An Open Access Journal Available Online

Computer Self-Efficacy of Librarians and Users as Influencers of University Libraries' Information System Security: Evidence from Nigeria

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Abstract: Librarians and their users interact with the library's information systems for different reasons. The need to protect information and information systems from unauthorized access, modification, data loss and destruction by librarians has become topical in recent times, hence this study. Using survey research design of the correlation type, three University libraries in the South-western Nigeria were purposively selected. Structured questionnaires for 48 librarians and 44,508 registered library users were used. Proportionate stratified random sampling technique for library users with Undergraduates, post graduates and staff as the basis for stratification was used. Total enumeration was used to capture all the librarians, total of 845 (95%) for library users and 42 (88%) for librarians were successfully completed and used for the study. Findings revealed that the librarians and library users had high computer self-efficacy levels related to information system security. Furthermore, computer self-efficacy of librarians significantly influence information systems security ($\beta = .61$, $t= 4.86$, $p<.05$) while computer self-efficacy of library users did not significantly influence information systems security ($\beta = -.01$, $t= -.26$, $p>.05$). The study concludes that these two groups have a strong belief in their abilities to use computers effectively to impact on the information system. The librarians' belief is in the positive; the users' appears to be for negative reasons. The study recommends very high level of computer and other technologies efficacy for librarians, regular training and retraining while

users should be re-orientated to the realities and benefits of secured information systems.

Keywords: Computer Self-efficacy, Information System Security, Information Systems, Librarians, Library users, University libraries, Nigeria

Introduction

Information systems security begins and ends with the individuals within an organisation that interact with the systems, directly or indirectly. These individuals need to belief in themselves and exhibit their capabilities to protect information and information systems from unauthorised disclosure, modification, loss, destruction, and lack of availability. Venter & Eloff (2003) posit that information security is the protection of information, information bearing materials and minimising the risk of exposing information to unauthorised parties. In this regards, information security plays an important role in protecting the assets of an organisation. Information security system practices are the procedures to achieve information integrity, availability, and confidentiality (Ma, Johnston & Pearson, 2008). This encompasses both technical and non-technical issues to safeguard organisational assets from a variety of threats.

In recent times, the protection of information and indeed information systems in libraries has become a topical issue in many African countries, especially as libraries continue to integrate technology into its operations. Libraries need to be fully aware of the need to devote more resources to the protection of information assets and information security which must become a top concern in libraries (Chen, Choo & Chow, 2006). Information

system (IS) in libraries support the delivery of image, services and collections to local and remote patrons and its availability over the Internet inevitably exposes it to security threats (Ismail & Zainab, 2011). As information systems have become critical for library activities, the security of information with regards to issues of confidentiality, privacy, integrity, accuracy, consistency and trustworthiness has become expedient for libraries. To achieve the foregoing, librarians and their users' computer self-efficacy belief could play a vital role; indeed a level of computer self-efficacy of those who interact with information systems of libraries' information is an assets.

Computer self-efficacy, adapted from self-efficacy concept has to do with the extent of an individual's perceived ability to use a computer. Computer self-efficacy is an individual's judgment of his or her capability to use a computer. It can also be seen as a measure of how confident computer users are with their ability to understand, use, and apply computer knowledge and skills (Compeau et al., 2006). Computer self-efficacy has been identified as essential in determining that individual's intention to engage in current or future use of an information system (Teo & Koh, 2010). Individuals who are more confident in their computer skills are more likely to expect positive results in their computer use (Choi, Levy & Hovav, 2013). Relatively, individuals' judgment of

their ability to complete a task using computers influences their decision on how they will use computers (Piccoli, Ahmad & Ives, 2001).

A strong sense of computer self-efficacy of librarians can affect the extent as well as the way technology can be used in daily activities including in the protection of information systems, significantly changing both the librarians' and the users' roles. Thus, librarians or users who do not regard themselves as competent computer users are less likely to use them. Attitudes towards information and communication technology are linked to computer self-efficacy since they are deemed to be significant factors in the interpretation of the frequency and success with which individuals use computers. This gives the practical exposure to identifying whether they are efficacious in the use of information systems in the library. Users with high computer self-efficacy would likely explore new technologies, software or databases together with the library's website, to find if the library has specialized resources. Users in this category and especially remote users are likely to pose threats to the information systems. They are possibly going to attempt to have access to unauthorized data and information using different tricks available.

