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INFORMATION TECHNOLOGY SUPPORT STAFF'S COMPETENCY LEVEL IN E-LEARNING IMPLEMENTATION: A COMPARATIVE STUDY OF KENYATTA UNIVERSITY, KENYA AND UNIVERSITY OF CAPE COAST, GHANA

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Abstract

E-learning is an area that has been embraced by many universities and other institutions of higher learning in many developing countries. An attempt to install and use e-Learning equipment and facilities has been met by many challenges. These are in hardware, software and manpower development to meet the needs of the students and staff. Provision of sustained technical support to the end-users is an area that has been overlooked in the adoption of e-learning platforms across the higher education institutions of developing countries. This was a comparative study that assessed Information Communication and Technology (ICT) competency level of Information Technology Support Staff (ITSS) of Kenyatta University (KU), Kenya and University of Cape Coast (UCC), Ghana. Descriptive survey design was used for the study. Purposive sampling technique was employed to select 68 ITSS for the study. Six hypotheses were formulated and tested using independent sample t-test. The study found that the ITSS in the two universities have low proficiency in the area of information system management, software application functions and hardware troubleshooting of the network facilities. The study further found that there exist statistically significant differences in the ICT basic literacy and patch management proficiency, between ITSS of UCC and KU. However, no statistically significant differences were established in the competency levels of system security administration, storage management, service directory administration and output management functions. Other conclusions and recommendations have been made for both universities.

Keywords: Output management, Service directory, Support staff, System security.

1. Introduction

This paper reports the findings of a comparative study conducted in both Kenyatta University in Kenya and University of Cape Coast in Ghana. Both are public universities with ICT infrastructure, equipment and internet access for use by staff and students. Efficient use of the facilities requires technical staff with expertise to manage the e-learning network systems. Information Technology Support Staff (ITSS) have been employed to assist users of the ICT facilities and to sort out technical problems that may arise. The ITSS must not only have the needed technical skills to set up systems, but also better understanding of the technology they operate on a daily basis. According to the British Educational Communications and Technology Agency (BECTA) (2006), the functions of the ITSS are to: increase

reliability of the ICT services, provide technical support and resources, improve user confidence, and lastly, improve communication among users. The above roles are in the domain of System Administration (SA), that ITSS must perform. The BECTA says SA helps to ensure technical support staff maintains a reliable and secure network. This involves having a number of skills:

Security administration (SA): The primary goals of SA are to ensure data confidentiality, integrity and availability, together with asset security.

Storage management (SM): The SM involves: tracking organisation's important data, maintaining data resources, storage media and data held on such media, data backups, data restoration and archiving.

Directory services administration (DSA): The DSA makes the organisation's network resources easy to find and access. Managers use directories to manage user accounts and network resources.

***Print and output management (POM*)**: The POM secures and manages printed output for the organisation, which is distributed to its staff or external bodies.

Patch management (PM): The PM keeps components in the network like hardware, software and services up-to-date with the latest patches. They are easily available to the end users. Without patching, networks could slow down and become affected by viruses.

Research Problem

The need for implementing e-learning in universities is vital. However, its adoption and utilisation in African universities appear to be slow. One of the primary concerns for many universities is how to develop and provide a sustained technical support to the end-users, who are mainly staff and students. Implementation of e-learning in the universities is destined to fail if studies to determine the extent to which ITSS acquire and use the needed skills to serve as anchors for e-learning adoption and utilisation are not conducted. Lack of such knowledge drove the researchers to conduct this study.

