proper citation, ethical behaviour, and originality (Coric, 2023; Loban et al., 2023). The absence or ineffective use of IRs leaves its stakeholders with challenges that impede the effectual practice of academic integrity. A decade of studies has defined IR (Alhaji, 2007; AL Salmi, 2008; Ezema and Ugwu, 2013; Saini, 2018) but not many could account for its impact in combating plagiarism by providing a verifiable source of original academic work. At its core, the need to ensure the credibility and originality of intellectual content is paramount to prevent plagiarism and increase quality assurance in academic materials or scholarly content. By this motivation, this paper focuses on the impact of IRs in upholding academic integrity within the borders of academia. The trend and challenges associated with the preservation of academic outputs using a target case study were first investigated and subsequently, a proposed IR was evaluated for quality assurance via its functionality and plagiarism features. Lastly, the resultant findings were summarized and reported accordingly.

The rest of the paper is structured into sections as follows: an overview of IRs in Nigeria, from a global perspective is presented in section 1.1. Section 2 captures the methodological approach while the solution, evaluation, and results are documented in Section 3. The paper ends with a concluding remark in Section 4.

1.1 Literary Studies

Academic integrity as a concept is well-established with numerous studies literary emphasizing its impact on intellectual outputs (Wong, 2020; Olusanya et. al., 2021). IRs, on the other hand, complement the credibility of these intellectual properties. Al Mahameed et al. (2021) among several other studies noted that the perpetual dissemination of intellectual properties by institutions through IRs increases and attracts a broader readership and stimulates greater citation of a university's scholarly works, thereby bolstering its reputation as a hub of

intellectual excellence (Oliha and Arthur 2014; Saini, 2018; Henok and Wilson, 2019). Studies have shown different perspectives in describing IR but, not many could associate its significance with original academic work (Alhaji, 2007; AL Salmi, 2008; Ezema and Ugwu, 2013; Saini, 2018).

Saini (2018) described an IR as a digital archive of intellectual properties created by and for the members of an institution, readily available within and outside the institution: that is, it could also refer to digital archives created to collect, store, and share scholarly materials generated by an institution that can be openly accessed by the public (Balutkina and Stukalova, 2022). In differentiating an Institutional Repository from a Regular Repository, Anene et al. (2020) noted that several key features stand out – including the exclusive archiving of scholarly publications, which represent the proprietary intellectual products of the constituent academic population of an institution; uploaded or submitted content is typically irrevocable unless circumstances involve intellectual property theft. The persistent preservation and accessibility of an institution's digitalized intellectual property are core aspects of an IR, along with the ability to provide open or conditional access to these resources. These distinct features collectively set an IR apart from conventional repositories, serving as specialized platforms tailored to the unique needs of academic institutions (Ezema and Ugwu, 2013; Wong, 2020; Oliha, 2020; Oliha, 2021).

It is crucial to recognize that Nigeria, like other African countries, possesses a wealth of intellectual potential and scholarship that has the potential to make significant contributions to global knowledge and research advancements (Ezema and Ugwu, 2013; Okon et al., 2020; Eromosele et al., 2022). More so, several studies revealed that the utilization of IRs as a means of preserving and disseminating scholarly output remains relatively limited while attributing it as the major challenge that impedes the adoption of ETDs and by extension IR development in Nigeria academic institutions is still relatively in the development and implementation stages (Anene et al., 2020; Olusanya et. al., 2021; Eromosele et al., 2022). As depicted in Figure 1, Olusanya et. al. (2021) corroborated that in Nigeria, most institutions continue to rely on traditional paper-based methods for cataloguing, indexing, abstracting, and disseminating academic and research-related resources. Apparently, scholarly contents are digitally preserved separately by the institution's journal repositories and their integrity is disjointly checked by means of a third-party tool (Turnitin). Sadly, it is not accessible to all.