University libraries in Nigeria have responded to the demand for use of technology in their operations, one notable area is in adoption of information systems which include networked systems, database systems, operating systems, physical security systems and the Online Public Access Catalogue (OPAC). The authors have

carefully selected those university libraries in Nigeria where these systems are deployed; it is against this backdrop that this study seeks to understand whether computer self-efficacy of librarians and users of the library could determine the security of information systems.

Problem Statement

It is worthy to note that computer self-efficacy is the belief held by someone, and not actual skill set possessed by an individual. Previous studies have not been able to look at information system security in libraries from the perspective of librarians and users computer self-efficacy in order to determine if the breach in systems security is as a result of librarians low level of computer self-efficacy or that of the users that manipulate the systems. The loopholes to information systems security in libraries could be as a result of low or no computer self-efficacy which seems to make the librarians not to provide the required configuration or authentication necessary for the systems; it could also be that users have low computer self-efficacy to access the library information systems. It is against this backdrop that the study examines the librarians and users' computer self-efficacy in determining university libraries information systems security in Nigeria.

Literature Review

Computer self-efficacy refers to the perceived competence to perform specific computer tasks and to the extent to which individuals perceive themselves capable of using computers for diverse applications. Messineo & Deollos (2005) stated that in academic

settings, computer competence is viewed differently by students, depending on whether they are using technology for personal or course-related tasks. According to Compeau & Higgins (1995) as cited in Malliari, Korobili & Togia, (2012) refer computer self-efficacy as the perceived competence to perform specific computer tasks and to the extent to which individuals perceive themselves capable of using computers for diverse applications. Looney, Valacich & Akbulut, (2004) pointed out that computer self-efficacy influences expectations and emotional reactions regarding the effective use of modern technologies. Thus, individuals who do not regard themselves as competent computer users are less likely to use them. Computer self-efficacy influences the acceptance and use of technology, skill acquisition, and computer-task performance (Mun & Kun, 2004).

Information System Security awareness (ISS) and training according to Johnston & Warkentin (2010), improves self-efficacy and compliance. Similarly, Bulgurcu, Cavusoglu & Benbasat, (2010) confirmed that an employee's intention to comply with ISS controls is influenced by their attitude, normative beliefs, and self-efficacy to comply. However, management can motivate employees to comply by improving security awareness through education that focuses on employee beliefs about intrinsic benefits, individual and organizational safety, and self-efficacy to use the required security outcontrols (Bulgurcu et al., 2010). Noa (2015) notes that individuals with high self-efficacy will take more challenging

tasks than those with low self-efficacy; it indicates that they will be more willing to try to use information systems. Phelps (2005), points out that the amount of time spent in a systems librarian position may significantly affect the subjects' attitude towards computers and computer related anxiety. Hence, both their computer self-efficacy and effectiveness at implementing information system security beyond that measured by training alone.

Sam, Othman & Nordin, (2005) conducted a study on computer self-efficacy, computer anxiety, and attitudes toward the Internet among undergraduates in University Malaysia, Sarawak (Unimas). The descriptive survey design was adopted with questionnaire as the instrument for data collection. The findings of the study revealed that undergraduates with better attitudes toward the Internet did more downloading of software and games activities. Likewise, undergraduates who had higher computer self-efficacy were using the Internet for product and service information. The study also showed that undergraduates generally used the Internet for educational purposes regardless of their computer self-efficacy and computer anxiety levels. Notwithstanding their levels of computer anxiety, attitudes toward the Internet, and computer self-efficacy, many of the undergraduates were found to be using the Internet mainly for emails. Reed, Doty & May, (2005) stated that researchers have demonstrated that computer self-efficacy influences the acquisition of new computer skills, as well as the willingness to use computers thus,

establishing new skills for students in computer usage. Similarly, Harrell & Decker (2007) stated that the computer self-efficacy of a student initiates confidence in the community college student to access library databases and engage in research methods at home, continued computer training and advancement in computer technology contributes to a community college student's computer self-efficacy.

