Assessing the E-Learning Readiness of Selected Sudanese Universities

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ABSTRACT

In today's knowledge-driven society and information economy, there is general consensus that higher education requires emphasis on lifelong learning and flexible forms of teaching. This expectation has heightened the initiatives of Higher Education Institutions (HEI) worldwide to adopt e-learning technologies in an effort to overcome deficits in education and improve pedagogy. Universities in Sudan are not exempted from recognizing this technological trend. However, although the need to implement e-learning is critical, there is also a need to realize that the process of implementing e-learning in an institutional setting and inserting it into the educational context of a university is a complicated endeavor; one which is not only costly but also presents a lot of challenges. In order to ensure a higher rate of success, it is imperative for universities to first conduct initial assessments to identify their level of organizational readiness and help determine how best they can implement the technology. This study presents a first step towards this goal. It is intended to make an assessment of e-learning readiness (henceforth e-readiness) in selected Sudanese institutions of higher learning in order to identify challenges that may impede possible implementation and enumerate measures that can be taken to address these challenges early on. Questionnaires were used to collect data from two hundred students along with sixty faculty members from selected universities in Sudan. The results of the study reveal that Sudanese universities, within the context of the universities surveyed, are overall not yet ready and still needs some work in several areas, particularly in the area of providing training and developing its technological infrastructure. In conclusion, appropriate policy suggestions were suggested to help enhance the e-readiness of the surveyed institutions.

Keywords: e-learning, e-readiness, assessment, Sudan Universities

INTRODUCTION

In this technology-driven age of human society, e-Learning has emerged as an important educational tool. It has shaped school systems and educational institutions by providing students with new ways of interacting and learning with each other and giving teachers new means of monitoring students' progress and expanding their learning opportunities. Any higher educational institution that would not opt to adopt this technology trend would be considered as at a disadvantage compared to other universities who would choose to adopt it.

Universities in Sudan are not exempted from recognizing this technological reality. However, although the need to implement e-learning is critical, there is also a need to recognize the fact that the process of implementing e-learning in an institutional setting and inserting it into the educational context of a university is complicated endeavor (Odunaike et al, 2013). It requires not only a robust technical infrastructure to support the delivery of the e-learning courses, but more importantly, the complete acceptance of its major would-be users as well, e.g., Faculty members and students (Ali Alamin & Elgabar, 2014).

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According to Davidson and Schofield (2002), implementing technology-enabled education requires the identification of barriers and obstacles prior to implementation so that plans can be drawn to address those challenges. Such planning entails a complex process, which ideally, should be institution-specific. In line with this, the reason why an e-learning readiness assessment is critical is because it provides key information on the institution-specific characteristics of the organization to enable it to decide whether it is capable of implementing an e-learning program and/or to determine the areas which need to be improved in order to maximize the success of an e-learning initiative.

The aim of this study is to assess the e-learning readiness of selected universities within Sudan. The objective is to determine on what level the universities are ready for e-learning, identify in which areas the universities still needs to improve in order to upgrade its e-learning readiness status, and gauge how faculty members and students perceive the e-learning technology and whether or not they are ready for e-learning in terms of technical competency.

LITERATURE REVIEW

E-Learning Readiness Assessment

In today's technologically-driven age, e-Learning (which stands for electronic learning) has become an important tool for enhancing the delivery, interaction, and facilitation of both teaching and learning processes (Cruthers, 2008). E-Learning can be defined as instructional content or learning experiences delivered or enabled by electronic technology (The Commission on Technology and Adult Learning, 2001).

There is a clear consensus in the literature with regards to the advantages that e-learning can bring to an educational organization. The proper utilization of e-learning can promote time and location independent access to the sources and contents of learning materials, reduce cost, and improve the quality of education (Andersson & Grönlund, 2009; Linna, 2013). It can also satisfy educative needs of learners, support the learning process, and provide collaborative learning opportunities.