Figure 1: *Preservation of Academic Theses and Dissertations in some Public Nigeria Universities.*

Revitalizing the ideology of IRs in literary studies as web repositories for universities, insights from Okon et al. (2020) revealed that scholarly publications were the major highlights for preservation to relieve the academic physical libraries from the rigours of management. This notion was also supported by Wong (2020) on the implementation of systems that promote scholarly reputations. In the same vein, Eromosele et al. (2022), further expressed that IR are crucial component in the preservation of academic research and content particularly for Nigerian universities. Beyond the spheres of Nigeria, IR adoption has been noted with great significance for digitizing graduate theses and dissertation projects in universities' physical libraries in countries like Zimbabwe and Kenya (Tapfuma and Hoskins, 2021; Njogu and Mutwiri, 2022). Their assertions further established the claims of Cramer et al. (2022) on IR as the "perpetual motion machine for preserving digital scholarly records". While some of these insights identified in reviewed studies have served their purpose in the past, they face significant challenges in meeting the integrity demands of researchers in the digital age. Thus, investigating the relationship between academic integrity and IR presents significant insights regarding the adoption and utilization of IRs towards increased preservability and visibility of an institution's academic outputs. These insights served as foundational basics for piloting this study. The next section presents the methodology adopted in achieving the milestones defined initially.

2. MATERIALS AND METHOD

2.1 Research Methodology

The study utilized a case-based methodological approach that systematically identifies a case study associated with the target domain (Wong, 2020; Tapfuma and Hoskins, 2021; Njogu and Mutwiri, 2022). To begin with, a domain of interest was identified via document analysis to gain the required knowledge for the trends, challenges, and directions toward building an effective IR for tertiary institutions in Nigeria. An IR for the case study is then proposed, modelled, designed, implemented, and evaluated to expose the relationship between intellectual artifacts and academic integrity in an academic setting.

2.2 The Proposed IR (i-Repo) System

A public university - the prestigious University of Benin with two campuses and fifteen faculties offering undergraduate and postgraduate degree programmes, was selected as the case study, on the ground that: 1) academic misconduct looms large; 2) thesis and dissertations in this university are shelved manually in most scenarios as depicted in Figure 1. Investigating the target case study revealed that in the absence of IRs, the preservation of academic theses and dissertations faces a significant hurdle due to the constrained storage mechanisms and highlighted the vulnerability of these documents to theft, mutilation, and speedy deterioration; access for scholarly contents are limited to very few individuals and the dissemination of these intellectual outputs lacks global visibility; and finally, the lack of traceability inherent in paper-based systems compounds the difficulty in detecting instances of intellectual property theft and pilferage. These challenge constructs have instrumentally factored the proposal of an IR for preservation and integrity services. Depicting a cohesive and dynamic blueprint of the i-Repo system architecture, Figure 2 is a black-box representation of the proposed IR architecture orchestrated as a collection of services.