3. Review of Relevant Literature

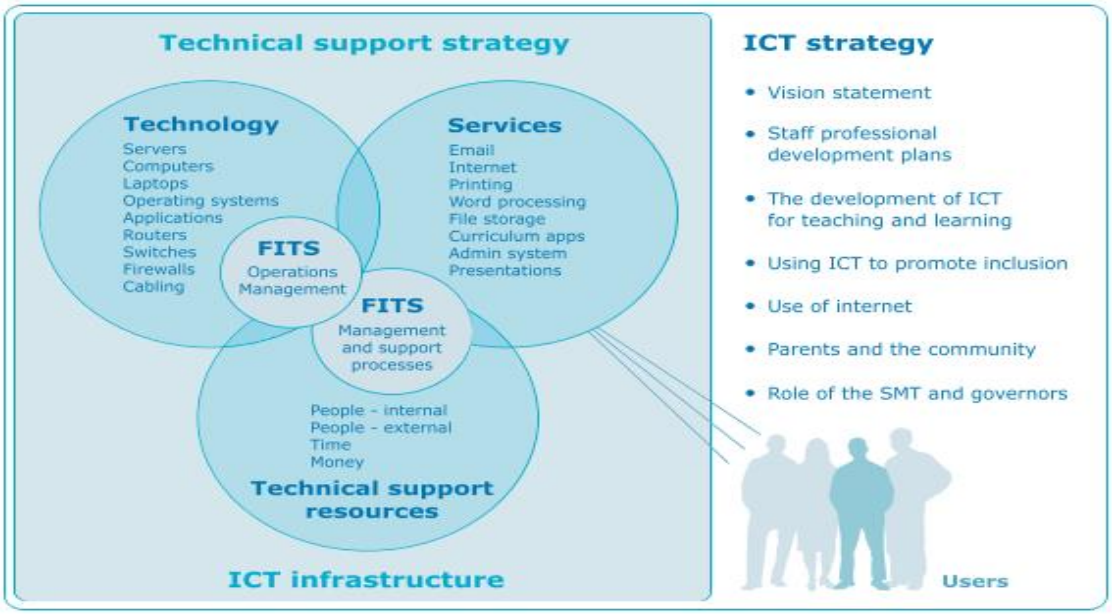
Provision of efficient and sustained technical support by the Information Technology Support Staff (ITSS) in universities is of concern. Many researchers acknowledge the need for adoption of e-learning platforms across higher education institutions of the developed and developing countries. Gray, Ryan and Coulon (2003); Valcke (2004) and Valdez et al. (2004) asserted that the success of an e-learning project is dependent on the skills and quality of technical support available to the end-users.

Educational technologists are concerned if university administrators are aware of the fundamental role that ITSS plays in ensuring smooth implementation of e-learning. Ellis, Jarkey, Mahony Peat and Sheely (2007) conducted a study at the University of Sydney, Australia. Results showed university administrators encouraged use of consultants who come, use their expertise and go. They leave behind little knowledge

capital for e-learning within the University. Ossei-Anto (cited in UNESCO, 2004) conducted a study titled: "Information and Communication Technologies Usage in Higher Distance Education in Sub-Saharan Africa". According to him, international agencies put pressure on governments to implement ICT-mediated processes. The governments then put pressure on institutions, which respond hastily by purchasing ICT packages, but with no advice, guidance or assessment and does not ensure essential process of training the support staff (P. 52).

Conceptual Model

The Framework for ICT Technical Support Operations Management (FITSOM) developed by BECTA (2006) was adapted as the conceptual model for this study. According to BECTA, FITSOM model is based on a collection of best practices, principles and models used successfully in education and industry. The model was designed to help schools achieve operational excellence in the management and administration of their ICT infrastructure. The model comprises **Technology** to support ICT infrastructure, **Services** used in learning to support school administration, and **Technical support resources** comprising people, time and money used to support the technology and services. The model was appropriate for this study because it provided a standardised framework to evaluate skills needed by the ITSS, to implement e-learning in the universities.



FITSOM Model, adapted from BECTA (2006)

4. Research Design and Methodology

The study adopted a descriptive survey design which focused on a quantitative approach to data collection and analysis. This design was chosen because it has the advantage of producing a good amount of responses from a wide range of ITSS in the two universities.

Population, sample and sampling procedures: The target population of the study was the entire 68 information technology support staff (ITSS) of the two

universities. Purposeful sampling technique was used to get the required samples. The samples comprised 35 ITSS from University of Cape Coast and 33 from Kenyatta University. This represented 100% response rate.

Instrumentation: A structured questionnaire and a semi-structured interview schedule were developed for the study. Questions were designed to cover key research hypotheses. To ensure validity, the questionnaire was reviewed by two experts in this area. Cronbath's alpha reliability coefficient for ICT skills yielded r =0.96.