However, despite its widely recognized advantages, implementing an e-learning project is not as simple as it seems. If not done properly, it can bring about a lot of problems and challenges, and worst, the expected benefits can even fail to take effect (Graham 2006). The biggest challenge probably lies in ensuring that certain preconditions are met for e-learning, such as access to ICT tools and network infrastructure. Changing the perceptions of teachers and learners towards e-learning and convincing them to accept it is also very crucial. Another aspect that needs to be looked at is the technical competency of the people that will interact with the e-learning system (Gold et al., 2001).

So and Swatman (2006) noted that to ensure the success of an e-learning implementation, there is a need to first acknowledge the importance of assessing the readiness of organizations, teachers, and learners to adapt to this learning style. Therefore, an e-learning readiness study must be the starting point for any educational organization wanting to implement an e-learning project.

Borotis & Poulymenakou (2004) define e-learning readiness as "the mental or physical preparedness of an organization for some e-learning experience or action". An e-learning readiness assessment, therefore, in the context of an educational organization, is meant to identify potential aspects that are necessary to ensure that the e-learning design are tailored to meet learners' needs and is acceptable for use by both teachers and learners. It can also help

organizations to design e-learning strategies comprehensively and implement its ICT goals more effectively (Kaur & Abas, 2004).

To date, numerous e-readiness assessment tools are already available in the literature. Figure 1, for example, by Akaslan and Law (2010), provides a conceptual framework of e-learning readiness survey that enumerates important factors that needs to be considered by any organization. This study initially looks only at factors concerned with institution, people, and technology.

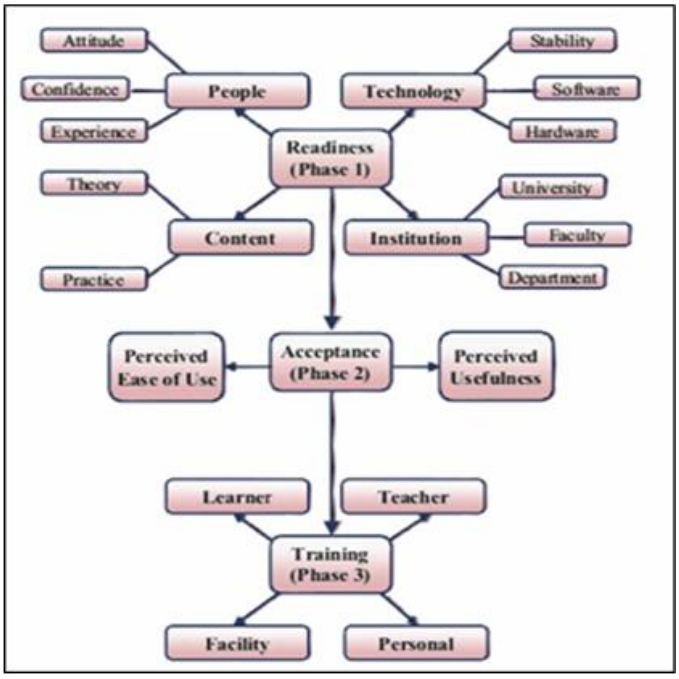

Figure 1. The conceptual model of e-learning readiness survey (Source: Akaslan and Law, 2010)

The Case of E-Learning in Universities in Sudan

In Sudan, the phenomenon brought by internet-based technologies and its various applications has also stirred all sectors of society and institutions. Aiming for further excellence in teaching and learning, it was natural for universities in Sudan to want to expose its faculty and students to these technologies too. As such, there have already been attempts in the past to utilize e-learning technology in the management of courses in the educational system of various universities in Sudan. Moodle, for example, a Learning Management System (LMS) designed to serve as a platform for the delivery of multimedia rich contents to the students have already been adopted by some universities (Ali Alamin & Elgabar, 2014; Elamahadi & Osman, 2013). In this respect, the Sudan Open University is the one leading the way in this initiative. Since its establishment in 2003 its population has now grown to more than 90,000 enrolled students (Zahawi, 2011). However, despite these initial initiatives, e-learning in Sudan can still be considered as being in its infancy and early adoption stage; and, as with any developing country, a lot of work is still needed to fully realize the adoption and utilization of e-learning in higher institutions (Ali Alamin & Elgabar, 2014; Deb, 2013). This study attempts to explore along these lines of e-learning challenges. The aim is to investigate the e-readiness of selected universities within Sudan and identify issues and analyze factors that need to be addressed as early as possible in order to enhance the process of introducing e-learning. Such assessment can help in ensuring that the systems put in place can be implemented as smoothly as possible and more acceptable to its front line users.

