

E-learning Environment's Effectiveness and Efficiency for Educational Institutions: the case of KAU & QU

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Abstract

The present research aims to investigate the efficiency and effectiveness of e-learning systems adoption and implementation in context to the Saudi educational sector with specific focus on Saudi universities. It investigates the impact of the system on academic staffs teaching online courses. Adopting quantitative research approach, the IS-Impact Measurement model was used to design the questionnaire to collect the primary data. It was used to find out the effectiveness of the current systems based on the perspectives of academic staff with experience teaching online courses for a year at least. The total outcomes of the whole research ended up proposing a business model to enhance and modify e-learning environments for Saudi universities with specific focus on their quality by assessing and understanding of the impact employees have within their roles.

Keywords: e-learning; distance learning; IS impact, Higher Education; Saudi Arabi

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1. Introduction

Recently, the Saudi educational sector has grown considerably. Global educational institutes and universities have implemented a range of innovations to offer high-quality courses to their students with the goal of enhancing their learning outcomes and overall quality of education. Within this domain, collaborative e-learning environment has gained considerable attention of many globally recognized universities and has played a pivot role in rising student enrollment. Saudi educational institutes are no exception as they have begun to provide education through eLearning^{[1][2]}.

Globally, technology development has been observed to be growing exponentially, and with this, communication and e-learning are also increasing gradually^[2]. Internet usage has been growing considerably and this is attributed to the influence of the developed services and applications. These include videoconferencing tools, data processing tools, multimedia tools, social media tools, and e-learning systems. It is reported that Saudi Arabia has effectively adopted e-learning systems during the initial stages of its development. Since the last decade, the number of Saudi students' enrollment has increased substantially^{[4][40]}. To further keep up with this trend, many educational institutes in Saudi Arabia have adopted e-learning systems to provide high quality education to students from remote locations. Furthermore, these systems ensure that both courses are accessible for both course instructors and students^[1].

IS Impact Measurement Framework was used to investigate the efficiency and effectiveness of e-Learning system from user perspective. In this research, the researchers considered four components for e-learning system evaluation^[41]. These are: organizational impacts, individual impacts, information quality, and system quality. While all these sides except the individual impacts were reported in^[5], this research intends to investigate the impact of e-learning systems at individual level with specific focus on Saudi Universities. Two Saudi universities were selected for the application of this study: King Abdulaziz University and Qassim University.

2. Related Studies

This whole project assessing the e-learning system is based on the IS-Impact Measurement model^{[6][7]}. The IS-Impact Measurement model had been selected because it has four aspects on basis of which, the efficiency and effectively of an educational system is reviewed^[6]. Furthermore, this evaluation model was chosen because the validation of e-Learning is more reliable than when other financial models are used^[6]. As an outcome, this research creates a theoretical framework that is relevant to educational organizations in Saudi Arabia. The analysis of existing literature has revealed that the given model can effectively be adopted for educational environment globally. The IS Success/Impact model is known to analyze the whole attributes of the e-learning environment^[8].

In addition, the multi-dimensional formative construct was utilized to address the

challenges that can determine the IS Success/Impact[9]. Gable, Sedera and Chan^[10] stated that it includes the majority of the environments. Based on the research, several models related to e-learning in context to technology and techniques were identified. DeLone and McLean's^[8] IS-Success model, the Balanced Scorecard^[11] and Gable, Sedera and Chan's^[10] The IS-Impact Measurement model was selected for this research as it was found to be appropriate based on the research aim and objectives. The DeLone and McLean IS-Success model has been studied extensively in research^[12].

