Measuring the Impact of the Blackboard System on Blended Learning Students

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Abstract—With the advantages of using learning management systems (LMS) such as Blackboard in the educational process, assessing the impact of such systems has become increasingly important. This study measures the impact of the Blackboard system on students at Saudi Electronic University (SEU) in order to help improve the quality of existing learning environment. For this assessment and measurement, the IS-Impact Measurement Model is used, since it is the most comprehensive model that is valid in the context of this study. The results of this paper indicate how Blackboard is influencing individual performance. It concludes that the use of the Blackboard system has a positive impact on individuals.

Keywords—learning management system; IS impact/measurement; Blackboard; blended learning

I. INTRODUCTION

The rapid growth of information and communication technologies provides unique opportunities for e-learning to improve the educational process. Leaning management systems (LMS), such as WebCT and Blackboard, are used by many universities and educational institutions to provide and improve learning. LMS take advantage of new technologies to make learning available and accessible anywhere in the world and at any time. According to [2], the success of e-learning can be attributed to the availability of LMS. LMS, which are also known as virtual learning environments (VLE) or learning platforms, enable educational institutions "to develop electronic learning materials for students, to offer these courses electronically to students, to test and evaluate the students electronically, and to generate electronically student databases in which student results and progress can be charted" [2, p. 2]. The use of LMS helps learners to easily keep track of their courses, and instructors to simply evaluate and track each learner.

Given the value of LMS, assessing the success and impact of LMS has become increasingly important to improve the quality of the educational process, especially in view of the fact that many studies, such as Aceto et al. [3], Wang et al. [4], and Alkhalaf [5], highlight the need for measuring and evaluating e-learning systems.

This research is situated within the field of information systems, and measures the impact of the Blackboard system adopted at Saudi Electronic University (SEU). More specifically, this study uses the IS-Impact Measurement Model [1] to assess the impact of the Blackboard system on students in order to help improve the quality of the existing learning

environment at SEU as the only university in Saudi Arabia that has adopted a blended learning style. This paper is structured as follows. The relevant literature is reviewed followed by the description of the empirical research that involved a descriptive survey of the students in SEU. Finally, the results and conclusions are presented.

II. BLACKBOARD AS A LEARNING MANAGEMENT SYSTEM

LMS have been defined differently by various scholars. Ayub and others [6] gave a precise definition and termed LMS as a Web-based technology that aids in the design, distribution and assessment of a certain process of learning. An LMS is basically software that has been designed to guide the entire learning process as well as provide learning resources to the learners. It can also be described as a set of tools and framework that enable easy creation of Web content while guiding learning [7]. Wahlstedt and Honkaranta [8] affirm that LMS are an advancement of traditional learning, since they comprise instructional devices, learning content, and evaluation devices. What is unique about LMS is that they can be used to plan, convey, and manage learning, thus combining various tasks earlier distributed to different stakeholders. Management tasks of LMS include delivery, examinations, statistical analysis, and virtual classes [7]. According to Paulsen [2], "Learning management systems manage the log-in of registered users, manage course catalogs, record data from learners and provide reports to the management." It is, therefore, a crucial tool in educational institution management because it basically brings all these facets on board.

An LMS is a crucial platform where learners and their instructors can interact and simultaneously share learning materials. An LMS can, therefore, be regarded as an advanced Internet-based technology solution for both the learners and the instructors because it allows the two parties to connect with the help of interactivity features such as forums, file-sharing platforms, and thread discussions [7]. An LMS can be used by an instructor to distribute course material while aiding in instructor–learner interaction [9]. The management function of LMS is particularly of great importance because it requires less effort and saves time that would otherwise have been wasted by the instructor without changing the entire instructional process. Threaded discussions, video conferencing, and discussion forums are key characteristics of LMS [7]. These features allow for an interactive learning environment.

LMS have a tremendous effect on e-learning. According to Paulsen [2], the presence of an LMS determines how e-

learning will succeed. With an LMS in place, an institution can easily develop Web content, teach electronically, evaluate learners electronically, and generate learners' databases through which the learners can access their results [2].