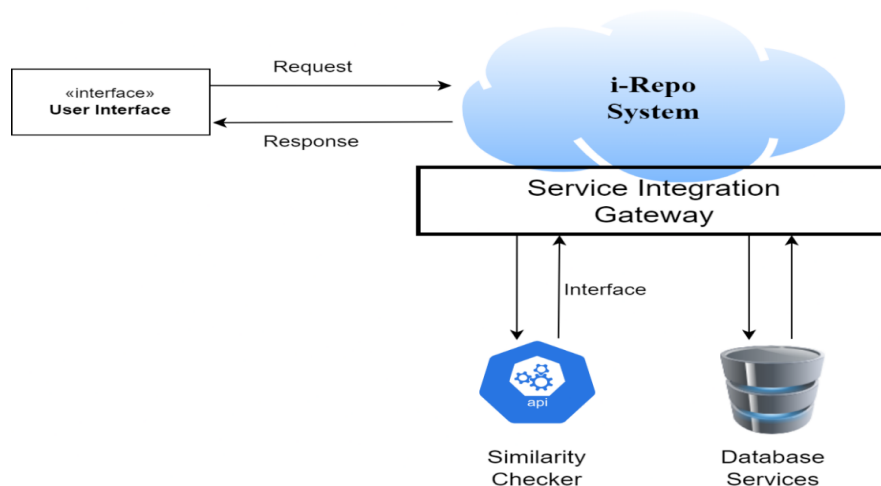


Figure 2: *The proposed system architecture for IR. – i-Repo.*

The i-Repo system architecture is meticulously orchestrated to provide a structured and organized platform for digital preservation, showcasing, and access to academic outputs. At its core, the architecture is composed of three main components: the Frontend Interface, the Backend Infrastructure, and the Database Management System. Its interactivity feature provides users with a frontend interface to browse, search, and access scholarly documents. The frontend interface communicates with the backend infrastructure through RESTful webservices, serving as a gateway, that encapsulates communication channels within well-defined interfaces between the frontend and the backend (Larezenko et al., 2022). It triggers data retrieval, processing, and authentication processes. The Backend Infrastructure interacts with the database services, storing or fetching requested documents and metadata based on user queries. It showcases inherent modularity and scalability traits, resembling the characteristics of objects within an object-oriented system. Each encapsulated module operates as a distinct method within the class, enabling independent development, deployment, and maintenance that oversee crucial functionalities such as user authentication, document management, access control, and interactions with the database. As a direct consequence of the components' orchestration and functionality mappings, the resultant operational i-Repo (IR) system was implemented with a live home screen captured in Figure 3.

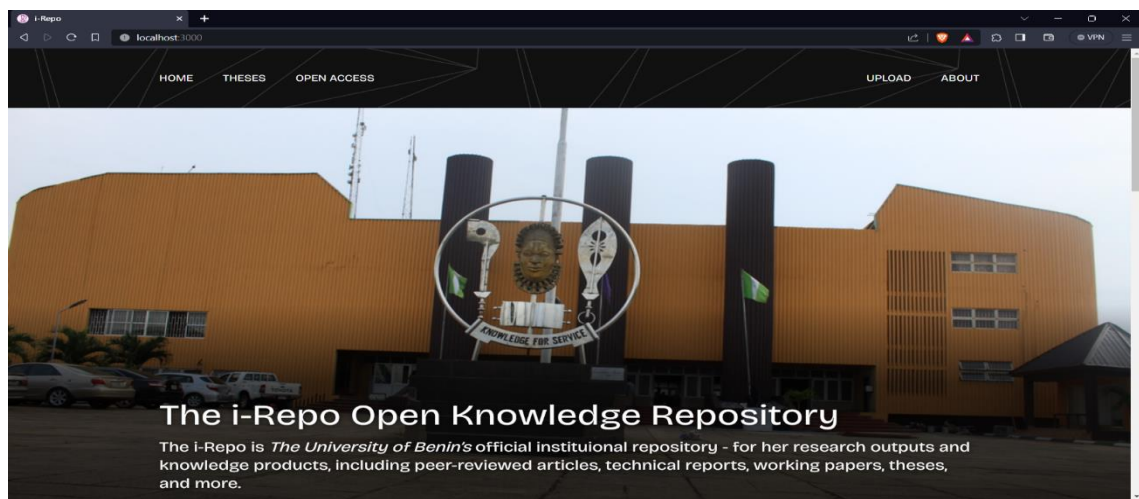


Figure 3: *Homepage Interface*

Figure 3 represents an instance (homepage interface) of the implemented IR (i-Repo) system for the target study. The user interface is an instance of embodied object-oriented design principles through modular components that encapsulate specific functionalities. Leveraging responsive design techniques, the interface adapts seamlessly to varying screen sizes, promoting user-friendliness across devices, and operating systems, and ensuring accessibility and portability across diverse environments. Consequently, to ascertain the quality (to guarantee

whether the implemented functionalities work as defined in actual principles and real academic environments), the orchestration of important functionalities and services was abstracted as a mind-map design for quality assurance: projecting software components with a focus on some specific aspects for evaluation.

2.3 Evaluation

Evaluation was an integral phase in the realization of the i-Repo solution, encompassing a testing process that rigorously scrutinizes the system's design, functionality, and alignment with user expectations to ensure that metrics like code quality, testing methods, usability constructs, and performance indicators are evaluated for overall quality (González-Sanabria et al., 2022; Liu et al., 2022; Oliha and Idehen, 2023). More so, the role of quality assurance for system evaluation is undeniable and hence, test measures must be designed in accordance with the standards set by the IEEE 829 benchmark for evaluation (Jovanovikj et al., 2018; Bozic and Wotawa, 2019; Tytska, 2019; Bartley and Daiker, 2022; Leloudas, 2023). Keying into this, the evaluation of the resultant i-Repo system involved the functionality and academic integrity (plagiarism service) construct. The study adopts the test case management approach where a test plan with several test cases is designed to simulate real user experiences with expected and actual outcomes (Tytska, 2019). The TestRail – a semi-automated test case management tool was selected for quality evaluation due to its efficient support for automated planning and test case orchestration (Bozic and Wotawa, 2019).