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PURPOSE

The study was a survey meant to collect primary data from faculty members and students in selected universities within Sudan in order to answer the question: "How ready are universities in Sudan for implementing e-learning?" The results of the study are expected to reveal the perceptions of faculty members and students towards adopting e-learning technology and help identify hidden issues that might impede the smooth implementation of this technology in the future. More particularly, the research questions considered have been formulated as follows:

1. Does the faculty and students of selected universities in Sudan ready for e-learning?
2. Does the faculty and students tend to accept or reject the introduction of e-learning in their teaching and learning practices?
3. Do the faculty and students perceive the need for training in implementing e-learning?
4. Do the faculty and students perceive the existing technological infrastructure of their university to be sufficient for implementing e-learning?

METHODOLOGY

The data collection method employed was a survey designed to seek input from faculty members and students who are able to judge various issues related to their universities' readiness for e-learning.

Participants

A cohort of 60 faculty members from various departments and 200 students enrolled in a variety of degree programs from two universities within Sudan were approached to serve as respondents for this study.

Instrumentation

Assessing the e-readiness of any university requires an analysis of the resources it possesses, the skills of its faculty and students, as well as the attitudes of these stakeholders towards adopting this technology. With this in mind, in order to assess the level of readiness of participating universities, this study adopted an assessment instrument based on the questionnaire previously developed and used by Akaslan and Law (2010). This instrument broke down the overall e-readiness factor of an institution into three dimensions, namely: Readiness, Acceptance and Training. The first dimension provides an indication of the e-readiness of respondents to e-learning. The second dimension concerned with how the participants accept the introduction of e-learning technology. Finally, the third dimension looks into whether or not participants need trainings on e-learning implementation. For each dimension, Akaslan and Law assigned a group of statements designed to measure a person's degree of agreement regarding specific issues that serve as indicators of readiness. Likert scale was used to gather respondent's response with five ordered choices ranging from 1 being "strongly disagree", 2 "disagree", 3 "neutral", 4 "agree", and 5 "strongly agree". In order to fit the instrument into the goals of this study, an additional dimension pertaining to the readiness of the technological infrastructure of the institution was added in the questionnaire. Overall, the resulting questionnaire contained a total of 57 statements. An additional section for gathering demographic data of the respondents was also included.

In the analysis, following Aydın and Tasçı's (2005) assessment model (See Fig. 2), we treated the mean score 3.41 as the expected level of readiness for each item in order to

establish an acceptable e-readiness index.

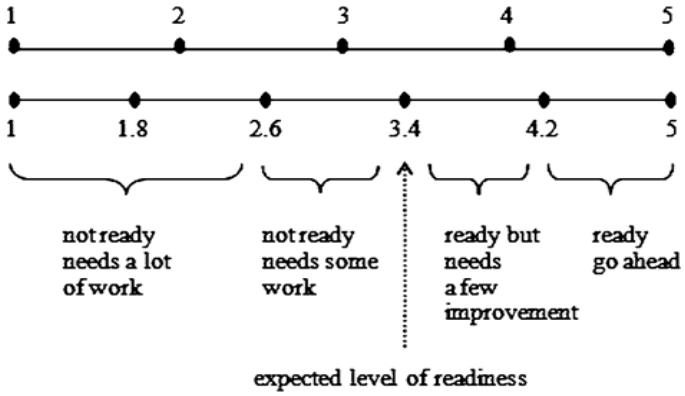

Figure 2. e-LRS assessment model (source: Aydin & Tasci, 2005)

The data generated was analyzed using descriptive statistics and interpretation was supplemented by a combination of interview and observation.

