AWARENESS AND ADOPTION OF INFORMATION SECURITY IN THE ERA OF THE DIGITAL INFORMATION ENVIRONMENT: A STUDY OF LIBRARIANS IN COLLEGES OF EDUCATION IN DELTA STATE, NIGERIA

By

[1]Ibeh Raphael Osayande
College of Education, Warri
Email: ibehraphael12@gmail.com
Tel.: 08030909666

[2]Emaro Aghogho Happy
Western Delta University, Oghara
Email: emarohappy474@gmail.com
Tel.: 08147038186

[3]Apkovika Hycent Enakpowoke
College of Education, Warri
Email: akpovikah ycentcoew@gmail.com
Tel.: 07064979249

Abstract

This study investigated librarians' awareness and adoption of information security in the era of the digital information environment in colleges of education in Delta State, Nigeria. The study adopted a descriptive survey research design. The target population comprised all librarians in three colleges of education in Delta State. A total of 39 professional and paraprofessional librarians participated in the study. Data were collected using a structured questionnaire and analyzed using the mean and standard deviation. The findings revealed that electronic information security measures were largely unavailable in the colleges of education studied, while the available manual security measures were not adequately implemented or controlled. The findings further showed that, although librarians possessed some personal knowledge of information security, their knowledge of electronic security operations was limited because of the absence of relevant information and communication technology facilities. The study also revealed that information security awareness had limited influence on the adoption of electronic information security practices in the libraries. The study concluded that the adoption of information security in the digital information environment was low. It recommended that the management of colleges of education libraries should organize regular awareness and training programmes on information and communication technology to equip librarians with the knowledge and skills required to prevent and manage information security breaches.

Keywords: Librarians' awareness, information security, digital environment, college libraries

Introduction

Colleges of education libraries are established to support the teaching, learning, and research needs of students and staff. They perform two complementary roles: supporting teaching and learning, research activities, and the academic curriculum. Colleges of education are educational institutions whose objectives include producing educated and skilled manpower and conducting meaningful research that contributes to societal development.

A college of education library provides a unified programme involving the use of audiovisual, printed, and non-printed information resources to satisfy the educational and recreational needs of students and academic staff. These resources include textbooks, journals, reference books, and multimedia materials, which are systematically organized, stored, and disseminated to users to support and enrich the school curriculum (Umar, 2020).

Oluwabunmi and Ezinwanyi (2022) stated that the exponential growth of information and information-bearing materials has resulted from the continuous expansion of knowledge. This development has increased the need to organize information resources and provide adequate security for them. Libraries serve as media for the development of intellectual capabilities and the promotion of cultural and social integration. However, because of the diverse use of library resources, libraries are vulnerable to various forms of crime and security risks from both users and library staff.

Security is designed to protect information against threats. In the library context, it involves preventing unauthorized access to and removal of library materials, often caused by intruders or theft (Song, 2020). Security may also be understood as the general system of policies, programmes, procedures, and measures adopted to ensure authorized access to resources. Marett and Barnett (2021) defined security as the prevention of adverse consequences resulting from intentional and unwarranted actions by users.

Information security refers to the protection of data and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction (Surwade & Patil, 2019). It also involves protecting information facilities and systems that store, use, and transmit information from a wide range of threats in order to preserve the value of information to an organization (Ngwun et al., 2020).

People are central to the human aspect of information security because of their direct contact with information. Their commitment to safeguarding information assets is usually documented in an information security policy, which plays an important role in information security management (Althogai, 2015). Nicles et al. (2017) described an information security policy as a set of formal procedures, guidelines, roles, and responsibilities that employees are required to follow in order to safeguard and properly use the information and technology resources of their organizations. When library employees become familiar with security policies, information security is more likely to become an established practice, and security breaches can be addressed more effectively.

Infinedo (2014), as cited in Oluwabunmi (2022), described information security as guidelines, requirements, and rules prescribed by an organization to regulate employees' behaviour and improve information security. The digital environment comprises the entire range of computer and network technologies that facilitate the online exchange of information resources across geographical boundaries.

The digital transformation of society has affected almost every area of human endeavour and has resulted in a rapid shift from traditional libraries to digital libraries. Digital libraries are important products of the information age because they offer large storage capacity, fast processing speed, and multimedia integration (Zhijie, 2021). However, the construction, management, and maintenance of digital libraries may be threatened by various security risks. To prevent unauthorized access to library resources, library managers and information professionals must develop strategies for protecting the information resources available in their libraries (Ismail & Zainab, 2020).