2.3.1 Test Strategy

1. **Scope:** The evaluation scope is limited to the functionalities associated with user account management, as well as configurations tailored for students and faculty members.
2. **Approach:** The testing approach encompasses the various actions undertaken to reach defined milestones, including the test plan with test cases, executions, and generated reports.
3. **Type:** This study focused on system testing to assess the quality of functionalities, with security and performance testing being excluded from examination.
4. **Tool:** TestRail was selected as the evaluation tool due to its capabilities in semi-automated configuration and assessment support, amongst other tools like JMeter, Cypress, and Jira.
5. **Analysis:** TestRail offers robust reporting features for test executions and results, providing valuable insights that can facilitate informed decision-making regarding quality (Hermann et al., 2020).

2.3.2 Test Suite Configuration

Adopting the test strategy, a total of 33 test modules and 66 test cases were formulated for quality assurance as depicted in Figure 4. The suite contained sections with core features for the i-Repo system configured for the Admin, Students, and Faculty members modules.

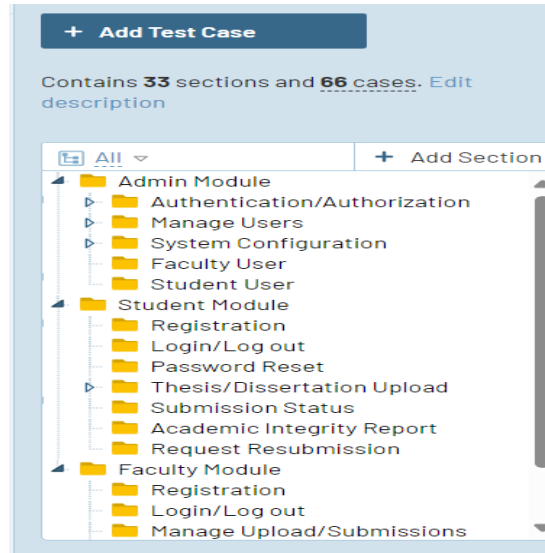


Figure 4: Configuration for Test Plan and Scenarios.

For every test case/scenario, there exists a precondition, steps to take, and the expected outcome after execution as depicted in Figure 5 representing a test case with ID C43. Figure 5. technically displays the complexity rules for password resetting for any registered user of the i-Repo system. A set of precondition constructs is first required, which are the steps or actions to be taken and they are dependent upon to yield the desired or expected output/outcome as seen in Figure 5.

QA for i-Repo

OVERVIEWTO-DO MILESTONES TEST RUNS & RESULTS TEST CASESREPORTS

C43

← →

🖨

✎ Edit

A reset password and link should be prompted after 3 consecutive failed login attempts

Student Module > Password Reset

Successfully updated the test case.

Type	Priority	Status	Assigned To
Other	Medium	Design	None
Estimate	References	Automation Type	
None	None	None	

Preconditions

User must have an account in the i-Repo system
User must have requested for a reset password using the forgot password link
User must have provided an email to reset password
User must have accessed the reset password page from their email

Steps

1. Request for a reset password using the forgot password link on the login page
2. Provide a registered email address
3. Check inbox for a reset password link
4. Click on the reset password link and be redirected to the reset password page
5. Reset your new password and confirm it in accordance with the complexity rules (max length, low and upper characters, etc)

Expected Result

The i-Repo system should decline users from resetting a password that conforms not to the complexity rules.

Figure 5: Test Case Configuration

After the test case configuration, a test run is created for the plan as shown in Figure 6. depicting the expectations of the test execution with reporting metrics such as the number of test cases passed, blocked, retested, and failed.

