

## Strategies for implementing library automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria: A review of best practices

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### Abstract

Globally, the implementation of library automation systems in tertiary institutions is a complex process that requires careful planning, resource allocation, and stakeholder engagement. Significant empirical evidence from literature revealed that 90% of academic libraries that successfully implemented library automation systems had a well-defined implementation plan in place, staff training and effective stakeholder engagement accounted for 75% of the critical factors for successful implementation, and agile methodologies helped reduce implementation time by up to 40% and led to higher user satisfaction with library services while involving faculty members, students, and other stakeholders in the decision-making process and communicating the benefits of library automation can lead to increased support and buy-in. Despite these important virtues, numerous investigations have shown a significant library automation gap among tertiary institutions in Nigeria due to insufficient user involvement, inadequate data management practices, incompatible systems and software, inadequate training and support, poor planning and implementation, resistance to change, and insufficient funding among others. This study highlights strategies for implementing Library Automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria. The conceptual framework for implementing library automation in this study is based on four interrelated components: planning, stakeholder engagement, staff, and students training, and ongoing support and maintenance. A narrative review methodology of related research findings from peer-reviewed articles was adopted to provide a useful way to synthesize and summarize the existing literature that revealed significant information on strategies for implementing Library Automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria. Results show that implementation of library automation in tertiary institutions requires careful planning, stakeholder engagement, staff training, and software and hardware support and maintenance. The best practices and statistics discussed in this review article suggest that effective implementation strategies can lead to successful automation projects that improve library operations and services.

**Keywords:** Library automation; User satisfaction; Stakeholders; Tertiary institutions; Integrated library systems; Electronic resource management; Circulation efficiency

### 1. Introduction

The implementation of library automation systems in tertiary institutions, especially in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria, has become increasingly necessary in the digital age to enhance library operations and services. Library automation has continued to be an important area of research and practice in the library and information science field, and a trend in the library world over the past few decades, with many libraries adopting

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various types of automated systems to enhance their operations and services, as libraries seek to improve their services and better meet the needs of their users in a rapidly changing technological landscape. Library automation refers to the use of technology to streamline and enhance library processes and services [35], evaluate their features, performance, and user satisfaction [12], identify the key factors that contribute to user satisfaction and implementing of strategies for improving system performance [41]. This can include the use of library management software, self-checkout systems, digital catalogs, online databases, artificial intelligence, machine learning, and data analytics, among other tools [11], and for improving access to information and suggesting strategies for overcoming barriers to implementation [5], [7]and, [37].

A study by [25] found that library automation led to a 50% reduction in the time spent on routine tasks such as shelving and circulation, allowing librarians to focus on more complex tasks such as research and outreach. Another study by [32] found that library automation led to a 70% increase in user satisfaction with library services, particularly in areas such as ease of access to library resources and speed of service, while 90% of academic libraries that successfully implemented library automation systems had a well-defined implementation plan in place [19], and [34] The use of project management methodologies, such as Agile or Scrum, has been found to help ensure the success of library automation implementation in tertiary institutions [43], while staff training contributed about 75% of the critical factor for successful implementation of library automation [19], and[34] Staff training should include training on the specific automation system being implemented, as well as training on how to use the system effectively and efficiently [4]. Library automation also involves the use of various technologies and software to manage and automate library functions, such as circulation, cataloging, and resource management. However, the implementation of library automation systems in tertiary institutions is a complex process that requires careful planning, resource allocation, and stakeholder engagement. In addition to effective planning, engagement of stakeholders, including the involvement of faculty members, students, and other stakeholders in the decision-making process and communication the benefits of library automation to increased support and buy-in, is also crucial for successful implementation [29].

However, despite these laudable and important virtues, numerous investigations have shown significant library automation, especially among tertiary institutions in Nigeria has failed due to insufficient user involvement (lack of involvement of library staff and end-users) in the automation process, leading to a system that does not meet their needs, resulting in poor adoption and dissatisfaction [13]. Other reasons why library automation fails included, among others inadequate data management practices resulting in incorrect or incomplete search results and system errors, leading to user frustration and loss of trust in the system [39] incompatible systems and software resulting in poor system performance, system crashes, and errors that can impact the overall user experience [22], insufficient training and support for library staff leading to frustration and low productivity, and resulting in poor system adoption and dissatisfaction among users [32] and inadequate or lack of funding resulting in incomplete system implementation, insufficient support and maintenance, and inadequate hardware and software upgrades, which negatively impact system performance and user satisfaction [17].