The synthesis of literature demonstrates that the IS Impact Measurement Model is the innovative model pertaining to e-learning environment. It is used for the IS investigation as a model of measurement^[7]^[10]. It is considered to be efficient for determining whether the given e-learning system is efficient in fulfilling the needs and requirements of the organization. This model has six dimensions with forty-one measures. The dimensions of the model are outlined as follows: Individual Impact, Informational Quality, Organizational Impact, System Quality, User, and User Satisfaction^[6]^[10]. Gable, Sedera and Chan^[10] and Rabaa'I and Gable^[13] have reported that both User and User Satisfaction are the dimensions that have emerged because of before and after of success. Both Information Quality and System Quality have been reported to influence Use and User Satisfaction^[14]. However, it should be noted that Gable, Sedera & Chan^[10] have

proposed that the Use dimension is not instrumental in determining the success of IS. Furthermore, they state that "User Satisfaction has been measured indirectly through Information Quality, System Quality and other variables in prior studies"^[10]. Therefore, this study has adopted four dimensions of the model. The four dimensions have thirty-six measures. These measures will be used to design the questionnaire to collect perception of end users in terms of e-learning systems.

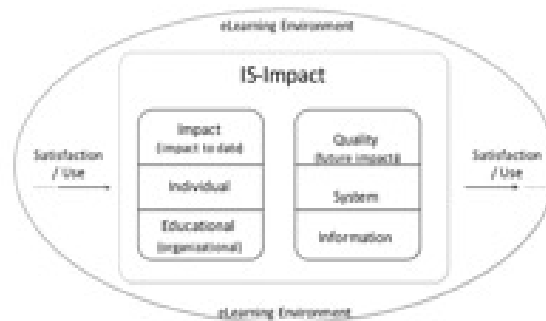
Ramayah & Lee^[15] studied the IS-Impact model's six dimensions extensively and justified its choice for design and utility in e-Learning systems. These include System use which is considered as successful when e-learners view it as adding value to their learning experiences or improves their performance. User satisfaction, on the other hand, is a measurement to analyze the association of the user with the e-learning system. It evaluates the end users needs and requirements, and it is surmises that frequently utilized systems indicate its successful impact. The dimension of the quality system is evaluated through availability and design of the system in terms of meeting their needs with its success being evaluated by user-friendliness and provision of feedback to the e-learner. Another dimension is the information quality which is examined through the system's output. This dimension is analyzed through different parameters such as precision, efficiency, reliability, and appropriateness in context to e-learning content^[16]. Additionally, e-learning systems should be user-friendly,

simple, and accessible for the end users^[17]. It is worth noting that the system utility influences user satisfaction and in turn leads to an improved e-learning system. These dimensions are inter-dependent on each other and form a continuous cyclic process^[18]. However, these dimensions produce different results depending on whether the system usage is mandatory or voluntarily chosen for e-Learning.

The synthesis of literature pertaining to IS, end-user computing satisfaction, e-learning system, and related areas have identified several variables that can be used to determine the efficiency and effectiveness of the e-learning systems (e.g., Latchman et al.^[19]; Naidu^[20]; Hooper^[21]; Liaw and Huang^[22]; El Mansour and Mupinga^[23]; Zembylas and Vrasidas^[24]; Suthers et al.^[25]; Okamoto^[26]; Bonk^[27]; Reuben^[28]; Tomsic and Suthers^[29]; Gable, Sedera and Chan^[7]; Gable, Sedera and Chan^[10]; Rabaa'i and Gable^[13]; Wang, Wang and Shee^[30]; Wang, Tang and Tang^[31]; Wang and Tang^[32]; Wang and Liao^[14]; Wang^[33]; Ramayah & Lee^[15]; Elias^[34]). Therefore, we ended up with four variables that are most suitable for e-learning system success, see figure 1 below. These variables are organizational impacts, individual impacts, information quality and system quality. All these variables except the variable of individual impacts were reported in Alkhalaf, Drew, AlGhamdi & Alfarraj,^[5] and Alkhalaf, Drew & Alhussain^[35]. So, the current paper emphasizes on the individual impacts of staff members of e-learning systems. In terms of individual impact,

this research evaluates how e-learning systems effect individuals. It emphasizes on the evaluation of the e-learning system to determine whether it is beneficial for individuals in context to learning, sharing of information, decision-making, and overall efficiency.