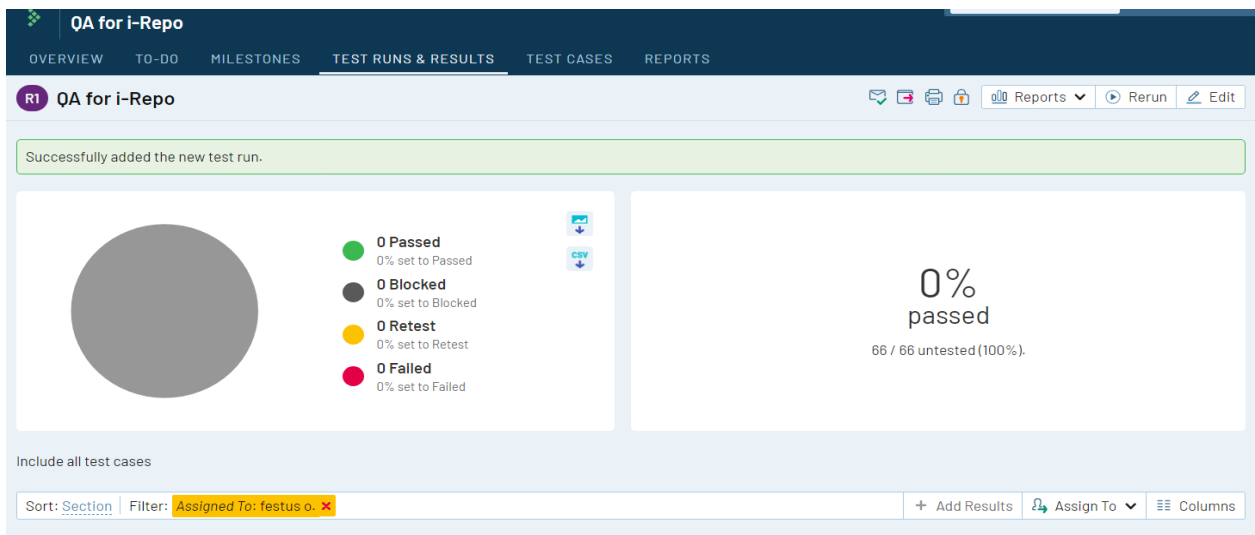


Figure 6: Test Result Interface before Execution.

3. RESULT AND DISCUSSION

3.1 Results

Results of the evaluation are depicted in Figure 7 and Figure 8 respectively, representing snapshots of the test runs at initial and final executions. Figure 7 shows that a total of 56 test cases initially passed the i-Repo evaluation accounting for about 85% overall passed grade. This indicates that a significant percentage of test cases (15%) are yet to meet the quality evaluation criteria. Noting the 2 % blocked test case, 5% retest required, and 9% failed test are indicators for further evaluation of the 15% test cases with defects.