McBride, Carter & Warkentin, (2012) conducted a study to test several factors in relation to the intention to violate cyber security policy and found that employees with low self-efficacy are more likely to violate cyber security policies. This was an important finding as it stresses the importance of boosting employees' self-efficacy. On the other hand, computer users are likely to employ the safeguard if there is a threat, and they have sufficient confidence in using the safeguard (Liang & Xue, 2009). Researchers have recently noticed that technology alone is insufficient to ensure security and have started to pay attention to the human aspect of security (Workman, Bommer & Straub, 2008). As a computer user, the individual must be confident and able to perform the necessary mitigation measures. Herath & Rao (2009), indicated that self-efficacy influences the attitude towards security policies positively, which did not influence policy compliance. During the accepting process of information security technology, computer self-efficacy has positive influential relation with cognitive ease to use. Yet users' computer self-efficacy indirectly influences intent to use by directly

impacting perceived ease of use and individual innovation. Relatively, user's computer self-efficacy can obviously and positively influence perceived ease of use. The findings of Rhee, Kim & Ryu, (2009) provide support for a research model which indicates that individuals with high self-efficacy in information systems (SEIS) used more security software and features.

Theoretical framework

This study is theoretically grounded on Protection Motivation Theory (PMT) proposed by Rogers (1975), later updated by Maddux & Rogers (1983). PMT was created to determine what stimuli variables raise fear in a person or institution and the cognitive process necessary to adopt a behaviour that will protect individual or institution from the outcome of the fear (Rogers, 1975). PMT has been applied successfully to health related issues, injury prevention, political issues, environmental concerns, protecting others, online privacy, and home wireless security (Woon, Tan & Low, 2005; Youn, 2005). This suggests that the theory would apply to a broad range of threats that an individual can effectively respond to by performing a given response.

As information security is as much about technical solutions as it is about getting people to respond to threats with a given action and system security is often referred to as system health (Karyda, Mitrou & Quirchmayr, 2006), it should be expected that this theory will display similar effects when applied to the information security setting. The Protection Motivation Theory (PMT) proposes that we protect our information systems based on four factors: the

perceived severity of a threat, the perceived probability of vulnerability, the efficacy of the recommended preventive behaviour, and the perceived computer self-efficacy. The theory in information system security explains how individuals are motivated to respond to warnings about threats or dangerous behaviours. It includes three factors that explain how threats are perceived, they are known as threat appraisal factors. These are rewards or benefits of any intrinsic or extrinsic motivation for keeping an unwanted behaviour, severity which is the magnitude of the threat, and vulnerability which is the extent to which the individual is perceived to be susceptible to the threat. PMT provides a theoretical explanation that can explain why people perform certain countermeasures to detect and prevent security threats, which ultimately result in deterring continued attacks on information systems (Crossler, 2009).

The premise of PMT is that individuals go through a coping assessment process to determine whether they should perform some behaviour that will influence their health. Sources of information from personal experience or an outside source influences this coping assessment. The individual then performs a threat appraisal, where he determines how severe a given threat is and how vulnerable he thinks he is to that threat. This threat appraisal combines with the individual's coping appraisal, where he determines how well he thinks he can perform the coping mechanism and how effective he thinks the coping mechanism is at providing protection from the threat (Maddux &

Rogers, 1983). By adapting this approach from threats to a person's health to threats to a person's information system, the result is individual security behaviour as a dependent variable of interest.

Research Question and Hypotheses

i) What is the computer self-efficacy level of librarians and library users in relation to information systems security?

The following research hypotheses were validated at the 0.05 level of significance

Ho1: Computer self-efficacy of librarians will not significantly influence information systems security in university libraries.

Ho2: Computer self-efficacy of users will not significantly influence information systems security in university libraries.

Methodology

Survey research design of the correlative type was adopted for the study. Three university libraries in the South western zone of Nigeria were purposively selected because they are the ones that have deployed the full complement of information systems that was investigated in this study. The study made use of two structured questionnaires for librarians and library users which had fixed set of pre-defined questions. A total of 48 librarians and 44,508 registered users of the libraries of University of Lagos, Lagos; Covenant University, Ota and Bowen University, Iwo were used for the study. Using the proportionate stratified random sampling technique, library users were stratified into undergraduates (UG), postgraduates (PG) and staff.

