

Evaluating E-Learning System Use by CBAM-Stages of Concern Methodology in Jordanian Universities

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Abstract—This paper presents the use of a new approach towards evaluating the use of e-learning system by faculty members in Jordanian universities. Evaluating the use of any system is aimed towards providing a better understanding for the needs, challenges and opportunities that are expected from using such systems. E-learning as a supportive method for education in Jordanian universities has been available since 2003 [1]. Different studies have provided an assessment for the use of e-learning in Jordan using different tools many of which have been found unstandardized tool for performing the evaluation. Some of those tools managed to give significant results, while others lacked the systematic approach and the use of appropriate methodology. The Concern Based Adoption Model (CBAM) Framework has been created in order to provide 3 different tools to assess the use of innovation tools used within educational context. CBAM framework is widely used in America, Canada and parts of Europe, and this tool has not been used in any research related to Jordan or e-learning in Jordanian universities. This study is the first study to use and provide valuable outputs for assessing the use of e-learning in Jordanian Universities.

Keywords-component; CBAM, Evaluation, E-learning, Jordanian Universities, Stages of Concern.

I. INTRODUCTION

The adoption of e-learning as effective medium for education has been addressed in different research studies. The benefits of using e-learning systems within educational establishments can be ensured if those systems are able of transferring the knowledge for learner with a high level of functionality, usability, flexibility and quality of learning objects. Also it is important to understand that one of the main sources of successful e-learning is the effective involvement of educators, moderators and facilitators in using this technology and developing, sharing and distributing the appropriate services and resources [2]. Thus for such reasons, the monitoring and evaluating of e-learning system use deserves special attention and requires the consideration of appropriate evaluation methodology. Evaluating educators use and engagement with e-learning can help in improving the quality of e-learning and in updating and shaping the future development in policies and practices [3]. Most of the used methodologies for monitoring and evaluating e-learning are based on questionnaires that are using various indicators which are not standardized [4], [5],[6]. Moreover, different models have been used in order to define educators change process in response to using educational technology. One of the earliest used models is called “The Apple Classrooms of Tomorrow” (ACOT), and this model had five different phases that define stages of educators change in response to introducing computers in the classroom [7]. The used phases were (Entry

phase, Adoption phase, Adaptation phase, Appropriation phase, Invention phase). Another models included all the previous phases with eliminating the entry phase as in the model produced by [8]. The used model had the phases of (Personal productivity, lecture enhancement, interactivity, student centered learning). Similar model was presented by [9] where he proposed a progression of higher education instructors and including the ‘view of computers. His proposed model included (content area and support tool for teaching, productivity tools, multimedia tools and technologies, facilitator of communication among instructors and learners). Most of the presented models and many other models are serving as a lens for inspecting different responses of educators towards e-learning. Those models have been found not providing any instruments that can be used to formally assess instructors use and interaction using e-learning. Another model was presented by [10] and it was called (The Technology Learning Cycle) TCL, this model emphasized on the personal response of faculty member’s use of technology. The TLC model has 5 different phases that are (Awareness Phase, Exploration and Filtration, Learning Phase, Personal and Professional Application Phase, Sharing and Reflection Phase). Another research studied the self-efficacy beliefs by defining the educators’ response to technological innovations. Such research was performed and developed by [11] as they validated computers use in teaching efficacy beliefs instruments (MITEBI). Their use model facilitated measuring instructors’ capability beliefs with regard to technology. In the

same scope a different study was performed by [12] and they proposed an instrument that validated the Beliefs about Teaching with Technology (BATT), and it was grounded on Ford's motivational systems theory which has 4 components that are (Capacity beliefs, Personal goals, Emotional arousal, Context beliefs). This tool was found to be similar to MUTEBI, as it was used to evaluate instructors' skill and beliefs regarding the use and acceptance of technology with more importance on insights of related factors affecting adoption. Most of the previous instruments were found valuable when there are definite concerns about self-efficacy opinions of participants in a changing process. Finally, there are different instruments that have been developed without theoretical foundations, and they are used to validate technological use in education through the focus on repeating the use of such validations in order to capture change over time. Examples for such instruments are (Flashlight TAGLIT, enGauge). Moreover, these instruments are typically aimed at practitioner uses and not used for formal research.