Figure 1: A developed model for staff members using e-Learning systems



3. Method

This study was based on the IS-Impact Measurement model. The model has been developed by Gable, Sedera and Chan^[7], which is used in surveys. Accordingly, the IS-Impact survey instrument has been used with minor modifications to ensure suitability with our topic, the full instrument items can be found in the appendix. The questionnaire was based on the 4 dimensions of the IS model. The dimensions selected were: individual impact, information quality, organizational impact, and system quality. These dimensions contained 36 items. A five point Likert scale was used for rating these items^[36].

The questionnaires were distributed among the faculty members of the Saudi universities, which were selected for this research. These were: Qassim University and King Abdulaziz University. It was presented to 50 faculty members. 11 partici-

pants were the entire members of the Computer Science Department in the College of Sciences and Art, Qassim University, while 39 respondents were the entire from the Computer Sciences Department, King Abdulaziz University, Saudi Arabia. 38 forms were retrieved that were completed. The response rate calculated was found to be 76%. The distribution of respondents by gender was 30 males (78.9%) and eight females (21.1%). Among the sample; 35 members were aged between 20-25 years 92.1 %, two members were aged between 25-30 years 5.2 % and one member was over the age of thirty 2.6%. Thus, it can be said that the sample in this study is representing the whole population.

Analysis of the responses obtained through the questionnaires was achieved using the SPSS software. This software provided an analysis of the questionnaire in terms of the percentage and frequency of each response category for every answer. It also evaluated the statistical level of significance of each response through the chi-square value.

4. Results and discussion

Table 1 below shows the Chi-square Goodness of Fit test values for Individual Impact, which is the first dimension of the IS model. 9.49 is the high Chi-square value. Here, the level of significance is 0.05 and 4 degrees of freedom. As shown in Table 1, the expected and actual values for the Individual Impact dimension have significant difference, which statistically is not a coincidence.

From the below table 1 and Figure 2, the

results indicate that Individual Impact is the most essential component of the e-learning system, which helps in their learning and enhancing their productivity. The participants also learnt from using the system, which contributed to their experience. As shown in the table, the mean of the responses was found to be between 3.3 to 3.79. The relative importance varied from 66% to 75.3%. The standard deviation determined for the responses varied from 0.935 to 1.199.

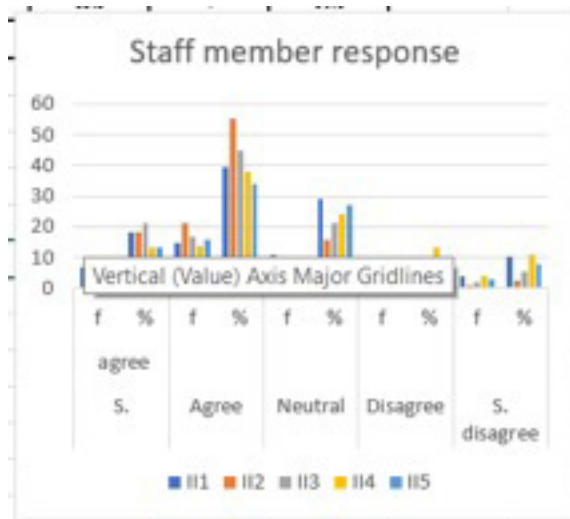
Table 1: Relative numerical distribution and standards deviation and the value of chi-square for related to the dimension (Individual Impact) for the staff members