RESULTS

Demographic Profile

The majority of the respondents were males (males=170, females = 90). On the faculty side, 53% of the respondents have doctorate degrees and the remaining 47% have master degrees, most of the degrees are related to computer science and IT-related fields. On the student side, 85% of the respondents are undergraduate students and the remaining 15% are taking up graduate courses. The undergraduate students' course is a mixture of Information Technology, Business Computing, Network Management, and Knowledge Management. The results also show that 100% of the faculty reported they have access to computers at home, while 91% of the students also indicated they have the same privilege. This data provides an encouraging indication that the sample group is reasonably well-equipped to engage in e-learning. Table 1 shows the frequency of age range of the respondents.

Table 1. Respondent's Age Range Statistics

Age Range	*Frequency*	*Percentage*
24 and below	196	75.4 %
25-34	13	5.0 %
35-44	28	10.8 %
45-54	21	8 %
55 and above	2	0.8 %
Total	*260*	*100*

Descriptive Statistics

Table 2 illustrates the overall mean score gathered from each group for each dimension used in the questionnaire. From the table it can be observed that the overall mean score for both groups (faculty and student) is a few points below the acceptable level of readiness

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(Mstuds=3.38 (for students) and Mfaculty=3.29 (for faculty) < Melr =3.41). Based on this result, it can be inferred that Sudanese universities, within the context of the institutions surveyed, are not yet ready and still needs some work in order to prepare them for e-learning.

Table 2. Overall descriptive statistics for each dimension

Student Results				*Faculty Results*			
Dimension	*N*	*M*	*SD*	*Dimension*	*N*	*M*	*SD*
E-Readiness Perception	200	3.69	0.37	E-Readiness Perception	60	3.63	0.43
Acceptance	200	3.87	0.2	Acceptance	60	3.86	0.26
Training	200	2.99	0.14	Training	60	2.7	0.1
Infrastructure	200	2.96	0.47	Infrastructure	60	2.96	0.28
Overall	200	3.38	0.3	Overall	60	3.29	0.27

Analyzing the results a little further, we find that the mean scores for the e-readiness perception of the respondents (Mstuds = 3.69 (for students) and Mfaculty = 3.63 (for faculty) > Melr = 3.41) as well as their level of acceptance of the e-learning technology (Mstuds = 3.87 (for students) and Mfaculty = 3.86 (for faculty) > Melr = 3.41) are already above the acceptable mean whereas the mean scores for training (Mstuds = 2.99 (for students) and Mfaculty = 2.7 (for faculty) < Melr = 3.41) and infrastructure (Mstuds = 2.96 (for students and faculty) < Melr = 3.41) are way below this threshold. This initial observation implies that the respondents are somewhat already optimistic regarding their own readiness and the role that e-learning will play in their work environment, at the same time, it also implies that in the point of views of these two groups of respondents, the universities still lags behind in terms of training as well as in the necessary technological infrastructure needed to support this learning environment.

Mean scores for each item in the questionnaire can also be used to identify specific areas of improvement for the universities. Relative to this, in order to dig deeper and to answer the research questions enumerated, further discussion of the results is organized into several succeeding sections.

Extent of Readiness of Faculty Members and Students

Table 3, displays the statements associated with the first dimension with computed mean scores greater than the expected level of readiness (mean > 3.4). The data shows that majority of faculty and students surveyed have reported that they have acceptable levels of experience and competency in using personal computers (Item # 7, 13); more particularly, both groups of respondents have indicated that they have sufficient knowledge of standard software packages (Item # 4) and that they know how to utilize the internet as an information resource (Item # 2). It also shows that they are well-aware of some of the mainstream web 2.0 tools needed to support communication and collaboration in an e-learning environment (Item #5, 6, 8, 9). These results indicate that both faculty and students already have good foundational technology skills to engage in e-learning.