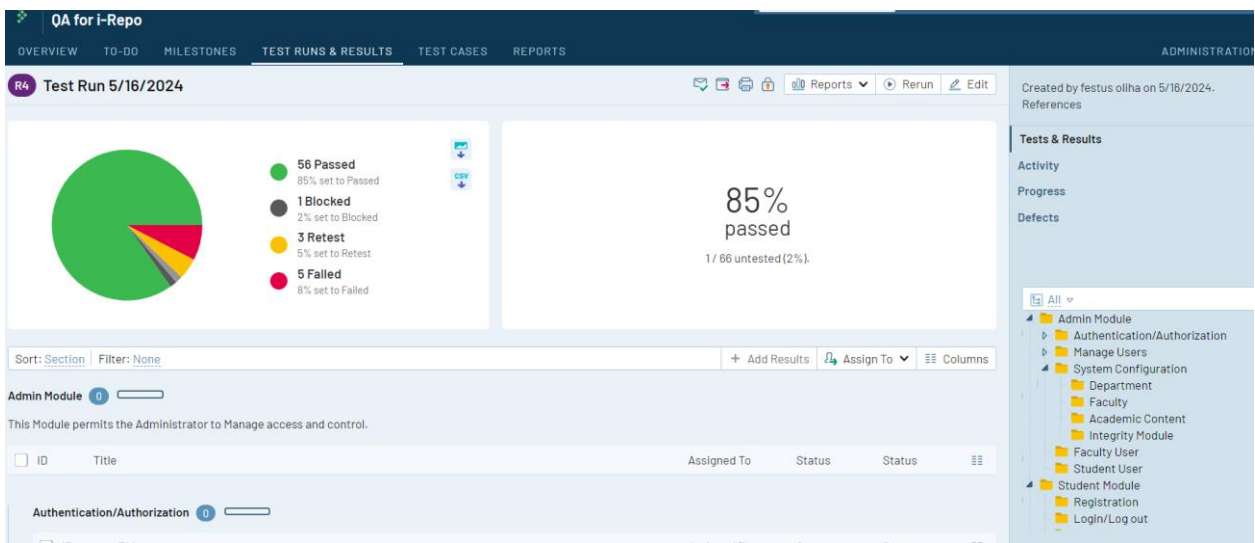


Figure 7: Test Result after First Execution

Subjecting the failed sample cases to further examination revealed the defects and their effects against the pass criteria for quality assurance. Thus, Figure 8 depicts the result of further evaluation of the failed test cases. It was revealed that 91% was accounted for as the overall passed test cases.

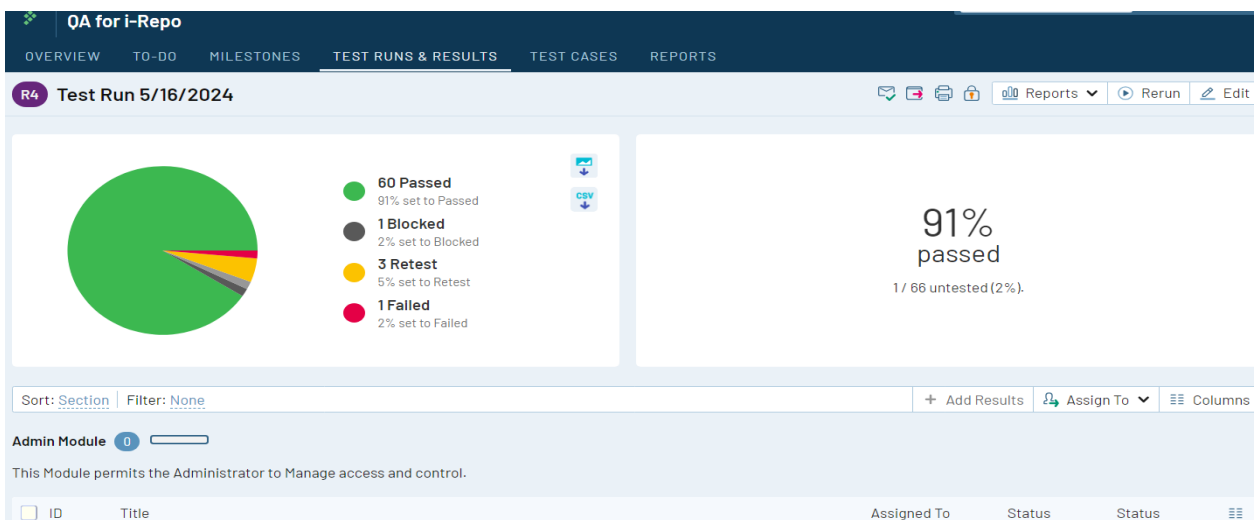


Figure 8: Final Evaluation Result after Issue Tracking

A significant percentage of unaccepted results accounting for 9% of the total test cases was shown for blocked (2%), retested (5%), and failed (2%). This is an indication that no software application is totally free of bugs as highlighted in some other studies (Salzer et al., 2012; Menendez, 2021). On the other hand, Figure 9 shows that the rigor of issue tracking and fixing leaves the resultant system defect-free with 0%, complementing the 91% passed. This is an indication that the i-Repo system meets and exceeds the quality benchmark according to the IEEE standard (Bartley and Daiker, 2022; Leloudas, 2023).