According to Lohr (2010), the researcher is meant to choose a uniform number of samples from the strata depending on the population size. Since the population is over 20,000 Lohr (2010) suggested that the researcher is meant to take two (2) percent of the total population, in view of that the researcher chose two (2) percent from each stratum to get a proportionate sample size of 891 users. Total enumeration was used to capture all the librarians because their population is relatively small. The instruments elicited demographic data on respondents; it had Computer Self-efficacy Scale with seventeen questions which was adapted from Murphy, Coover & Owen, (1989) and also on

Library Information Systems Security Scale adapted from Ismail & Zainab (2011), grouped according to various systems as it affects library information systems. Each of these information systems (Database / OPAC system, Network system, Operating system and Physical security system) had eight items in each. These scales were developed for both the librarians and the library users. The librarians in charge of the libraries assisted the researchers and research assistants in the administration of the questionnaires. A total of 845 out of 891 representing 95% administered copies of questionnaire for library users and 42 out of 48 administered copies of questionnaire (88%) were successfully completed and used for the study.

Results

Table 1: Computer self-efficacy levels of librarians

Questions	SD	D	A	SA	Mean ($\overline{X}$)	SD
I feel confident working on a personal computers	-	1 (2.4%)	6 (14.3%)	35 (83.3%)	3.81	0.46
I feel confident getting software up and running	-	5 (11.9%)	15 (35.7%)	22 (52.4%)	3.40	0.70
I feel confident learning to use a variety of programmes or software	-	2 (4.8%)	20 (47.6%)	20 (47.6%)	3.43	0.59
I feel confident learning advanced skills within a specific programme or software	2 (4.8%)	2 (4.8%)	18 (42.9%)	20 (47.6%)	3.33	0.79
I feel confident using the computer to organize information	2 (4.8%)	-	15 (35.7%)	25 (59.5%)	3.50	0.74
I can become very good in the use of computers by continually using it	-	-	9 (21.4%)	33 (78.6%)	3.79	0.42
I feel confident writing simple programmes for the computer	5 (11.9%)	20 (47.6%)	10 (23.8%)	7 (16.7%)	2.45	0.92
I feel confident working and logging onto a computer network	1 (2.4%)	2 (4.8%)	16 (38.1%)	23 (54.8%)	3.45	0.71
I feel confident in my ability to keep operating systems and applications software up to date	1 (2.4%)	7 (16.7%)	20 (47.6%)	14 (33.3%)	3.12	0.77

I feel confident learning advanced skills within a specific application software	1 (2.4%)	5 (11.9%)	23 (54.8%)	13 (31.0%)	3.14	0.72
I feel confident adding and deleting information from a data file	-	-	18 (42.9%)	24 (57.1%)	3.57	0.50
I feel confident copying a disc or an individual file	-	1 (2.4%)	14 (33.3%)	27 (64.3%)	3.62	0.54
I feel confident to use the computer to find information and resources for personal purposes	-	-	11 (26.2%)	31 (73.8%)	3.74	0.45
I feel confident using the users' guide when help is needed	-	-	18 (42.9%)	24 (57.1%)	3.57	0.50
I feel confident troubleshooting computer problems	-	7 (16.7%)	17 (40.5%)	18 (42.9%)	3.26	0.73
I feel confident logging onto a server or database computer system	2 (4.8%)	5 (11.9%)	19 (45.2%)	16 (38.1%)	3.17	0.82
I feel confident to participate in mailing lists, listservs	-	5 (11.9%)	18 (42.9%)	19 (45.2%)	3.33	0.69
Average mean of items	**2.5**					

Computer Self-efficacy of Librarians in relation to Information Systems Security

The librarians were asked to respond to items measuring their level of self-efficacy in relation to the handling of the security of information systems in their libraries. The study revealed that the librarians had high computer self-efficacy levels. They viewed that they could work on personal computers ($\overline{x}$ = 3.81; SD = 0.46), get software up and running ($\overline{x}$ = 3.40; SD = 0.70), learn to use a variety of programmes or software ($\overline{x}$ = 3.43; SD = 0.59), learn advanced skills within specific programme or software ($\overline{x}$ = 3.33; SD = 0.79), use the computer to organize information ($\overline{x}$ = 3.50; SD = 0.74), work and log on to a computer network ($\overline{x}$ = 3.45; SD = 0.71), troubleshoot computer problems ($\overline{x}$ = 3.26; SD = 0.73), log onto a server or database computer system ($\overline{x}$ = 3.17; SD = 0.82), participate in mailing lists, listservs ($\overline{x}$ = 3.33; SD = 0.69) and so on. However, low self-efficacy level was revealed on ability to write simple programmes for the computer ($\overline{x}$ = 2.45; SD = 0.92). Therefore, it can be

deduced that librarians have high computer self-efficacy.