This study provides a useful way to synthesize and summarize the existing literature that revealed significant information on strategies for implementing Library Automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria with the aim of addressing these gaps in library automation projects to ensure their success and user satisfaction.

### *Objectives of the Study*

The objectives of implementing library automation in tertiary institutions are focused on improving the library's operations and services to better support the institution's mission and goals. By achieving these objectives, the institution can enhance the quality of teaching, learning, and research outcomes for its community. These objectives include

- To assess the current state of the library and identify areas for improvement.
- To develop a roadmap for implementing library automation systems that aligns with the institution's strategic goals and objectives.
- To engage stakeholders, including faculty, students, library staff, and administrators, in the decision-making process and communicate the benefits of automation.
- To provide staff training on how to use the automation system effectively and efficiently.
- To establish ongoing support and maintenance for the automation system to ensure long-term success.
- To evaluate the effectiveness of the automation system in achieving the institution's goals and objectives and make adjustments as needed.

### *Significance of the Study*

This study on Strategies for Implementing Library Automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria is significant for several reasons. First, it provides insights into the challenges faced by academic libraries in adopting automation technologies and the strategies that can be used to overcome these challenges. Second, the study highlights the benefits of library automation in terms of improved efficiency, reduced costs, and increased user satisfaction. Recent studies, such as those by [25], [32] and [13], have demonstrated the positive impact of library automation on various aspects of library services. Third, the study emphasizes the importance of effective project management, stakeholder engagement, and communication in ensuring the successful implementation of library automation systems. Studies by [43] and [29] have shown that involving stakeholders and using project management methodologies can lead to increased support and successful implementation.

Overall, this study is significant as it provides valuable insights into the best practices for implementing library automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria, and the benefits that can be realized. The study can serve as a guide for academic libraries that are considering or planning to implement library automation systems. The significance of this study lies in its potential to provide insights and guidance to tertiary institutions seeking to implement library automation systems. The strategies and best practices outlined in the literature review can serve as a roadmap for institutions looking to streamline their library operations and enhance the services they offer to their users. By implementing library automation systems in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria, the institution can improve the efficiency and effectiveness of its library operations, leading to increased user satisfaction and improved outcomes for students, faculty, and researchers. Library automation systems can help institutions provide better access to information resources, streamline circulation and interlibrary loan processes, and improve collection management and assessment.

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## **2. Conceptual Framework**

The conceptual framework for implementing library automation in tertiary institutions is based on the best practices and strategies identified in recent studies. The framework serves as a guide for institutions seeking to streamline their library operations and improve the services they offer to their users. By following the framework, institutions can ensure the successful implementation and maintenance of library automation systems, leading to improved outcomes for students, faculty, and researchers. The conceptual framework for implementing library automation in tertiary institutions consists of several key components, including:

### **2.1. Planning and preparation**

This stage involves identifying the needs and goals of the institution, evaluating the available resources, and developing a comprehensive plan for implementing library automation. According to the study by [33], factors such as perceived usefulness, ease of use, and system quality are critical to user adoption of library automation systems in tertiary institutions. System selection: This stage involves identifying and selecting the appropriate library automation system that meets the needs of the institution and aligns with the established goals.

#### *2.1.1. Implementation*

This stage involves the actual deployment of the library automation system, including installation, configuration, and testing. [17], proposes a cost-benefit analysis model for the implementation of library automation systems in tertiary institutions, highlighting the importance of considering the financial implications of such systems.

#### *2.1.2. Training*

This stage involves providing comprehensive training to all relevant stakeholders, including librarians, staff, and users. [22], propose a service-oriented architecture based on RESTful API to enhance the interoperability of various library systems in tertiary institutions.

#### *2.1.3. Maintenance and support*

This stage involves ongoing maintenance and support of the library automation system to ensure optimal performance and user satisfaction. [39], propose a big data quality management framework for library automation systems, emphasizing the importance of data quality in ensuring optimal system performance. [13], found that end-user satisfaction is a critical factor in the success of library automation system implementation in Portuguese academic libraries.