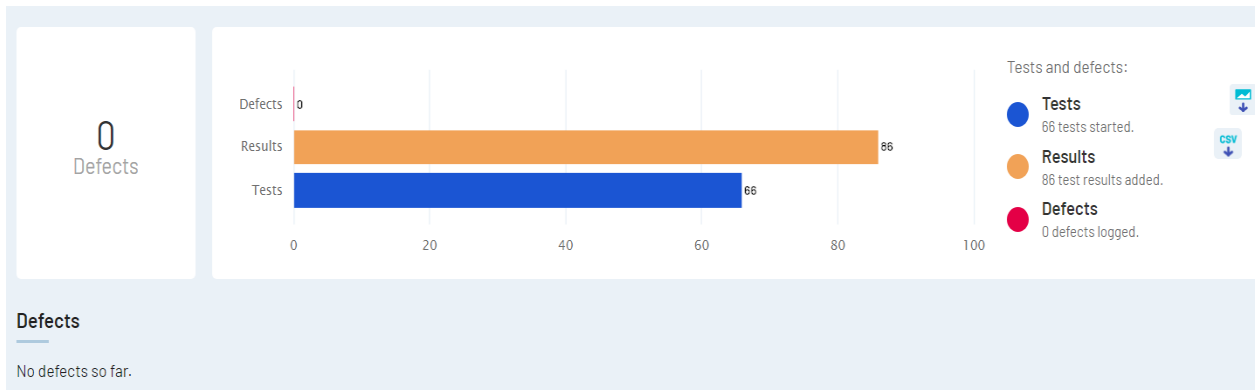


Figure 9: Defect Report

For academic integrity, Figure 10 represents a random snapshot of the similarity index report generated via an integrated API module for the plagiarism checker service. For the submitted thesis, the report indicates a high percentage of plagiarism (43.7%), which exceeds the benchmark of 25% for the system under study. This reinforces the impact of the plagiarism module in upholding the integrity of academic contents via the i-Repo system in deterring the irregularities propagated by physical libraries as noted in Eromosele et al. (2022).

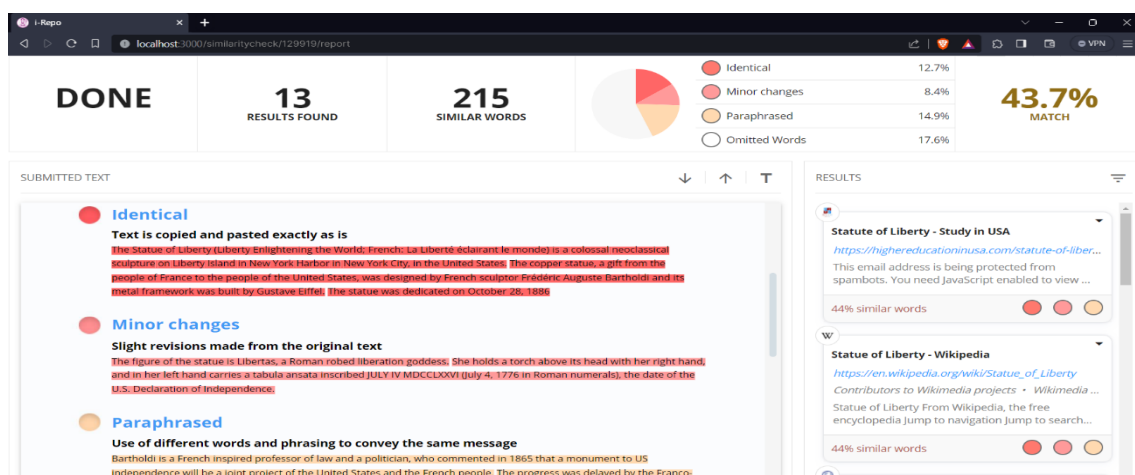


Figure 10: Similarity Report

3.2. Discussion of Results and Findings

The study carried out in this research concentrated on the importance of IR in promoting academic integrity. With the target case study, the milestones were accomplished by proposing, implementing, and evaluating the resulting i-Repo system to guarantee quality assurance in providing IR services that conform to ethical standards at its core. Consequently, the resultant IR system digitizes as an electronic collection of academic materials (thesis, dissertations, and other intellectual contents) and functions as a central platform where academic stakeholders can globally access, retrieve, and interact with a variety of academic materials as stated in Tytska (2019). The assessment findings unveiled various constructs of quality assurance in the usability of the i-Repo for IR services, which are further discussed.