Studies have shown that information security awareness influences information security compliance among library personnel in university libraries. However, information security awareness programmes in colleges of education libraries appear to be inadequate. Libraries therefore need to implement information security plans and strategies, supported by appropriate staff awareness programmes. Before staff members can be expected to comply with security measures, they must first understand the need for such measures and how they should be implemented.

Several measures can be used to control information security in libraries. These include physical security measures, closed-circuit television (CCTV), radio-frequency identification (RFID), 3M exit detection systems, network security measures, and user education and

awareness programmes. When these measures are effectively implemented, information security awareness and compliance can be improved. It is against this background that this study investigated librarians' awareness and adoption of information security in the digital information environment in colleges of education in Delta State.

Statement of the Problem

Nigerian libraries face numerous challenges, including inadequate funding, which affects various aspects of library operations, including the security of information resources. Library crime and vandalism are serious and widespread problems in academic libraries. Damage to library materials, buildings, vehicles, equipment, and furniture has been reported. Other problems include theft, mutilation of books, loss of materials, non-return of borrowed books, physical and verbal abuse, misuse of reading materials, excessive borrowing, unauthorized borrowing, inappropriate patron behaviour, misplacement of materials, and other illegal activities. These challenges raise concerns about the effectiveness of information security in college of education libraries. The problem of this study, therefore, is to determine the level of librarians' awareness and adoption of information security in the digital information environment in colleges of education in Delta State.

Objectives of the Study

The main objective of this study was to investigate librarians' awareness and adoption of information security in the digital information environment in colleges of education in Delta State.

Specifically, the study sought to:

1. Identify the information security measures available in colleges of education libraries in Delta State.
2. Determine the level of information security awareness among librarians in colleges of education libraries in Delta State.
3. Determine the influence of information security awareness on the adoption of information security practices among librarians in colleges of education libraries in Delta State.

Research Questions

The following research questions guided the study:

1. What information security measures are available in colleges of education libraries in Delta State?
2. What is the level of information security awareness among librarians in colleges of education libraries in Delta State?
3. What influence does information security awareness have on the adoption of information security practices among librarians in colleges of education libraries in Delta State?

Review of Related Literature

Information security measures in libraries and digital environments must be carefully planned and effectively implemented. Alminded and Martins (2020) noted that properly planned information security awareness programmes and staff training can help reduce information security breaches in libraries. Benedick et al. (2020) suggested measures such as tightening security at library entrances and exits.

Nath and Deka (2020) maintained that library professionals cannot effectively prevent and control information security breaches without suitable security measures, including CCTV, RFID, 3M exit technologies, and compliance with relevant security policies. They further observed that illegal activities in libraries are often encouraged by weak security systems. Library management should therefore intensify efforts to establish and maintain effective security policies.

Yerby and Floyd (2018) argued that effective information security policies cannot be implemented without librarians' awareness and appropriate training programmes addressing policies, procedures, and responsibilities. Physical information security measures can only become effective when librarians are adequately informed and trained. Guimaraes (2021) also emphasized that user education and information security awareness play significant roles in improving the overall level of security in libraries. Adequate

information security training is required to create and strengthen the awareness of library staff.

Manoj and Haneefa (2022) emphasized the need to protect library infrastructure. They observed that many libraries have not fully recognized the importance of protecting their information and communication technology resources and services from misuse, damage, theft, sabotage, and human error. Albrechtsen and Hovdan (2010), as cited in Oluwabunmi and Ezinwanyi (2020), concluded that effective information security compliance depends largely on the level of security awareness created by library management. A digital library environment includes hardware, library management software, computer programmes, electronic databases, and data. Threats to these resources may arise from the failure of security programmes or plans.

The misuse or abuse of digital information through unauthorized access may result in vandalism, shortage, fraud, or theft. Since digital environments operate through specified procedures and technologies, they remain vulnerable to various forms of crime and security risks from users and members of the library community (Nicles et al., 2017). Given the impact of the digital environment on teaching, learning, and research, adequate security is necessary to protect the information resources available in libraries.