### 3. Literature Review

The implementation of library automation systems in tertiary institutions requires careful planning, stakeholder engagement, the use of project management methodologies, training and capacity building, and a cost-benefit analysis. These strategies can help to ensure the successful adoption of the automation system and improve the user experience for students, faculty members, and librarians. It is important for tertiary institutions to consider these strategies when implementing library automation systems to ensure that the benefits of the system are fully realized. The use of library automation systems in tertiary institutions has become increasingly popular in recent years. This is due to the numerous benefits that come with the adoption of such systems, such as improved access to information, enhanced service delivery, and increased efficiency in library operations. However, the successful implementation of library automation systems requires careful planning and execution. This literature review aims to examine the current state of knowledge on strategies for implementing library automation systems in tertiary institutions. The use of library automation systems in tertiary institutions has become increasingly popular in recent years. This is due to the numerous benefits that come with the adoption of such systems, such as improved access to information, enhanced service delivery, and increased efficiency in library operations. However, the successful implementation of library automation systems requires careful planning and execution. This literature review aims to examine the current state of knowledge on strategies for implementing library automation systems in tertiary institutions. Key themes in the literature is the importance of having a well-defined implementation plan in place [19], stakeholder engagement such as involving faculty members, students, and other stakeholders in the decision-making process and communicating the benefits of library automation can lead to increased support and buy-in. [29], regular communication and consultation, as well as providing opportunities for feedback and input, project management methodologies as a crucial role in the implementation process [43], and interoperability between different library systems [22].

#### 3.1. Strategies for Implementing Library Automation

Developing a comprehensive well-defined implementation plan is essential for the successful adoption of library automation systems in tertiary institutions [19] and [37]. The plan should clearly outline the goals and objectives of the automation project, the scope of the project, the timeline for implementation, and the resources required for the project. This plan should be developed in collaboration with all stakeholders, including librarians, faculty members, students, and IT personnel. Also, stakeholder engagement comprises faculty members, students, and other stakeholders in the decision-making process and communicating the benefits of library automation to increase support and buy-in [29]. The use of Project management methodologies, according to [44] was found to ensure the success of library automation implementation in tertiary institutions. These methodologies provide a structured approach to project management, which can help to manage resources effectively, identify and address issues in a timely manner, and ensure that the project is delivered on time and within budget. Another strategy is training and capacity building for the successful adoption of library automation systems in tertiary institutions [33] This involves providing training to librarians, faculty members, and students on how to use the automation system and its features effectively. This can help to improve the user experience and ensure that the benefits of the automation system are fully realized. Also Cost-benefit analysis, according to [17] is a required strategy to determine the feasibility of implementing library automation systems in tertiary institutions. This involves evaluating the costs associated with implementing the system against the benefits that are expected to be realized. This can help to determine whether the implementation of the system is financially viable and whether it will provide a return on investment.

#### 3.2. System Component and Configurations

System Components for Library automation systems for tertiary institutions typically consist of several components, including Integrated Library System (ILS) that manages the library's collection, circulation, cataloging, and acquisitions functions. [38], the discovery Layer which provides a user-friendly interface for searching and accessing the library's resources, and can also provide advanced search options, faceted search, and relevancy ranking [40]. Other components are the Electronic Resource Management (ERM) System which manages the library's electronic resources, including subscriptions, licenses, and access rights. [30], the Digital Asset Management (DAM) System, a component that takes care of the library's digital assets, including photographs, videos, and audio recordings. [10], and the Analytics and Assessment Tools that provide data analysis and assessment tools to help the library evaluate the effectiveness of its collections and services [31]. The configuration of library automation systems for tertiary institutions varies depending on the specific needs and requirements of the institution. However, some common configurations include Standalone Systems where each system component is installed and maintained separately. This configuration is suitable for small libraries or institutions with limited budgets [23]. Cloud-Based Systems is a system configuration where the library automation system is hosted on a cloud server, and users access it through a web browser. This configuration provides the benefits of scalability, flexibility, and reduced maintenance costs. [10]. The Integrated Systems configuration or multiple system components is integrated into a single platform and provides the benefits of improved workflow and

streamlined operations. [30] The Hybrid System is a combination of on-premise and cloud-based systems that provides the benefits of both standalone and cloud-based systems, including control, security, and flexibility [40]. The choice of system configuration will depend on factors such as the institution's budget, staff resources, IT infrastructure, and user needs. Regardless of the configuration, the library automation system should be designed to meet the specific needs of the institution and provide efficient and effective library services.