Conventionally, the evaluation explored a test plan that configured test cases with preconditions, steps, and the expected outcome (Figure 5). A total of sixty-six (66) test cases (amassed from 33 test sections) were examined via the execution of test runs to determine the IR system's adherence to established standard quality requirements. The execution report, initially depicted in Figure 6, indicated among other constructs, the metrics of passed, blocked, retested, and failed status cases. Figure 7, which presented the outcome of the evaluation for the first execution phase, disclosed how well it meets the conventional IR goal with a quality benchmark of 85% passed. It also reported as well as what percentage of the evaluation was blocked (2%), retested (5%), and failed (9%), resulting in a 15% shortfall in optimal efficiency for modern IR services. However, this concern indicated that the projected IR system is 85% efficient in managing repository services for the target case study.

Further investigation was paramount as 15% of cases of the test execution did not meet the expected outcomes. Subjecting these cases to issue tracking and management, it was unveiled that 7% of the failed (9%) scenarios were defects of feedback messages in the JavaScript() method for form validation on unsuccessful authentication inputs. Also, the blocked (2%) test cases were found to be replicas of identical fields, while the retested cases were abortive to further improvements. Thus, findings from further evaluation revealed an improved quality of the i-Repo system from 85% to 91% as represented in Figure 7 and Figure 8. This further indicates that the resultant i-Repo system can guarantee repository services with an assurance of about 91% for the target case study. This finding aligns with the impact of IRs highlighted in related studies (Olusanya et. al., 2021; Eromosele et al., 2022; Njogu and Mutwiri, 2022).

Finalizing the evaluation of the construct of academic integrity, ethical principles were handled by the integration of a plagiarism service with the i-Repo system.

Through the similarity checker (Figure 10), the plagiarism module ensures that the academic contents or outputs conform to academic integrity (proper citations, ethical behaviour, copyrights, transparency, etc.). The assessment, as depicted in Figure 10 implied that the academic content evaluated did not meet the threshold of a 25% similarity index for the system under study and thus, it was rejected for resubmission. The inclusion of the similarity index service demonstrates how it extends beyond the quality standards of a modern IR (increased visibility, digital preservation of scholarly content, accessibility). This finding unearths the efficiency of the i-Repo system in the digital preservation of intellectual outputs while promoting scholarly reputation and deterring academic misconduct. Thus, it has a direct consequence in bridging the gap between IRs and academic integrity, contributing to the claims on scholarly reputations and elitisms in some other studies (Okon et al., 2020; Bashir et al., 2022).

The study highlighted key significances and contributions as follows:

1. the study's findings foster a global reputation for scholarly content with access to digitally preserved theses, dissertations, articles, and other high-quality academic outputs for students, faculty members, and researchers within Nigerian universities.
2. the integration of similarity services with the i-Repo system further enforces the relationship between IRs and academic integrity as frowned upon by Jamieson and Howard (2019).
3. its implication contributes to the production of genuine intellectual content and preservation which indirectly promotes the tenets of academic integrity in Nigerian universities.

While the study's uniqueness sets it apart from other studies in related context (Okon et al., 2020; Tapfuma and Hoskins, 2021; Eromosele et al., 2022; Njogu and Mutwiri, 2022), the impacts of the findings are more realistic within the case study and Nigeria. This limits the study outcomes to Nigeria academia. Further study is paramount to:

1. investigate other aspects of modern IRs like feedback mechanisms, performance, artificial intelligence content detection, and discussion forums within the repository
2. facilitate collaborative scholarly reputation and networking opportunities via the IR solution to create a cross-border academic community.

4. CONCLUSION

The crux of this study was to emphasize the importance of IRs in the preservation of academic and intellectual content towards an effective measure to mitigate

academic misconduct associated with building a reputable scholarly image within Nigerian academia. Milestones were established to achieve this goal including the implementation of an i-Repo architecture for the prestigious University of Benin. The study's evaluation for quality assurance in IR services revealed that the resultant i-Repo system is by extension, beyond simplifying the procedures for creating, uploading, organizing, and retrieving scholarly works; it also integrates robust originality services to coerce academic integrity. With the findings' implication, it is safe to aver that the scholarly reputation of academic institutions is set to expand significantly by the adoption and full implementation of the i-Repo system. The adoption of the IR architecture is encouraged for other academic institutions with tailored services to foster a nationwide network of repositories, promoting a unified approach to preserving academic integrity in Nigeria. However, the future direction is to expand the scope of the resultant IR solution to support democratized access to scholarly content with increased visibility, significantly to the global academic community to foster a culture of integrity in research and education.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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