N	S. agree		Agree		Neutral		Disagree		S. disagree		M	SD	X ²	Relative weight	#
	f	%	f	%	f	%	f	%	f	%					
II1	7	18.4	17	43.7	11	28.0	3	7.6	4	10.3	3.73	1.158	18.21	75.6	3
II2	7	18.4	20	51.3	6	15.4	3	7.6	3	7.6	3.78	1.405	12.31	71.8	1
II3	8	21.1	17	43.7	8	21.1	3	7.6	2	5.26	3.68	1.068	18.51	71.6	2
II4	3	7.6	14	37.8	9	23.3	5	12.8	4	10.3	3.30	1.199	9.33	66	3
II5	3	7.6	16	41.2	10	27	3	7.6	3	7.6	3.46	1.095	18.92	69.2	4

** Significant at 0.05
* Significant at 0.01

Items: II1: I have learnt much through the experience of using the eLearning system (Learning); II2: The e-Learning system enhances my awareness of requirements of educational processes (Awareness/Recall); II3: Using the eLearning system will increase my productivity (Individual productivity); II4: I am satisfied with the experience of using the eLearning system (Experience); II5: Most users have a positive attitude towards or evaluation of the eLearning system functionality (Attitude) The results indicate the following. For Item II1, a rate of 57.9 %, believed there was a positive impact on development from the use of e-Learning, which indicates the effectiveness of e-Learning in the

Figure 2: Staff member response



development of the educational process. An IT manager stated, “The staff members need more time to feel comfortable and learn about the need to use the eLearning system”.

Furthermore, as indicated by Item II2, 73.7% of respondents agreed that the system of eLearning enhances their awareness of the needs of research, and helps them complete their scientific research by utilizing the e-Learning system’s electronic libraries, databases and electronic systems.

Concerning Item II3, 65.8% of respondents confirmed that the use of e-Learning helps increase their production of knowledge. According to a member of Academic Development and a teacher using an e-Learning system, some reasons may hinder the process of production, such as the years of working service. It was found that some of the faculty members with long period of work experiences are reluctant to effectively use the non-traditional teaching style. Also, the type of job or specialty, and the type of college are seen to have impact

on using technology. An IT manager stated, “We have some members of the faculty who have a tough time dealing with technology. They can usually work quickly, but when they use a computer their work is much slower”.

E-learning system offers benefits to faculty members. The most important use of modern electronic systems is to help quicken access to everything they need for obtaining and processing information, educating themselves in the process, and therefore increasing their scientific output. According to a member of Academic Development, “ELearning helped the development of functionality”. Another, faculty member reported that “I learned a lot; I learned about processing lectures from the Internet, I learned more about IT and information security, I learned how to be in communication between myself and the students more closely, I learned that when the students say what they need they use the website (a cooperative Blackboard discussion) or e-mail. Moreover, I learned when e-Learning will be useful to students and when it will not be useful”.

According to all interviewees, e-Learning increases productivity because it saves time and provides more definitive products. The responses from Item II4 found that 51.3% of the participants showed satisfaction in terms of e-learning system based on their usage. This finding may be due to the widespread availability of modern technology recently utilized by the University of Qassim and King Abdulaziz University’s educational systems. 47.7% of the re-

spondents of Item II5 rate the functionality of the e-Learning system as positive.

As a result of the above responses, it has been verified that e-learning systems are beneficial and are practically viable for educational institutes, colleges, and universities, and dramatically increases the capacity of faculty members at Qassim and King Abdulaziz Universities to interpret information accurately, thereby increasing their understanding of the information. It also works to increase faculty members' relevant activities in their scientific departments, as well as helping to provide the basic information used in their studies, which helps in improving both learning and teaching process significantly.