### **3.3. Systems Analysis and Design for System Components and system configurations**

Systems analysis and design is a crucial aspect of implementing an automated library system in tertiary institutions [2], [28] and [41]. Some key steps adopted in the systems analysis and design process for implementing library automation include Requirements gathering, including the size of the collection, number of users, and available resources, analysis of the existing library system to identify any issues and areas that need improvement, System design based on the requirements and analysis. This includes designing the user interface, database schema, and other system components [3], System implementation by developing the software, hardware, and network infrastructure. Other key steps adopted are System testing to ensure that the new system meets the requirements and is functioning properly, and 6. System maintenance provision, support, and updates as necessary. The hardware and software requirements for implementing an automated library system in tertiary institutions vary depending on the specific needs of the institution [6], [8], [20], [46], and [47]. This study considered the following Hardware requirements: Computer systems (servers, workstations, laptops, and mobile devices), Barcode scanners and/or RFID readers for scanning library materials, Printers for printing receipts, reports, and labels, and Networking equipment (routers, switches, and access points) for connecting all the hardware devices. Software requirements adopted included Library automation software that includes modules for cataloging, circulation, acquisitions, serials, and interlibrary loans, Database management software to manage the library's digital resources, Security software to protect the library's digital assets and network infrastructure, and backup and recovery software to ensure data is safe and can be restored in case of system failure

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## **4. Research Methodology and Data Collection Methods**

The research methodology and data collection methods used for this study on system components and system configurations for implementing library automation were chosen based on the research objectives and questions. The authors combined multiple methods to provide a comprehensive understanding of the library automation system's components and configurations. These methods include Surveys and interviews used to collect data from library staff and users on their experiences with the system components and configurations, administered through the questionnaire in person [24]. Also, interviews were conducted in person or over the phone to collect in-depth information from library staff and users on their experiences with the system components and configurations. [1]. The authors also adopted Case studies [16] where case single or multiple cases of library automation system implementations in tertiary institutions were analyzed to gain insight into the system components and configurations that have been successful and those that have not. We also engaged Focus groups where applicable to collect data from library staff and users on their experiences with the system components and configurations. Focus groups involve bringing together a small group of people to discuss a specific topic [18] and [24].

Also, there were document analyses and narrative reviews of peer-reviewed journals where the authors analyzed documents related to the library automation system, such as reports, manuals, and training materials. According to [27] this method can be used to gain insight into the system components and configurations and how they are used in the institution. A narrative review provides a comprehensive overview of a particular topic, summarizing and synthesizing the existing literature in a narrative format [14] and Thakur et al., 2022). Unlike systematic reviews or meta-analyses, a narrative review does not follow a strict methodology or set of criteria for selecting and analyzing studies [9], [26] and [36]. Data triangulation was implemented in this study. Data triangulation involves using multiple sources or methods to collect data on the same topic, which can increase the validity and reliability of the findings [15] and [21]. Multiple data triangulation methods were adopted to gain a comprehensive understanding of the library automation system's components and configurations, which can help in developing effective strategies for implementing library automation in tertiary institutions.

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## **5. Findings and Strategies for Implementing Library Automation in Anambra State Polytechnic Mgbakwu, Awka North, Nigeria:**

The implementation of library automation systems in tertiary institutions has numerous benefits, including increased efficiency and effectiveness in library operations as shown in sample Figure 1 to figure 4, improved user experience, and enhanced access to information resources.