II. THE CONCERNS-BASED ADOPTION MODEL

The previous presented methods are mainly used to measure the change in response to technological innovation. However they have been found short in their inclusiveness and the used instruments, as they have not been found suitable to cover wider aspects. On the other hand, the use of Concern Based Adoption Model (CBAM) has proven to provide a wide-ranging methodology for inspecting change in behavior that result from the use of technological innovations within educational environment. Moreover, CBAM were found to provide an effective instrument for assessing the change with a strong framework for contextualizing the results. The use of CBAM is grounded in theory and it has a rich history of application in research and practice. For those reasons this research found the use of CBAM as well suited methodology and tool to investigate the use of e-learning in Jordanian Universities. The development of CBAM has been accredited to France Fuller in the late 1960s [13]. Fuller's research was founded on evaluating the change process of pre-service teacher based on forming a development model of stages of teacher development. Her research presented participants showing some precise teaching concerns, through which they advance over stages on self-focused concern that was formed later as a task focused concern in order to attain a stage of concern associated to effect on students [14]). Fuller's work had a major concern from researchers that work at Research and Development Centre for Teacher Education at the University of Texas-Austin in the 1970s[15]. The researchers concern was related to the change at the individual level and its effects to the individual adopter. The continuous research on CBAM steered to the development of three different core concepts that created diagnostic tools within the framework of the CBAM model. The main theory of the model is to build tools that can foresee, quantify, define and clarify the change process that teachers are undergoing when implementing an educational innovation. Moreover to be able to identify how the change process is affected by the interferences of the changing facilitators (Anderson, 1997). According to [16],[17] they found that diverse key expectations are underlining the CBAM model that are:

- Change is a nonstop progression, not an event
- Change is achieved by individuals
- Change is greatly an individual experience
- Change includes progressive evolution in feelings and skills
- Change can be provided by directing interferences to individuals, innovations, and contexts

The first tool that was created by CBAM was the Stages of Concern (SoC) and this tools focused on the feelings and concerns of individuals involved with using an innovation [18]. The second tool developed for CBAM, was the Level of Use (LoU) which focused on the innovation related skills, knowledge and behaviors of individuals [19]. Moreover it is important to understand that SoC and LoU displays classical developmental patterns of sequences, however, CBAM do not view these as strictly lock-step in nature. In addition CBAM developed a third tool under the name of Innovation Configuration (IC), and this tools were developed from the understanding that implementation of an innovation is variable thus IC defines ideal and less than ideal features that the scope of an innovation my reveal in practice [20]. In addition to what has been mentioned, the use of CBAM is well acknowledged in different parts of the world and mainly in North America, Western Europe and Australia ([16], [17]). Also the use of CBAM was found to assist in information collection and distribution during the change process and it serves as a mutual language for all involved persons [21].

III. THE CBAM'S STAGES OF CONCERN

The Stages of Concern (SoC) is the first tool that was developed for the CBAM model. Also it is the first tool to be used to investigate the use of an innovation within the educational context. The use of CBAM SoC brings the focus on individual feelings and concerns in responses to an innovation. The concerns towards the innovation are organized into seven different stages that progress gradually from unconcerned to self-focused concerns to focus on tasks and finally to focus on impacts on students. The following table shows the categories of each stage and its meaning:

TABLE I. STAGES OF CONCERN

Impact	6	Refocusing	The person focuses on exploring ways to gain more widespread benefits from the use of the innovation, with the opportunity of making major changes to it or replacing it with more powerful alternatives.
	5	Collaboration	The person focuses on organizing and collaborating with others concerning use of the innovation.
	4	Consequence	The person focuses on the innovation's effect on students in his direct domain of influence. Reflections include the significance of the innovation for students; the assessment of student outcomes, including performance and abilities; and the changes needed to advance student outcomes.
Task	3	Management	The person focuses on the procedures and tasks of using the innovation and the superlative use of information and resources. Moreover there are considerations for Issues related to efficacy, organizing, managing, and scheduling.
Self	2	Personal	The person is unclear about the demands of the innovation and his capability to meet those demands and to define his role with the innovation. He is mainly analyzing and defining the relationship to the reward structure of the organization, in order to determine his role in decision making, and considering possible encounters with current structures or personal commitment. Another concerns in this stage can also involve the economic or status inferences of the program for the user and his colleagues.
	1	Informational	The person shows an overall awareness towards the innovation and has more curiosity to learn additional details about it. In this stage the persons is more relaxed about himself in relation to the innovation. Any interest is considered objective and in practical aspects of the innovation, such as its general characteristics, effects, and requirements for use.
	0	Awareness	The person shows slight concern about his involvement with the innovation.

The CBAM's questionnaire for SoC involves 35 questions that have been tested for reliability, internal consistency and validity by diverse samples and more than 11 innovations [17]. In addition to what has been said it has been found that CBAM allows for an open ended statements of concern to be collected

in addition to the SoC. It is important to understand that SoC has a well-defined measures and updates included in the latest version to support users in scoring, understanding and reporting SoC results [17],[22]. However, every tool has its limitations and in terms of SoC limitations the following points are being described as the limitations of SoC according to [17].

- SoC is used for detection purposes and not to monitor or judge.
- The SoC questions must not be modified or changed.
- The results and interpretations needs to be confirmed with the respondents.
- It is important to assume feedback.
- It is important to base any practical critique of the Stages of Concern on acceptable samples and proper research methodology.

IV. STAGES OF CONCERN VALIDITY

The validity of using any tool for assessment is considered an important issue that needs to be investigated and defined. In terms of CBAM's SoC validity the manual published by [17] has a complete consideration, description and discussion on the procedures that SoC was considered, verified, and developed in accordance with the iterative expansion of the SoC tool in the early 1970s. The verification for validity was completed by the CBAM team on two different educational technologies and with two different educational levels of schools settings and also in higher education. At the early beginnings the CBAM questionnaire had (195) item, and they were tested with a sample of 363, the data was investigated and the results were associated with findings from the follow up interviews. This procedure resulted in forming the CBAM SoC to include the 35-item that was again administrated to a stratified sample of 830 elementary, secondary, and college professors. The results for the Internal reliability coefficients ranged from 0.64 for Stage 0 to .83 for Stage 2, and the rest of stages results were greater than 0.70. Another study had more than 150 participants that used the SoC questionnaire and the test-retest reliability correlations for this study ranged from 0.65 for Stage 0 to 0.86 for Stage 1, and the rest of stages having a result greater than 0.70. More studies were performed on SoC in order to define the relationship between the data gathered via the SoC questionnaire and the data gathered from interviews. Different studies involved the use of correlation matrices, factor analytic procedures and correlation between SoC results and data from other measures of concern were all used in creating the authentication of the SoC. Based on the same research performed by [18] he recounted that the internal reliability coefficients from 7 different large scale SoC studies with a sample size ranged from 214 to 1585 the results were for stage 0 had the lowest reliability with scores ranged from 0.50 to 0.78 while the other stages all scored above 0.70 with some few exceptions on separate studies. The main conclusions that can be derived from the previous studies have proven that the use of SoC questionnaire is a valid tool for assessment within CBAM framework. This research study is found confident to use the same tool with the validity results proven in prior

research studies for the purpose of using e-learning as innovation tools in education.

V. RESEARCH METHODOLOGY

This research methodology is based on using the CBAM’s Stages of concern questionnaire that has a quantitative nature.