Table 3. Statements related to e-readiness perception with computed mean scores > 3.4

Faculty				*Students*			
Items	*Specific Statements*	*Mean*	*SD*	*Items*	*Specific Statements*	*Mean*	*SD*
2	I use the Internet as an information source.	4.02	1.0	2	I use the Internet as an information source.	4.19	0.95
4	I am comfortable using office software (e.g., Microsoft Office, Open Office, etc.) for content delivery and demonstration.	4.27	0.88	4	I am comfortable using office software (e.g., Microsoft Office, Open Office, etc.) In making assignments and presentations.	4.16	0.95
5	I have a social networking account (e.g., Facebook, Twitter, etc.) and I use it often.	4.3	0.91	5	I have a social networking account (e.g., Facebook, Twitter, etc.) and I use it often.	4.28	0.95
6	I use instant Messaging (e.g., MSN, Yahoo, etc.).	3.53	1.13	6	I use instant Messaging (e.g., MSN, Yahoo, etc.).	3.41	1.26
7	I use computers confidently.	4.08	1.05	7	I use computers confidently.	4.04	1.02
8	I use web browsers (e.g., Internet Explorer, Google Chrome) confidently.	4.43	0.83	8	I use web browsers (e.g., Internet Explorer, Google Chrome) confidently.	4.4	0.9
9	I use search engines (e.g., Google, MSN Search) confidently.	4.25	0.89	9	I use search engines (e.g., Google, MSN Search) confidently.	4.36	0.92
12	I have information about what e-learning is.	3.88	0.88	12	I have information about what e-learning is.	3.86	0.95
13	I have enough information and competency to prepare e-learning materials.	3.57	1.13	13	I have enough computer skills and competency to study e-learning materials on my own	3.71	1.16
14	I feel that I am ready to integrate e-learning in my teaching.	3.72	0.92	14	I feel that I am ready to integrate e-learning in my learning activities	3.83	0.93
16	I believe my students will like e-learning.	3.48	1.11	16	I believe my instructors can handle e-learning.	3.66	1.06
17	The top-level administration understands what e-learning is.	3.5	1.08	17	The top-level administration understands what e-learning is.	3.72	1.0
18	The top-level administration supports the use of e-learning.	3.5	0.93	18	The top-level administration supports the use of e-learning.	3.58	0.94
22	E-learning can enhance the quality of the theoretical part of my research field.	3.97	0.82	19	I believe e-learning is applied in my department.	3.41	1.1

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23	E-learning can enhance the quality of the practical part of my research field.	3.9	0.9	20	I believe e-learning is applied in the university faculty.	3.43	1.15
24	E-learning can be applied to the theoretical part of my research field.	3.65	1.12	21	I believe e-learning is applied at my university.	3.43	1.21
25	E-learning can be applied to the practical part of my research field.	3.55	1.03	22	E-learning can enhance the quality of the theoretical part of my course.	3.74	0.93
				23	E-learning can enhance the quality of the practical part of my course.	3.81	0.91
				24	E-learning can be applied to the theoretical part of my course.	3.61	1.04
				25	E-learning can be applied to the practical part of my course.	3.57	1.0

Table 4. Statements related to e-readiness perception with computed mean scores lower than 3.4