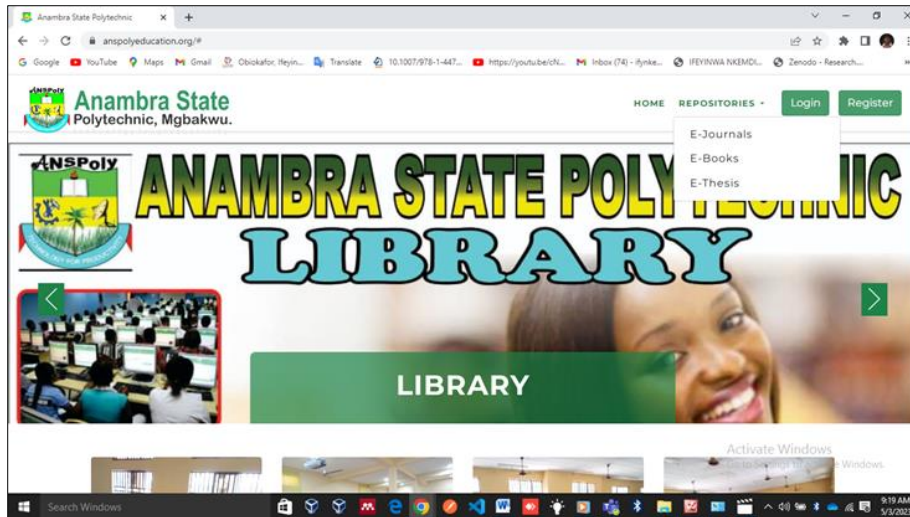


Figure 1 Home Page

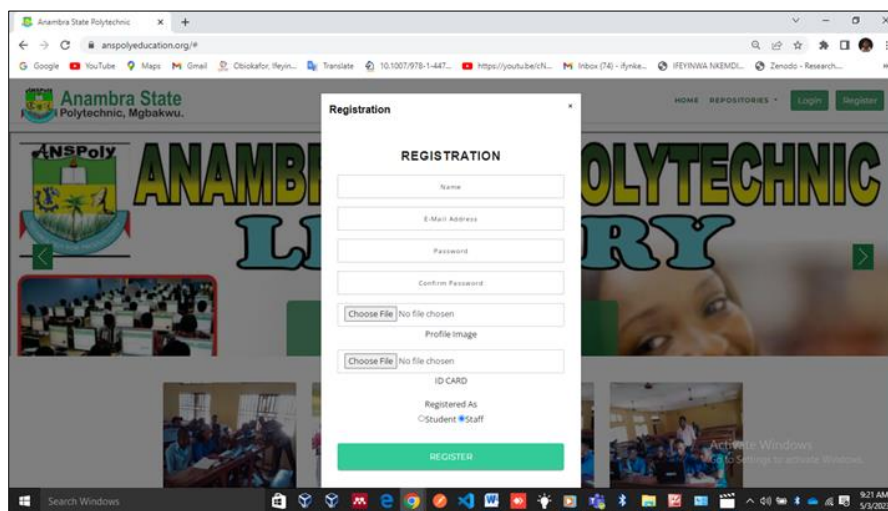


Figure 2 Sign up Registration form for staff and student

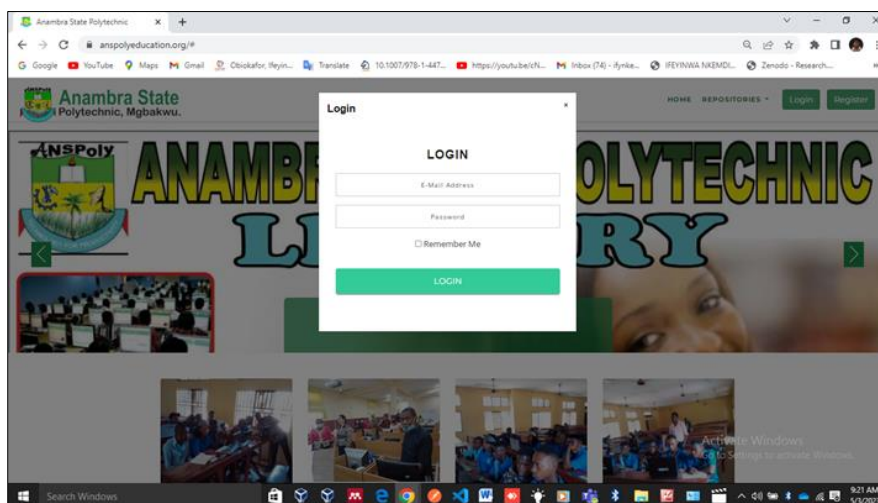
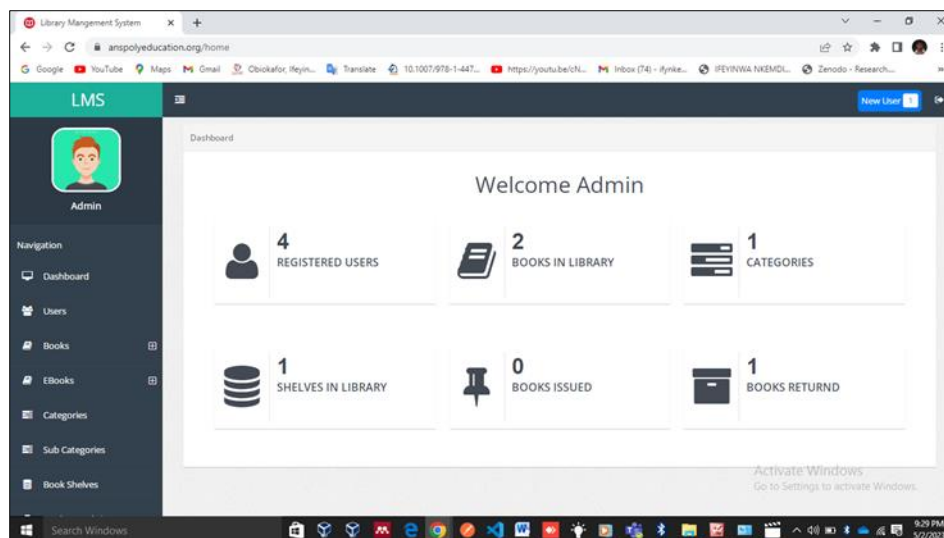