Data collection procedure and analysis: Data were collected using the instruments from all the 68 ITSS in the two universities. Data collected were analysed both descriptively and using inferential statistics. The quantitative data were aggregated, coded and analysed using the Statistical Package for Social Sciences (SPSS version 16). The descriptive analysis covered the six hypotheses. The mean, (*M*) and standard deviations (*SD*) of the variables were used to form a cross-tabulation, showcasing the comparative aspects of the study. Furthermore, with the inferential statistics, independent sample t-test, tested at the alpha level of 0.05 was applied on all the hypotheses with the view of determining the statistically significant differences between UCC and KU in the areas specified in the hypotheses.

5. Results and Discussions

Personal data from respondents

More than half of the participants were male. In inter-university comparison, more females (39%) were engaged as ITSS in KU than in UCC (31%). The study also revealed male dominance in ICT related careers than female in both universities. This finding is consistent with other empirical findings. In Australia, females continue to be largely under-represented in ICT-based careers (under 20%), and the low participation rates have not improved in the past decade (Miliszewska, 2006). This finding is further supported by Griffith (2000) who pointed out that women are struggling to find executive positions in ICT-based economies.

Responsibilities of information technology support staff

The ITSS have the following responsibilities in both universities: Managing and ensuring availability of network, maintaining access, troubleshooting network outages, creating learning course elements under the guidance of instructors, researching online materials and copyright issues, training instructors/lecturers to use the e-learning technology, assisting with pedagogical issues to adapt/develop curriculum and course materials, selecting appropriate technical tools and resources, assisting with hardware and network technology infrastructure issues, and lastly, managing intellectual and technical property rights. These responsibilities corroborated findings of Kirsch (2003).

Training

The ITSS had received some training in technical support: UCC (71%) and KU (48%). Mahmood and Khan (2007) say ICT training must be a continuous process for efficiency.

Challenges faced

The ITSS gave the following reasons for the challenges they were faced with daily: Students' lack of knowledge about technology, frequent power outage, network access problems, creating easy-use tools, utilization of course application tools, maintaining technical infrastructure, pedagogical support from lecturers and technical support from learners, maintaining a standard network/user platform. In assessing the effects the identified challenges had on the rate of e-learning adoption and utilisation, 67% of ITSS in KU said they had mild effects, while 63% in UCC said the challenges had negative effects on e-learning adoption.

ICT proficiency levels

The ITSS were also asked about their ICT proficiency levels in various areas. The hypotheses below attempted to answer the questions.

Hypotheses

The hypotheses were meant to assess and compare the ICT related skills acquired by the ITSS. To statistically test differences in skills acquisition between ITSS in KU and UCC, the means and standard deviations of the independent variables were analysed.

Test of hypotheses

H_0: There is no statistically significant difference between UCC and KU in terms of basic ICT skills acquired by ITSS

The study revealed proficiency levels vary between the two institutions in this area. A statistically significant difference in basic ICT skills acquisition was found: $t(63.63) = 0.003$, $p = 0.05$, between KU, whose mean score is relatively higher, ($M = 3.76$, $SD=0.435$) than UCC ($M = 3.51$, $SD = 0.562$). The results, therefore, rejected this null hypothesis. This finding is consistent with the result obtained from Nairobi university, Kenya by Day and Jolliffe, cited in UNESCO (2004). They found ITSS were trained to develop basic e-learning courseware and the university now has staff with appropriate technical expertise.

H_0: There is no statistically significant difference between UCC and KU in terms of system security administration skills of ITSS

Even though KU recorded a higher mean, the results of the t-test for independent samples did not indicate any statistically significant difference $t(58.54) = -1.900$, $p = 0.62$, between KU participants ($M = 3.73$, $SD = 0.452$), and UCC ($M = 3.46$, $SD = 0.701$). The test, therefore, failed to reject the null hypothesis. This study found above average skills in system security administration in the two institutions. The finding is consistent with Cavanaugh (2012) who observed that the expectations are always high when it comes to the performance of the system administrator.

Cavanaugh concluded that possessing these skills can help improve ITSS performance, as the goal of any system administrator is to make sure the network infrastructure is secure, stable and prepared to fight off any attack.