5. Implications

This research aimed at analyzing the use of e-learning systems by analyzing the perceptions of the users, which included both learners and faculty members. While this perspective would have been enhanced by interviews with more staff members and managers; this research found that flexibility of the system and positive impact of the IS Model is needed to enhance the e-learning system's capabilities in terms of space, time, speed, and interaction. This research recommends the activation and use of the "Hyper business model of e-Learning", Figure 3, in all divisions and steps, and to monitor its impact on education by using the "IS-Impact Measurement model of e-Learning" at least once every two years. The figure contains five entities: the e-Learning Improvement Project, the Academic Department, the e-Learning System, the Learning Management System, and the System Development/Enhancement Project.

tem, the Learning Management System, and the System Development

Project. This diagram of the business model gives a comprehensive view and descriptions of the life cycle and shows where the items must be taken into account in those five entities' life cycle (both in operation and creation). This mapping is intended to provide a complete view of e-Learning environments (what entities are involved and what their life cycle is), Figure 4, and illustrate where the items (defined by the IS-Impact Measurement model) must be taken into account in the life cycle of these entities (both in operation and creation), e.g., influencing the tasks of academic departments and developmental projects.

Figure 3: Proposed Hyper Business Model of e-Learning

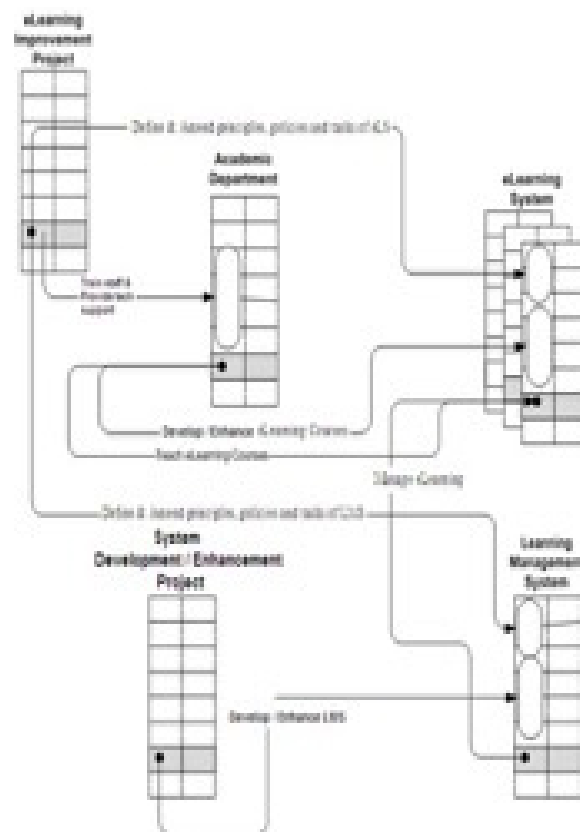
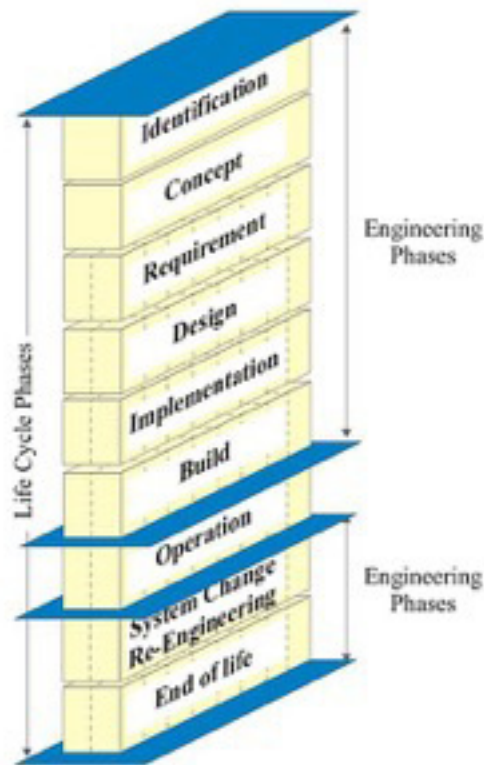


Figure 4: Enterprise architecture life-cycle phases [37]
[38]



The e-Learning improvement project is intended to improve the e-Learning environments through the analysis and investigation of the content offered by the website along with the analysis of the e-learning tools incorporated. This is in order to improve the quality of e-Learning and to evaluate staff competencies and technical support.