Despite being helpful in aiding e-learning, there has been a gap between reality and other advanced instructional tools, such as the multimedia type that are believed to be of help in instruction [9]. On many occasions, these multimedia tools are not normally used, or if they are used, instructors do not exploit them fully. For example, many institutions are currently using LMS to facilitate e-learning but instructors limit themselves to uploading course materials and barely use the other features, such as discussion forums [9]. Other users have been discouraged by the fact that they do not receive immediate feedback from features such as email [9]. Although these interactive features have been included in LMS, their use may still be restricted by the commitment of both parties. LMS can be used to bridge the gap that exists between reality and advanced instructional tools. This can only be possible if the LMS is built to be more adaptive and customizable [9]. Building an adaptive and customizable LMS will help in ensuring that learners and instructors with different levels of computer literacy are accommodated.

The Blackboard system is Web-based software that features a customizable open architecture for course management that permits amalgamation with student information systems and authentication protocols. This system may be installed on local servers or hosted by Blackboard ASP solutions, and its core purposes are to develop completely online courses with a few or no face-to-face meetings and to add online elements to courses that are delivered conventionally face to face. The Blackboard Learning System provides users with a platform for sharing content and communication [9]. With regard to communication, the Blackboard system enhances announcements, that is, instructors can post items for learners to read. Such announcements may be created as pop-up messages or via the announcement available in the Blackboard system. A discussion feature makes it possible for professors and students to create discussion threads and offer feedback. The chat function in the Blackboard system allows learners to converse and share ideas. Lastly, the Blackboard mail allows students and teachers to send mail to each other or to groups. The learning modules feature allows professors to post various lessons for students to access. Instructors can also post assignments and receive assignments via the assessment tab. Teachers and professors can use the grade book feature to post grades for students to view. Lastly, videos and other media can be posted under the media library function.

III. SAUDI ELECTRONIC UNIVERSITY (SEU)

A royal decree was issued by King Abdullah Bin Abdul-Aziz, the custodian of the Two Holy Mosques, on October 8, 2011 to launch the Saudi Electronic University (SEU) as a government educational institution. The SEU is the only specialized university in blended learning in the Kingdom of Saudi Arabia, and it offers both graduate and undergraduate degree programs along with lifelong education. The goals of the university are to represent the nation and to compete with other international universities, to present a flexible and

distinguished example of higher education, to support self-learning skills and offer knowledge, to offer higher education based on the best applications and technologies of e-learning, to transfer and localize knowledge, and to support the mission and the concept of lifelong e-learning and blended education for all members of Saudi society.

SEU adopted a blended learning pattern, which is the latest style of learning used in universities around the world. It is based on the combination of 25% direct traditional education with 75% e-learning using virtual classrooms, educational forums, and interactive activities. This style of learning is based on self-discipline and leadership for self-learning. Moreover, it considers the student to be the focus of the educational process, and he or she is the initiator and the leader. The teacher's role is to motivate and direct the educational process.

The adopted blended learning pattern in SEU combines the features of both traditional education and e-learning in an integrated model that obtains the maximum benefit from the technology and the means available to each of them in order to achieve the desired optimal learning objectives.

IV. THE IS-IMPACT MEASUREMENT MODEL

The IS-Impact Measurement Model proposed by Gable, Sedera, and Chan in 2008 has always been regarded as a comprehensive and valid IS success measurement model [10]. Gable et al. [1] proposed a definition of the IS-impact of an information system (IS) and they defined it as "a measure at a point in time, of the stream of net benefits from the IS, to date and anticipated, as perceived by all key-user groups" [11]. This model was designed based on the work of DeLone and McLean [12], and it corrects the setbacks of the DeLone and McLean IS success model.
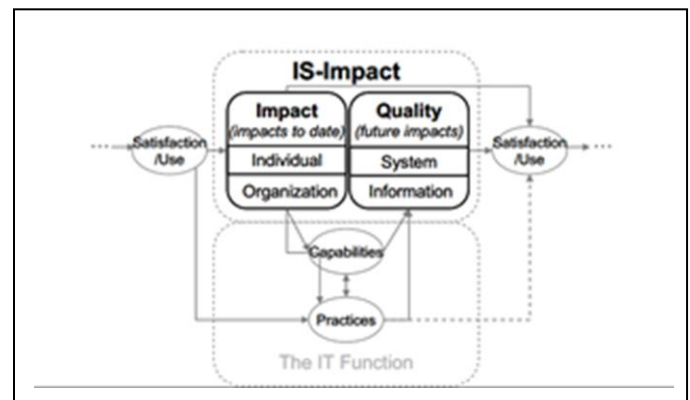

Fig. 1. IS-Impact Measurement Model [1].