Table 2: Computer self-efficacy levels of users

Questions	SD	D	A	SA	Mean ($\overline{X}$)	SD
I feel confident working on a personal computers	31 (3.7%)	26 (3.1%)	283 (33.5%)	505 (59.8%)	3.49	0.73
I feel confident getting software up and running	33 (3.9%)	99 (11.7%)	372 (44.0%)	341 (40.4%)	3.21	0.80
I feel confident learning to use a variety of programs or software	23 (2.7%)	103 (12.2%)	371 (43.9%)	348 (41.2%)	3.24	0.77
I feel confident learning advanced skills within a specific programme or software	30 (3.6%)	131 (15.5%)	392 (46.4%)	292 (34.6%)	3.12	0.79
I feel confident using the computer to organize information	22 (2.6%)	76 (9.0%)	391 (46.3%)	356 (42.1%)	3.28	0.73
I can become very good in the use of computers by continually using it	20 (2.4%)	31 (3.7%)	234 (27.7%)	560 (66.3%)	3.58	0.68
I feel confident writing simple programmes for the computer	74 (8.8%)	255 (30.2%)	321 (38.0%)	195 (23.1%)	2.75	0.91
I feel confident logging onto a computer network	23 (2.7%)	79 (9.3%)	382 (45.2%)	361 (42.7%)	3.28	0.74
I feel confident working on a computer network	20 (2.4%0	106 (12.5%)	393 (46.5%)	326 (38.6%)	3.21	0.75
I feel confident learning advanced skills within a specific application software	32 (3.8%)	140 (16.6%)	418 (49.5%)	255 (30.2%)	3.06	0.79
I feel confident adding and deleting information from a data file	28 (3.3%)	85 (10.1%)	383 (45.3%)	349 (41.3%)	3.25	0.77
I feel confident copying a disc or an individual file	23 (2.7%)	103 (12.2%)	352 (41.7%)	367 (43.4%)	3.26	0.77
I feel confident to use the computer to find information and resources for personal purposes	17 (2.0%)	22 (2.6%)	298 (35.3%)	508 (60.1%)	3.53	0.65
Average mean						**2.5**

Computer Self-efficacy of Library Users in relation to Information Systems Security

The data revealed that users generally have high computer self-efficacy levels related to information system security. They believe they could work on a

personal computer ($\overline{x}$ = 3.49; SD = 0.73), get software up and running ($\overline{x}$ = 3.21; SD = 0.80), learn to use varieties of programs or software ($\overline{x}$ = 3.24; SD = 0.77), learn advanced skills within specified program or software ($\overline{x}$ = 3.12; SD = 0.79), use the computer to organize information ($\overline{x}$ = 3.28; SD = 0.73), become very good in the use of computers by continually using it ($\overline{x}$ =

3.58; SD = 0.68), write simple programs for the computer ($\overline{x}$ = 2.75; SD = 0.91), log onto a computer network ($\overline{x}$ = 3.28; SD = 0.74), work on a computer network ($\overline{x}$ = 3.21; SD = 0.75) and learn advanced skills within a specific application software ($\overline{x}$ = 3.06; SD = 0.79) . However, given the response the level of computer self-efficacy of users is high.

Influence of Computer Self-Efficacy of Librarians on Information System Security

Table 3: Simple linear regression showing the influence of computer self-efficacy of librarians on information systems security

Variables	B	B	T	*P*	R	R²	df	F
Computer Self-efficacy	1.81	.61	4.86	<.05	.61	.37	1, 40	**23.64***

*significant at 0.05 level

Hypothesis 1: *Computer self-efficacy of librarians will not significantly influence information systems security in university Libraries*.

Here the computer self-efficacy level of librarians was regressed against information system security to determine the influence of librarians' self-efficacy beliefs on information system security. The result indicates that computer self-efficacy of librarians significantly influence information systems security (**β = .61, t= 4.86, *p*<.05**). This implies that the self-cognition of ability of using computer or other information and communication technology to achieve goals determines

how secure the information systems would be. The higher the computer self-efficacy, the higher tendencies librarians have to ensure secure information systems. The overall influence shows 37% contribution of computer self-efficacy on information systems security [F (1, 40) = 23.64, p<.05; R= .61; **R² = .37**]. It is important that librarians have high computer self-efficacy when handling information systems. Therefore, the hypothesis is not accepted.