The e-Learning improvement project's responsibility is to identify the e-learning system's concepts and notions, policies, procedures, and responsibilities. Moreover, this entity is responsible for training academic staff and creating technical support within the academic department. The lists of items most satisfied by this entity are:

- Ensuring that the e-Learning components are always available both online and offline, by using a server and providing access to the e-Learning system inside and outside the campus.
- Aiming to design a navigational e-learning system, which is easy to use. It is considered to be simple as compared to LMSs such as Blackboard.
- Creating ease of access while on campus that is as simple as just one click on the Internet.
- Providing all course-related materials on one website, and providing the student with an organized display of assignments and handouts to make it easier to print the relevant materials at his or her convenience. Furthermore, it offers arrangement configurations for documents based on time requirements.

The academic department supports the development of e-Learning courses and provides teachers with e-Learning courses that are delivered through part of the e-Learning system.

The following are considerations must be made to ensure the satisfaction of teachers:

- The adoption of implementing e-learning system is essential for improving teaching methods. Therefore, it is imperative for the academic department to take into account the need for online collaboration and to acknowledge the academic workload associated with such delivery. Therefore, academic staff must be trained so that they are at a capacity to efficiently use collaborative tools.
- Students are active in discussions within

the e-learning environment. However, it is important for the academic department to also actively participate to ensure that students receive adequate feedback to guide them along the correct path.

- e-Learning course materials are always scheduled online on time.

The e-Learning system involves delivering online courses in which the delivery process includes teachers, students, and course materials through support tools (such as collaborative tools). The design of each online course needs to be consistent with the principles and policies defined by the tasks from the e-Learning improvement project. The actual tasks (desired learning outcomes as well as other functional and non-functional requirements) of each course are defined by the academic department. When developing e-Learning courses the academic departments need to take into account the following items of success:

- The teacher should foster student engagement (student interaction).
- Collaborative tools act like a motivational agent that encourages the students to have online interactions with the teacher and with each other.
- The teacher should have an interest in teaching students in an e-Learning setting.
- The teacher always effectively utilizes the e-Learning system.
- Student participation and involvement in discussing topics are always highly active in the e-Learning setting.
- The teacher initiates most of the discussions that make the collaborative tools

more active and effective.

- E-Learning encourages students to ask questions; this enhances their knowledge level when compared to traditional methods.

- Both teachers and students use the e-Learning components more adequately by selecting easier and better approaches for their use.

The Learning Management System is a software, which is responsible for supporting the e-learning system. The software must support collaborative tools to provide a high-quality eLearning environment. The list of items which are most satisfied by this entity include:

- Most of the e-Learning tools used in the collaborative system are easy to use.
- Resources can be browsed and downloaded at a reasonable speed.
- All course-related material is available at the one source, which enables students to easily acquire printouts of assignments and handouts.
- The e-Learning components are always available both online and offline.
- The system development project is involved in context to the e-learning platform. Its duty is to identify the concept and the requirements of the learning management system entity. The item of success most satisfied by this entity is:
 - Students have the right to receive advice/help from the teacher in a collaborative environment.

6. Conclusion

In conclusion, this research aimed at investigating the adoption of the e-learning sys-

tems of the Saudi universities perspective to identify its benefits. It focused on the individual influence of the online courses taught by academic staff. The system flexibility and the significant influence of the IS Model are expected to enhance space, time, speed and engagement functionality of the e-learning system. This study suggests that the “Hyper business model of e-learning” should always be enabled and used. Moreover, it recommends that all three stakeholders (teachers, students, and materials) are essential for the success of the model to engage with each other within the context of the structure of the model. The findings of this study also showed a clear understanding of the e-Learning environments. This understanding could create a clear awareness of the employees influence when doing their responsibilities, which could speed up the educational progression and enable students to master concepts more quickly.

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