Faculty				*Students*			
Item#	*Specific Statements*	*Mean*	*SD*	*Item#*	*Specific Statements*	*Mean*	*SD*
1	I am satisfied with the university's network infrastructure.	2.8	1.1	1	I am satisfied with the university's network infrastructure.	3.12	1.22
3	I use e-mail as the main communication tool with my students and colleagues.	3.27	1.0	3	I use e-mail as the main communication tool with my classmates and friends.	3.04	1.1
10	I use digital file management tools confidently.	3.22	1.04	10	I use digital file management tools confidently.	3.37	1.02
11	I use tools to create learning materials confidently.	3.12	0.92	11	I use tools that present learning materials confidently.	3.28	0.94
15	I have enough time to prepare e-learning materials.	3.25	0.91	15	I have enough time to study e-learning materials.	3.32	1.03
19	I believe e-learning is applied in my department.	3.13	1.08				
20	I believe e-learning is applied in my faculty.	3.22	1.08				
21	I believe e-learning is applied at my university.	3.27	1.18				

On the other hand, Table 4 displays the few statements associated with this dimension where the computed mean scores are below the expected level of readiness (mean < 3.4). According to this table, faculty and students in the universities surveyed share an almost similar degree

of negative perceptions with regards their self e-readiness. These negative perceptions stem from their dissatisfaction with the weak network infrastructure of the university (Item #1) as well as the lack of necessary skills/habits of using more advanced e-learning environment tools, e.g., emails, digital file management tools, authoring tools, etc. (Items #3, 10, & 11). Both groups also expressed concern over their lack of time in handling e-learning based activities (Item #15).

Finally, an interesting thing to note about these results is the gap between the mean score level of faculty members and students for three items (19, 20, & 21). The statements associated with these items have to do with their perceptions of whether e-learning is being applied in their institution at various levels (i.e., department, faculty, university). Faculty responses generated mean scores lower than the expected level of readiness indicating their opinion that e-learning is not being applied at these levels. However, students' responses generated mean scores higher than the acceptable mean scores for these items which indicate that they view e-learning as already being implemented. This seemingly conflicting results can be interpreted if we consider that there were already circumstances where faculty members have started adopting Learning Management Systems (e.g., Moodle) on a personal level – the students might be aware of these initial initiatives and is already considering them as e-learning implementations, however, faculty members are more keenly aware that simply implementing an LMS does not constitute a full scale adoption of e-learning.

Acceptance of e-learning

The second research question focuses on how faculty and students tend to accept the introduction of e-learning technology in their work environment.

Table 5. Statements related to acceptance dimension

Faculty				*Students*			
Item#	*Specific Statements*	*Mean*	*SD*	*Item#*	*Specific Statements*	*Mean*	*SD*
26	I believe that e-learning can improve the quality of my teaching.	4.1	0.94	26	I believe that e-learning can improve the quality of my learning.	4.1	0.95
27	I believe that using e-learning can increase my productivity.	4.1	0.91	27	I believe that using e-learning can increase my productivity.	4	0.96
28	I believe that e-learning is useful for my research.	4.1	0.98	28	I believe that e-learning is useful for my research.	4.1	0.95
29	I believe that e-learning will enable me to accomplish my teaching more effectively than the traditional classroom-based approach.	3.5	1.05	29	I believe that e-learning enables me to achieve my learning more effectively than the traditional classroom-based approach.	3.76	1.08
30	I believe that it is easy for me to use e-learning.	3.8	0.7	30	I believe that it is easy for me to use e-learning.	3.7	0.97
31	I believe that my students will find it easy to use e-learning.	3.57	0.85	31	I believe that I will find it easy to use e-learning.	3.54	1.07

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Table 5 provided the statistics for the statements related to this dimension. As can be seen from this table, the mean scores of all the items were above the expected level of readiness (M > 3.4) both for the faculty and student respondents; in fact, it is the only dimension where all the statements received a positive response. This result only shows that both faculty and students have high confidence and positive attitudes towards the adoption of e-learning technology. The items which garnered the lowest means in this section is item#29 for the faculty ($mean_{faculty}$ = 3. 5) and item#31 for the students ($mean_{students}$ = 3.54). This indicates that for the most part, the biggest concern for the faculty is whether or not they will be able to utilize the e-learning technology to augment their traditional teaching pedagogy. On the other hand, the biggest concern for the students is whether or not they will be able to effectively utilize e-learning technology to improve their learning.