Figure 3 Login Page



**Figure 4** Admin User interface and platform

Our study focused on the system components and configurations that are necessary for the successful implementation of library automation in tertiary institutions. Based on our research, the authors found that the system components that are essential for library automation include hardware, software, networking equipment, and database management systems. In addition, we identified several system configurations that should be considered when implementing library automation, such as user authentication, security measures, and data backup and recovery procedures.

We also discussed the importance of involving stakeholders in the implementation process, including library staff, IT professionals, and end-users. Collaboration and communication between these stakeholders are critical to ensure that the system is tailored to meet the specific needs of the institution and its users. Furthermore, we discussed the importance of selecting the appropriate system management cycle, such as ITIL or COBIT, to ensure the system's ongoing maintenance and improvement.

## 6. Conclusion

In conclusion, our study highlights the importance of system components and configurations for the successful implementation of library automation in tertiary institutions. By focusing on these critical elements, institutions can ensure that their library automation system is efficient, effective, and meets the needs of their users. Moreover, our study emphasizes the importance of involving stakeholders in the implementation process and selecting the appropriate system management cycle to ensure the system's ongoing maintenance and improvement. Overall, implementing library automation systems can bring numerous benefits to tertiary institutions, including improved library operations, enhanced user experience, and increased access to information resources. By considering the system components and configurations discussed in our study, institutions can successfully implement library automation and realize these benefits.

## Compliance with ethical standards

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### *Disclosure of conflict of interest*

There are no conflicts of interest.

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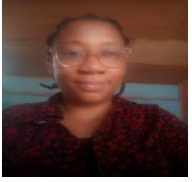

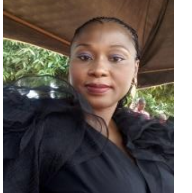
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### Authors short biography

	<p><b>Ifeyinwa Nkemdilim Obiokafor.</b> She is a graduate of Computer Science from Federal Polytechnic Oke and also has PGD and Master's in Computer Science from Nnamdi Azikiwe University Awka. Basically, with over ten years of professional teaching experience in Computer Sciences at the Polytechnic level, and over five years of research experience for numerous projects in the field. Enjoys solving problems and is always on the lookout for new information, one who strives to accomplish development goals despite time constraints by delivering top-notch outcomes. Research Areas include Cybersecurity, Cyber Threat intelligence.</p>
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	<p><b>Ifesinachi Rita Ogarlue,</b> My experience spans oversight function of circulation activities, identifying the needs for particular publication within the institution and departmental Libraries and collecting information on them, recommending materials to help users find information needed. Responsible for identifying the sections in the library that require automation, as well as to ensure correct work flow among the different sections of the Library.</p>