The quantitative research methodology is used in order to investigate the current stage of concern from Jordanian Faculty members in general scope with respect to the use of e-Learning. The natures of this research required the involvement of faculty members in order to present and analyze numerical data and to use statistical procedures to draw conclusions and results, consequently it favored a quantitative exploratory approach. The sample chosen for this study were faculty members from different Jordanian universities, and the questionnaire was printed and handled for a sample of 400 faculty members in 12 different universities. The answers came from 138 faculty member and the data were gathered and analyzed using SPSS. The following section will present the results with respect for each stage and questions defined by the CBAM’s Stages of Concern questionnaire.

VI. CBAM’S STAGES OF CONCERN RESULTS

The following table shows the results that have been produced from analyzing the SoC questionnaire. The Mean and Standard Deviation for each question and category is presented in the following table.

TABLE II. FACULTY MEMBERS STAGES OF CONCERN RESULTS

Stage 0 – Awareness	Mean	Std. Deviation	%
I am more concerned about another innovation.	1.90	0.905	38%
I am not concerned about e-Learning at this time.	2.00	0.816	40%
I am preoccupied with things other than e-Learning.	2.27	1.004	45%
I spend little time thinking about e-Learning.	3.50	0.576	70%
Currently, other priorities prevent me from focusing my attention e-Learning	3.90	0.755	78%
Group - s0	2.71	0.822	54%
Stage 1- Informational	Mean	Std. Deviation	%
I have a very limited knowledge about e-Learning	4.00	1.007	80%
I would like to discuss the possibility of using e-Learning	3.54	0.781	71%
I would like to know what resources are available if we decide to adopt e-Learning	4.18	0.882	84%
I would like to know what the use of e-Learning will require in the immediate future.	4.60	0.445	92%
I would like to know how e-Learning is better than what we have now.	4.53	0.455	91%

Group s1	4.17	0.714	83%
Stage- 2 Personal	Mean	Std. Deviation	%
I would like to know the effect of e-Learning on my professional status	3.66	0.717	73%
I would like to know who will make the decisions in the new e-learning system	2.37	0.785	47%
I would like to know how my teaching or administration is supposed to change	2.90	1.242	58%
I would like to have more information regarding the type of commitments required by the use of e-Learning.	3.19	0.499	64%
I would like to know how my role will change when I am using e-Learning	2.79	0.815	56%
Group - s2	2.98	0.811	60%
Stage- 3 Management	Mean	Std. Deviation	%
I am concerned about not having enough time to organize myself each day.	3.12	1.211	62%
I am concerned about conflict between my interests in e-Learning and my responsibilities.	4.12	0.807	82%
I am concerned about my inability to manage all that e-Learning requires.	4.10	1.288	82%
I am concerned about time spent working with non-academic issues related to e-Learning.	4.22	0.968	84%
Coordination of tasks and people is taking too much of my time.	2.60	1.047	52%
Group - s3	3.63	1.064	73%
Stage – 4 Consequence	Mean	Std. Deviation	%
I am concerned about students’ attitudes toward e-Learning	2.80	0.737	56%
I am concerned about how the e-Learning affects students.	3.22	0.457	64%
I am concerned about evaluating my impact on students.	2.56	1.066	51%
I would like to excite my students about their part in using e-Learning effectively.	3.11	0.510	62%
I would like to use feedback from students to change the e-Learning practices and activities.	2.96	0.921	59%
Group - s4	2.93	0.738	59%
Stage -5 Collaboration	Mean	Std. Deviation	%
I would like to help other faculty in their use of e-Learning.	2.60	0.702	52%
I would like to develop working relationships with both our faculty and outside faculty using e-Learning	2.90	0.715	58%
I would like to familiarize other departments or colleagues with the progress of this new approach of using	2.85	0.403	57%

e-learning.			
I would like to coordinate my effort with others to maximize e-Learning's effects.	2.91	0.805	58%
I would like to know what other faculty members are doing in this area.	2.84	0.748	57%
Group- s5	2.82	0.675	56%
Stage – 6 Refocusing	Mean	Std. Deviation	%
I now know some other approaches to learning that might work better when using e-Learning	1.54	0.703	31%
I am concerned about revising my use of e-Learning	3.10	0.742	62%
I would like to revise e-Learning's instructional approach.	2.56	0.410	51%
I would like to modify our use of e-Learning based on the experiences of our students.	3.60	0.431	72%
I would like to determine how to supplement and enhance e-Learning	2.84	0.415	57%
Groups- 6	2.73	0.540	55%