Training

The third research question focuses on the perceived training needs of the respondents. Table 6 presents the data gathered in this aspect. The results show a very low mean index for this dimension for both faculty and student respondents. These low mean values reflect the eagerness of both groups to receive proper training. It also shows that there is a definite need for universities to improve on delivering e-learning and technology oriented training, for both faculty and students, before taking any step in implementing e-learning initiatives.

Table 6. Statements related to training needs with computed mean scores lower than 3.4

Faculty				*Students*			
Item#	*Specific Statements*	*Mean*	*SD*	*Item#*	*Specific Statements*	*Mean*	*SD*
32	I do not need training on e-learning.	2.63	1.33	32	I do not need training on e-learning.	2.87	1.43
33	My students do not need training on e-learning.	2.58	1.01	33	My instructors do not need training on e-learning.	2.84	1.16
34	Technical and administrative personnel do not need training on e-learning.	2.73	1.19	34	Technical and administrative personnel do not need training on e-learning.	3.06	1.2
35	The facilities of the university are sufficient for e-learning.	2.85	0.88	35	The facilities of the university are sufficient for e-learning.	3.19	1.08

Technology Infrastructure

Finally, technological infrastructure is also an important factor that can affect the adoption of a technological innovation in an educational institution. A university that wants to implement e-learning should have at least established a basic technological framework that can support this learning environment.

Table 7 provides the mean scores of participants' responses for issues pertaining to this dimension. The result of the assessment shows that 20 out of 21 statements have means lower than the expected level of readiness (M < 3.4). The only item which garnered an acceptable mean score is item #45 which relates to the use and availability of multimedia projectors. This implies that the current technological infrastructure of the universities surveyed is not good enough in most cases, and that there is much that needs to be done in order to upgrade

the infrastructure of these institutions to the level needed to make e-learning possible and more meaningful.

Table 7. Statements related to technology infrastructure with computed mean scores lower than 3.4

Faculty				*Students*			
Item#	*Specific Statements*	*Mean*	*SD*	*Item#*	*Specific Statements*	*Mean*	*SD*
36	I have sufficient access to online resources and learning materials and can adequately use them in creating exercises and designing learning activities.	3.38	1.47	37	Internet services provided by the university are adequate.	2.93	1.26
37	Internet services provided by the university are adequate.	2.75	1.28	38	Internet services provided by the university are fast.	2.89	1.25
38	Internet services provided by the university are fast.	2.85	1.29	39	Internet services provided by the university are reliable.	2.9	1.21
39	Internet services provided by the university are reliable.	2.95	1.27	40	Internet services can be easily accessed outside the university (example: through private cyber cafes).	1.0	1.14
40	Internet services can be easily accessed outside the university (example: through private cyber cafes).	3.25	1.24	41	The university's digital library is efficient.	2.91	1.12
41	The university's digital library is efficient.	2.77	1.16	42	Educational materials could be accessed from the university's website.	2.99	1.14
42	Educational materials could be accessed from the university's website.	2.77	1.14	43	Links to educational resources websites and e-journals can be found on the university's website.	3.05	1.19
43	Links to educational resource websites and e-journals can be found on the university's website.	3.23	1.23	44	Students can easily get access to a computer in the ICT centre or within the university	2.89	1.27
44	Students can easily get access to a computer in the ICT center or within the university	2.8	1.25	46	Interactive whiteboards are available in the University.	3.42	1.15
46	Interactive whiteboards are available in the University.	3.32	1.13	47	Computers are adequately provided.	3.19	1.26
47	Computers are adequately provided.	2.9	1.22	48	Other electronic devices that could access, store,	3.03	1.14