The IS-Impact Measurement Model differs from the old DeLone and McLean IS Measurement Model in five ways: 1) it reflects a true measurement model rather than the causal/process model depicted by the D&M model; 2) the use of dimensions has been omitted; 3) the aspect of satisfaction is seen as a measure of success rather than a dimension of success; 4) the modern IS context has been taken into consideration through the inclusion of new measures; and 5) additional measures have been added to deeply examine organizational dimension [11].

As illustrated in Figure 1, within the IS-Success/Impact framework, the success and impact of an IS system can be measured in terms of the quality of the information produced (information quality), the performance of the system from a technical perspective (system quality), the impact on individual users (individual impact), and the impact on the relevant organization (organizational impact).

The IS-Impact Measurement Model was selected because it comprehensively takes into account the evaluation of information systems through comprising 37 measures in four important dimensions of the system: "System Quality," "Information Quality," "Individual Impact," and "Organizational Impact." As such, it is a more comprehensive and valid model for use. According to Rabaa'i [11], this model has been tested statistically though surveys; it has proven to be valid and it employs perceptual measures. Such tests depict the validity and reliability of this model. Despite borrowing heavily from the DeLone and McLean model by adopting its constructs, it has succeeded in employing them for a different purpose [1]. The model and approach employ perpetual measures, aiming to offer a common instrument answerable by all relevant stakeholder groups, thereby enabling a combination or a comparison of stakeholder perspectives [10].

Moreover, a study conducted by Alotaibi [13] validated the IS-Impact Measurement Model and emphasized the completeness and validity of IS-Impact Measurement Model as a hierarchical multidimensional formative measurement model in the Saudi Arabian context. Accordingly, this model has been adopted in this research owing to its strengths in comparison to other models. It is quite clear that this model has eliminated all the weaknesses of the other models by including and reviewing their constructs.

V. INDIVIDUAL IMPACT

This paper will focus on measuring the impact of the Blackboard system on blended learning students as individuals. As stated by Gable et al. [1; p. 289], "The 'individual impact' is a measure of the extent to which [the IS] has influenced the capabilities and effectiveness, on behalf of the organization, of key-users." Based on the IS-Impact Measurement Model [1], the variables for the construct of "individual impact" are the following:

- I have learned much through the presence of Blackboard.

- Blackboard enhances my awareness and recall of job-related information.

- Blackboard enhances my effectiveness in the educational process.

- Blackboard increases my productivity.

Accordingly, individual impacts are concerned with how the Blackboard system influences individual performance. The hypothesis of this construct is that the Blackboard system used in SEU has a positive impact on the individual.

VI. METHODOLOGY

This study adopts a positivist paradigm of research that seeks to test theories, verify hypotheses, and investigate the real world as it exists [14, 15]. This paper is a part of the research that will evaluate and measure the use of the Blackboard system adopted at SEU by testing the IS-Impact Measurement Model developed by Gable, Sedera, and Chan in 2008 (Figure 1). In particular, this paper measures the impact of the Blackboard system on blended learning students by using a single case design. This is because the use of a single case design is more suitable for research that aims to test a theory, anomaly, or special case [16]. This research will use a single case design to delve more deeply into the phenomena in order to insure that a rich description and understanding is provided. It will use a case study to help achieve the aim of the research, which is to evaluate and measure the impact of the Blackboard system adopted at SEU for the purpose of improving the quality of the existing learning environment. As mentioned by Benbasat, Goldstein, and Mead [17, p. 370], "A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)."

For the purpose of this research, a questionnaire was used for data collection. The questionnaire was designed based on the IS-Impact Measurement Model [1]. It was distributed to blended learning students at SEU, including males and females from all branches of the university. The questionnaire included two main sections. The first intended to collect demographic information on the respondents, while the second included the 37 measures of the IS-Impact Measurement Model in four important dimensions: System Quality, Information Quality, Individual Impact, and Educational Impact. As discussed earlier, this paper is focused on the individual impact, which includes four variables to test construct validity. The researcher distributed 2256 questionnaires (to 203 master's students and 2053 bachelor's students). Of these, 447 were returned by the participants. The participants answered the questions on a scale of 1 to 5, where 1 represented "Strongly disagree"; 2, "Disagree"; 3, "Neutral"; 4, "Agree"; 5, "Strongly agree."