H_0: There is no statistically significant difference between UCC and KU in terms of storage management skills

Research results showed the participants in KU scored higher means (M = 3.18, SD = 1.014) than those in UCC, (M = 3.11, SD = 0.796) in storage management skills. However, the test statistics demonstrated no statistically significance difference, $t(66)$ =0.306, p = 0.760, between KU and UCC. The test, therefore, failed to reject the hypothesis. The explosion of data and dependency on digital information are leading to larger and more complex information storage environments that are challenging to manage. Egan and Marino (2012) indicated that poorly designed and managed storage infrastructure can put the entire organization at risk in case of failure. A robust storage infrastructure requires reliable equipment and management experts. Egan and Marino (2012) also found 42% of the ICT managers believed they had workers least capable of performing with virtualized and cloud environments. Most of the key challenges faced are mentioned above.

H_0: There is no statistically significant difference between UCC and KU in terms of directory services management

In the area of directory services administration skills, KU again showed higher skills than UCC. However, no statistically significant difference, $t(64.066)$ = 0.497, p = 0.621, was found between the ITSS of KU (M = 2.79, SD = 0.893) and the ITSS of UCC (M = 2.69, SD = 0.796). The test, therefore, rejected the null hypothesis. BECTA (2006) stated that directory services management makes the organisation's network resources easy to access. It forms the main database where objects, user accounts, and network resources are managed.

H_0: There is no statistically significant difference between UCC and KU in terms of output management skills

The independent sample t-test conducted on the variables showed that UCC had competitive advantage over KU in this area. However, no statistically significant difference was noted between the two institutions. Thus, $t(66)$ = 1.282, p = 0.206, with UCC recording (M = 3.00 SD=0.728) and KU (M=2.76, SD=0.830). The test, therefore, failed to reject the hypothesis.

The nature of the human resources needed to run an electronic records programme has been much debated by the archival profession, ever since it became clear that computers were transforming the way organizations do business. BECTA (2006) said the goal of Output management (OM) skills is to manage printed output in line with the institution's requirements. It ensures any sensitive printed material is properly secured. The European Commission's Document Lifecycle Management (DLM) forum (2002) underscored the need for managing electronic records as a team effort, with a specialist unit providing a focal point for expertise in technical standards. Some of the core competencies for OM are outlined above. The forum concluded that

the skills are very demanding and this confirmed why few respondents could assess themselves as having high output management skills.

H_0: There is no statistically significant difference between UCC and KU in terms of patch management skills.

Finally, regarding the patch management (PM) skills, the test statistics established statistically significant difference between UCC (M = 2.80, SD = 0.797) and KU (M = 2.30, SD = 0.951) with $t(66) = 2.340$, $p = 0.022$. This difference was attributed to the higher mean scores demonstrated by UCC participants over their counterpart at KU. The tests rejected this null hypothesis. The results show ITSS from the two institutions do not have the same level of skills in the area of PM. The National Institute of Standards and Technology's (NIST) special report of 2005 recommended organizations to create a patch and vulnerability group (PVG) to facilitate the identification and distribution of patches within the organization. When network managers and technicians fail keep the network available and reliable, they leave the institution vulnerable to network failure, poor performance and attacks by hackers. These have an impact on the teaching, learning, and management of the institutions.

6. Conclusion

The task of keeping up with reports of vulnerabilities and releases of patches has become more burdensome for organizations due to a lack of personnel having the requisite competences. It is expected that the ITSS in institutions of higher learning should be individuals with knowledge of vulnerability and patch management, as well as system administration, intrusion detection and firewall management. It is also beneficial to have specialists in the operating systems and applications mostly used within institutions. This conclusion is consistent with the finding of this study that revealed, in both institutions, only a handful of ITSS claimed to have advanced skills in patch management.

A critical examination of the expected ICT skills shows there is a lot to be desired in relation to the skills needed by the ITSS to fully implement e-learning in the two universities. Although they demonstrated relatively higher proficiency in basic ICT literacy, their skills in information system management as measured by security administration, storage management, directory services administration, output management and patch management skills are low. Comparatively, the study established similarities between KU and UCC in the areas of system administration, storage management, directory services administration and output management proficiency levels of ITSS. However, differences were noted in the proficiency levels of ITSS of KU and UCC in the areas of basic ICT literacy and patch management skills. These results are indicators of the levels of ICT skills proficiency of ITSS in African universities. Further training is needed to ensure efficiency in this sector.

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