Research Design and Methodology

The study adopted a descriptive survey research design. It was conducted in three colleges of education libraries in Delta State:

- College of Education, Warri; Federal College of Education (Technical), Asaba; and Delta State College of Education, Mosogar.

The target population comprised all librarians in the three colleges of education libraries. The total population was 39 librarians, consisting of professional and paraprofessional librarians. Since the population was manageable, the entire population was used for the study.

Data were collected using a structured questionnaire developed by the researchers. The validity and reliability of the instrument were established before administration. The questionnaires were administered to the respondents with the assistance of research assistants in each institution. The data collected were analyzed using the mean and standard deviation. A mean score of 2.50 or above was regarded as agreement, while a mean score below 2.50 was regarded as disagreement.

Presentation and Analysis of Results

Questionnaire Response Rate

Table 1: Questionnaire Response Rate

Number administered	Number returned	Percentage returned
39	36	92.3%

Thirty-nine copies of the questionnaire were administered, while 36 copies, representing 92.3%, were returned and found usable. This response rate was considered adequate for the study.

Gender of Respondents

Table 2: Gender Distribution of Respondents

Gender	Frequency	Percentage
Male	22	61.1%
Female	14	38.9%
Total	**36**	**100%**

Table 2 shows that 22 respondents, representing 61.1%, were male, while 14 respondents, representing 38.9%, were female. This indicates that male librarians constituted the majority of the respondents.

Institution of Respondents

Table 3: Distribution of Respondents by Institution

Institution	Frequency	Percentage
Federal College of Education (Technical), Asaba	14	38.9%
College of Education, Warri	14	38.9%
Delta State College of Education, Mosogar	8	22.2%
Total	**36**	**100%**

Table 3 shows that the Federal College of Education (Technical), Asaba, and the College of Education, Warri, each contributed 14 respondents, representing 38.9% respectively. Delta State College of Education, Mosogar, contributed eight respondents, representing 22.2%. This indicates that the first two institutions had more library personnel than Delta State College of Education, Mosogar.

Research Question One: What information security measures are available in colleges of education libraries in Delta State?

Table 4: Information Security Measures Available

S/N	Information security measure	Mean	SD	Decision
1	Electronic access control	1.58	0.72	Not available
2	Surveillance/CCTV cameras	1.35	0.74	Not available
3	Burglar alarm system	1.41	0.63	Not available
4	Electromagnetic security system	1.11	0.58	Not available
5	Biometric access technology	1.16	0.49	Not available
6	Radio-frequency access control	1.16	0.37	Not available
7	Security locks	3.30	0.65	Available
8	Security personnel	3.40	0.84	Available
9	Window security locks	2.95	0.72	Available
10	Identification cards for authorization	2.59	0.49	Available
11	Visible shelves and monitoring	3.12	0.51	Available
12	Daily records of borrowed and returned books	2.85	0.72	Available

Source: Field Survey, 20205

Table 4 indicates that electronic information security measures, including CCTV cameras, electromagnetic systems, biometric technology, radio-frequency access control, and electronic access control, were generally unavailable in the colleges of education libraries studied.

However, manual security measures such as security locks, security personnel, window locks, identification cards, visible shelf monitoring, and daily records of borrowed and returned books were available. Security personnel recorded the highest mean score among the manual security measures.

Research Question Two: What is the level of information security awareness among librarians in colleges of education libraries in Delta State?

Table 5: Level of Information Security Awareness

S/N	Item	Mean	SD	Decision
1	I raise an alarm when a security breach occurs.	2.59	0.72	High
2	I understand that patience is important when handling security issues.	2.50	0.56	High
3	I understand that teamwork and cooperation are important in security matters.	3.22	0.72	Very high
4	I can detect information security breaches.	2.40	1.10	Low
5	I have limited knowledge of electronic security.	2.25	1.80	Low
6	I possess knowledge of information security awareness.	3.41	0.61	High
7	I understand information security technology.	2.53	0.61	High
8	I understand how to use security software.	2.30	0.98	Low
9	My library operates a CCTV security system.	2.11	1.10	Very low
10	I have knowledge of my library's security guidelines.	2.03	0.73	Very low

Table 5 shows that the respondents had personal knowledge of general information security. They demonstrated high awareness of teamwork, cooperation, and general security responsibilities. However, their awareness of electronic security operations, security software, CCTV systems, and library security guidelines was low or very low. This limited awareness may be associated with the absence of electronic security systems and inadequate ICT facilities in the libraries. Consequently, librarians may be unable to respond effectively to electronic information security threats.