VII. RESULTS

All questionnaire responses were stored in the SPSS (Statistical Package for the Social Science) software, which was used for the analyses. Statistical analysis included the frequency and the percentage of each variable, the chi-square value, and its level of significance. As mentioned earlier, only the survey questions that measure the impact of the Blackboard system on blended learning students were included.

It is noteworthy that the total sample of the survey consists of 447 participants, comprising 48 male students and 399 female students. The highest percentage (89%) of the participants were studying for their bachelor's degree, while the lowest percentage (11%) were postgraduate students. All of the participants had at least one year of experience with the Blackboard system

TABLE I.   RELATIVE NUMERICAL DISTRIBUTION AND BASIC STANDARDS, INCLUDING THE CHI-SQUARE VALUES OF VARIABLES RELATED TO INDIVIDUAL IMPACT

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly Agree		M	SD	X^2	Relative weight	Order
	f	%	f	%	f	%	F	%	f	%					
1	10	2.2	32	7.2	78	17.4	237	53.0	90	20.1	3.82	.912	352.519**	3.58	1
2	8	1.8	36	8.1	74	16.6	246	55.0	83	18.6	3.81	.894	383.436**	3.57	2
3	11	2.5	46	10.3	92	20.6	217	48.5	81	18.1	3.70	.964	272.810**	3.46	3
4	15	3.4	55	12.3	125	28.0	185	41.4	67	15.0	3.52	.999	197.172**	3.3	4

[a.] * denotes significance at 0.01

[b.] ** denotes significance at 0.05

[c.] Items: 1. I have learned much through the presence of Blackboard; 2. Blackboard enhances my awareness and recall of job-related information; 3. Blackboard enhances my effectiveness in the educational process; 4. Blackboard increases my productivity.

The survey results clearly indicate that only 2% responded that they strongly disagree that the presence of the Blackboard system has helped them to learn much, while 7.2% disagree on the same, and 17% remained neutral. On the other hand, the majority (53%) of the students agree that the presence of the Blackboard system has helped them to learn much and 20% of the respondents strongly agree that the presence of the Blackboard system has helped them to learn much. It is evident from the data collected that 73% of the students say that the presence of the Blackboard system has helped them to learn much, whereas 9.2% say that the presence of the Blackboard system has not helped them to learn much, and 17% remain neutral on the subject.

As evidenced from the data analysis, only 9.1% of the students perceive that the Blackboard system has not enhanced their awareness and recall of relative information, while the majority (73%) agree that the Blackboard system has enhanced their awareness and recall of relative information. However, 16 % are neutral on the same question. With regard to item number 3, a low percentage (12%) of the respondents indicate that the Blackboard system has not enhanced their effectiveness in the educational process, while a high percentage (66%) of the students either agree or strongly agree that the Blackboard system has enhanced their effectiveness in their educational process, and 20% of the respondents remain neutral on this matter. On the last question, only 15% of the students disagree that the Blackboard system has increased their productivity, while 28% of the students neither agree nor disagree, and a high percentage (56%) of the students believe that the Blackboard system has increased their productivity.

All this can be generalized to the whole population of the students, since the standard deviations are very small and the chi-square statistic on all the answers given by the respondents are significant.

VIII.   CONCLUSION

This paper reports on measurements of the impact of the Blackboard system on blended learning students. This measurement and evaluation was based on the IS-Impact Measurement Model developed by Gable, Sedera, and Chan in 2008. Results of this research support a number of findings reported in literature regarding the impact of LMS on individuals. Analysis of the results shows that the use of the Blackboard system has a positive impact on the individual at SEU. The analysis of the results indicates that using the Blackboard system has helped students to learn much and increased their ability to interpret and recall relative information. The findings also highlight that the Blackboard system has enhanced students' effectiveness in the educational process and has increased the overall productivity of students in the learning process.

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