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					send, manipulate and read information are adequately provided.		
48	Other electronic devices that could access, store, send, manipulate and read information are adequately provided.	2.9	1.05	49	Television sets are available.	2.9	1.34
49	Television sets are available.	2.45	1.16	50	Digital Video Disk players are available.	2.84	1.19
50	Digital Video Disk players are available.	2.67	1.27	51	Flash drives/External Hard drives are adequately provided	3.13	1.2
51	Flash drives/External Hard drives are adequately provided	2.87	1.23	52	E-books are adequately provided	3.04	1.2
52	E-books are adequately provided	3.08	1.37	53	Software is sufficiently provided	3.04	1.39
53	Software is sufficiently provided	2.62	1.35	54	Printers are adequately provided.	2.92	1.29
54	Printers are adequately provided.	2.62	1.25	55	Online collaboration /teleconference are employed by lecturers to enhance teaching	2.94	1.35
55	Online collaboration /teleconference are employed by lecturers to enhance teaching	2.73	1.51	56	Computerized diagnostic assessment tools are available for assessing students.	2.56	1.24
56	Computerized diagnostic assessment tools are available for assessing students.	2.62	1.28	57	Institutional email accounts are provided adequately.	3.04	1.19
57	Institutional email accounts are provided adequately.	2.72	1.21				

FINDINGS AND RECOMMENDATIONS

In this study, the level of readiness of higher education institutions were divided into four dimensions, namely: the perceived e-readiness of faculty and students, their level of acceptance of the technology, the need for training, and the readiness of the technological infrastructure of the university to support e-learning. While the statements used in the survey instrument represent only some of the major issues for assessing e-learning for each dimension and are by no means complete, they still provide some indication about the status of e-readiness in each university as perceived by its faculty members and students.

The overall descriptive analysis of the results revealed that, at the moment, the universities surveyed are not yet ready for implementing e-learning. The bright spot identified by this study, however, is that the combination of a good level of readiness in terms of technological skills and a high degree of acceptance by faculty and students already provides an important

starting point for any e-learning initiatives that may be implemented in the future. Since it implies that less effort need to be exerted in convincing these two important groups of key players to participate and support the initiative. However, while faculty and students are ready enough and have positive perceptions towards e-learning, more efforts would be needed to address other possible hindrances. The study shows that these hindrances revolve around issues related to the lack of training and the inadequacy of existing technology infrastructures.

To achieve a higher level of readiness, universities need to provide preparatory training to both faculty and students to further improve their skills in handling the technology involved in this environment. In this case, the weaknesses identified through the results of the survey can provide some guidance on identifying their training needs. Based on the data collected, faculty members should foremost be provided training on how to confidently utilize file management tools to prepare them for the transition from the traditional to the digital media format. Training should also be provided on how to effectively use authoring tools to develop and design their own course contents. Appropriate techniques for utilizing email for online communication should also be provided and the habit of using it should be encouraged. The time management skills of faculty members should also be enhanced to enable them to cope with the time-draining processes of mediating and monitoring online activities. Finally, if faculty members are to become efficient e-learning practitioners, it would be advisable to concentrate on providing them with adequate training on implementing technology-mediated instruction. This will help remove their doubts on their skills to utilize e-learning and will assist in allowing them to adapt their methods to include these new technology tools. On the other hand, students should also receive adequate orientation on e-learning and other related concepts to help remove their doubts on e-learning. They should also have the right technology skills and attitudes in order to adapt into this new environment.

The issue of expanding the capacity of the technological infrastructure must also be addressed prior to implementing an e-learning initiative. Universities in Sudan need to put in place the necessary infrastructure needed to support this new environment such that faculty members and students would not use it as an excuse to turn away from e-learning. The results of the survey also helped to highlight some of the most significant limitations that hamper the existing infrastructures of Sudanese universities. From both the faculty and students' perspectives these limitations include: the lack of adequate access to computers inside the university, the lack of reliable and stable internet connections, the lack of peripheral devices like televisions, printers, DVD players, and other electronic devices. Software tools are also not sufficiently provided and digital libraries and access to online resources and learning materials are inadequate as well, including the provision of institutional email accounts.

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