Research Question Three: What influence does information security awareness have on the adoption of information security practices among librarians in colleges of education libraries in Delta State?

Table 6: Influence of Information Security Awareness on Security Practices

S/N	Item	Mean	SD	Decision
1	I ensure that security personnel remain at their duty posts.	2.66	1.81	High
2	I ensure that all library doors are locked.	3.30	1.04	High
3	I provide accurate information about security threats.	2.50	1.06	High
4	I ensure that information resources are safeguarded.	3.21	1.00	High
5	I use library identification cards as clearance for graduating students who borrow books.	2.93	0.73	High
6	I use video surveillance content, such as CCTV recordings.	2.34	1.06	Low
7	I use radio-frequency technology to control information security threats.	2.05	0.80	Low
8	I use electronic access control systems.	2.20	0.89	Low
9	I use alarm systems to control information security threats.	2.40	1.08	Low
10	I use questioning as an information security control measure.	2.49	0.81	Low

Table 6 reveals that awareness and adoption of manual information security practices were relatively high. These practices included locking library doors, safeguarding information resources, maintaining security personnel, and using library identification cards. However, the adoption of electronic information security practices was low. The respondents reported limited use of CCTV recordings, radio-frequency technology, electronic access control systems, and alarm systems. This result indicates that information security awareness has had a limited influence on the adoption of electronic security practices in the libraries.

Discussion of Findings

The findings revealed that 36 out of the 39 questionnaires administered were returned, representing a response rate of 92.3%. Of the respondents, 22, representing 61.1%, were male, while 14, representing 38.9%, were female. The Federal College of Education (Technical), Asaba, and the College of Education, Warri, each contributed 14 respondents, while Delta State College of Education, Mosogar, contributed eight respondents.

The findings further showed that electronic information security measures were generally unavailable in the colleges of education libraries studied. Measures such as CCTV cameras, electromagnetic security systems, biometric technology, radio-frequency control, electronic access control, and alarm systems were either unavailable or not effectively implemented. This finding is consistent with Yerby and Floyd (2018), who maintained that information security policies, training programmes, and physical security measures can only be effective when library

personnel are adequately aware of and trained in their use.

The study also found that librarians possessed general knowledge of information security but had low awareness of electronic information security systems. Their limited knowledge of CCTV systems, security software, and electronic access control may be attributed to the lack of ICT facilities in the libraries. This finding supports Guimaraes (2021), who argued that user education and information security awareness significantly contribute to the overall security of libraries. Continuous awareness and training programmes are therefore necessary to improve the security knowledge and practices of library personnel.

Finally, the findings showed that manual information security practices had a relatively high level of adoption, whereas the adoption of electronic security practices was low. This finding is consistent with Ismail and Zainab (2020), who reported that information security awareness influences information security compliance among library personnel. The persistence of theft, mutilation of books, non-return of borrowed materials, unauthorized borrowing, and misuse of library resources indicates weaknesses in information security practices. Oluwabunmi and Ezinwanyi (2022) identified similar problems as major information security breaches in libraries.

Conclusion

This study examined librarians' awareness and adoption of information security in the digital information environment in colleges of education libraries in Delta State, Nigeria. The findings established that electronic information security measures were largely unavailable in the libraries. Although librarians possessed some general knowledge of information security, their awareness and use of electronic security systems were low.

The study also established that manual information security practices were more commonly adopted than electronic practices. The low adoption of electronic information security measures was associated with inadequate ICT facilities, limited training, and insufficient information security awareness programmes. It was therefore concluded that the level of information security adoption in the digital information environment of the colleges of education libraries was low.

Recommendations

Based on the findings, the study recommends that:
College of education libraries should organize regular training programmes for professional and paraprofessional librarians on information security and the prevention of information security breaches.

Library management should provide relevant ICT facilities, including CCTV cameras, biometric systems, electronic access control, alarm systems, and radio-frequency identification technology.

Colleges of education should develop and implement clear information security policies and guidelines for library personnel and users.

Library management should organize continuous information security awareness programmes for staff and library users.

Security personnel should be adequately trained, properly supervised, and consistently deployed to their assigned duty posts.

Library management should regularly evaluate existing security measures and update them in response to emerging digital security threats.

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