Influence of Computer Self-Efficacy of Library Users on Information System Security

Table 4: Simple regression showing the influence of computer self-efficacy of users on information systems security

Variables	B	B	T	*P*	R	R^2	df	F
Computer Self-efficacy	-.01	-.01	-.26	>.05	.01	.00	1, 843	.07

*significant at 0.05 level

Hypothesis 2: Computer self-efficacy of users will not significantly influence information systems security in university libraries.

Computer self-efficacy level of library users was regressed against information system security and the result indicates that computer self-efficacy of users did not significantly influence information systems security (β = -.01, t= -.26, p>.05). The self-cognition of operating computers by users does not influence information systems security. More so, the factor had almost no influence on the dependent variable [F (1, 843) = .07, p>.05; R= .01; R2 = .00]. This indicates that computer self-efficacy of users does not impact information systems security. Therefore, the hypothesis is accepted.

Discussion of findings

The study established that librarians have a positive and high level belief that they can use computers adequately to protect the library's information systems. They are sure and confident working on personal computers, getting software up and running, learning how to use a variety of programmes or software, learning advanced skills within specific programme or software, using computer to organize information and also can become very good in the use of computers continually all in their belief that information systems in the library can be protected against threats.

This confirms that individuals who are more confident in their computer skills are more likely to expect positive results in their computer use (Choi et al., 2013). This finding further assures that a strong sense of computer self-efficacy of librarians can positively affect the extent as well as the way technology can be used in daily activities, in the protections of systems and significantly changing librarians' roles. Generally, this shows that librarians have good level of computer self-efficacy to guard the library information systems against attacks.

On the computer self-efficacy level of users relative to information systems security, the study revealed that users have a very high level of computer self-efficacy belief. The study shows that users are confident to work on a personal computer, get software up and running, learn to use a variety of programmes or software, feel confident in learning advanced skills within specific programme or software, use the computer to organize information, become very good in use of computers continually to protect the information systems against attacks. This corresponds to findings of Alahakoon (2016) which identifies that users have high computer self-efficacy level of over eighty one percent irrespective of the gender. Also, Harrell & Decker

(2007) stated that the computer self-efficacy of a user initiates confidence in a user to access library databases and engage in computer training and advancement in computer technology. This result has also shown that the library users, many of which are undergraduates could be capable of actions that constitute threats to the information systems. Library users are not library staff, therefore they are likely to constitute threats rather than being protectors of the information systems.

Computer self-efficacy of librarians significantly influenced information systems security in the libraries. This implies that the higher the computer self-efficacy, the higher tendencies librarians have in ensuring the security of information systems. The implication of this is that a strong belief by the librarians on their ability to use computers effectively would translate to them being able to protect and ensure security of information systems. The findings of Rhee et al., (2009) provide support for this which indicates that librarians with high computer self-efficacy used and implement more security software and features.

The test on the influence of computer self-efficacy of users and information systems security in the selected university libraries showed that computer self-efficacy of users did not impact information systems security. The self-cognition and belief of operating computers by users has no influence on information systems security. The import of this finding is that the strong belief of users on their ability to effectively use computers / technology will not ensure or assure

information system security in the libraries. Those who are likely to put up actions that pose threat to information system are the users. This is very likely to be true for academic libraries where there is a high traffic of tech savvy young users. Many of this category of library users are unpredictable and adventurous.

Conclusion

The study has brought to the fore theself-efficacy level of both the librarians who are custodians of and work using the information systems and the library users who are primarily interested in interacting with the information systems for knowledge acquisition purposes. This means that these two groups in the study have a strong belief in their abilities to use computers effectively to impact on the information system. The former's belief is in the positive while the latter's appears to be for negative reasons. While the librarians' self-efficacy belief had positive and significant influence on information system security, users' self-efficacy belief did not significantly influence information system security in the libraries.

Recommendations

Librarians have a role to protect the information systems against all possible threats and especially from library users who are noted for their high level tech skills. Therefore the following recommendations are necessary:

i) Librarians need to achieve a very high level of computer and other technology efficacy in order to assure the security of their information systems.

ii) users should be re-orientated to the realities and benefits of secured information systems.

iii) libraries should come together in a partnership to share system security problems and build reliable security features around their systems for improved service delivery.

iv) regular training and re-training of librarians to strengthen their self-efficacy belief is important.

v) librarians should put in place all the necessary physical access controls for securing servers and desktop machines as well as strong and multiple authentications for the information systems.

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