VII. DISCUSSING THE INVESTIGATION PHASE -SECTIONS RESULTS

The presented results are assembled according to Stages of concern model. The following section will discuss the results with respect for each stage, and later general discussion on the results will be provided for all the obtained results.

A. Stage 0 Awareness

This stage had the percent of (54%) and it shows that most participants in regard to the awareness stage they have little concern and involvement with the e-learning systems. From this stage, the highest percent indicates that (78%) of participants are having other educational priorities preventing them from directing their activities towards the use and adoption of e-Learning. The second highest percent of (70%) shows that participants attitude were to spend little time thinking about the use of e-Learning. Such percent can be justified, as most participants didn't get proper e-learning training on the use of e-Learning systems and tools, and most of the participants were found engaged with other teaching tasks and activities.

B. Stage 1 Informational

This stage had the percent of (83 %) and it shows that most of the participants are having common awareness and curiosity towards e-learning. The participants classified in this stage do not have worries in relation to the innovation and their interest is in objective and functional aspects of the innovation. Such interests are related to general features, properties and requirements for use. The questions in this section had a percent value over (70%). The highest percent in this stage was (92%) and it came for the concern of using e-learning and what are the needed requirements in the immediate future. Another

high percent of (92%) came for the concern related to how the e-learning is better than what they are practicing now using their traditional approach. Another high concern was observed with a percent of (84%) for the concern of electronic resources availability to be used with e-learning courses. Still more to be added that (80%) of participants stated that they consider their knowledge about e-learning is very limited. Finally a percent of (71%) showed interest in possible use of e-learning in the near future.

C. Stage 2 Personal

This stage had the percent of (60%) of participants are showing personal concerns in regard to e-Learning adoption and use. The question that had the major concern with a percent of (73%) was related to faculties' members' curiosity to know the effect of adopting e-learning on their professional status. The second highest percent of (64%) was related to the types of required commitments resulting from using e-learning systems. Also a percent of (58%) of faculty members showed concerns regarding the change in teaching and administration if they adopt e-learning. The percent of (56%) faculty members showed concerns related to their roles if they need to be changed in the case they adopt e-learning. Finally a percent of (47%) of faculty members showed concerns regarding who shall make the decisions in the new e-learning system.

D. Stage 3 Management

The management stage had the percent of (73%) for the faculty members. This stage specifies that faculty members are mainly focusing on the procedure and tasks associated with the use of e-learning and the optimal use of information and resources. Thus in this stage issues related to competence, classification, management, and scheduling dominate. In this stage the highest concern percent for faculty members was (84%) for the concern of time spent on non-academic issues related to e-learning. The second highest percent was (82%) for faculty members concern of being unable of managing all that e-learning requires. The same percent of (82%) came for faculty members concern towards possible conflicts between their interest and e-learning responsibilities. Another percent of (62%) came for faculty members that had concern related to their time as not being able to organize themselves to commit with e-learning and other responsibilities. The lowest percent of (56%) came for faculty members that had concerns related towards students attitude towards using and being engaged with e-learning.

E. Stage 4 Consequence

This stage shows that a percent of (59%) of faculty members are having considerations on e-learning impact on students in their direct specialty of influence. The considerations include significance of e-learning for students, assessment of students' outcomes including performance, competencies and the needs to improve students' outcomes. The highest percent in this stage was (64%) of faculty members are having concerns towards how e-learning effect will be on students. The second highest percent was (62%) of faculty members are having concerns on how to excite their students

into using e-learning effectively. The percent of (59%) was related to faculty members concern on having students' feedback on how to change e-learning practices and activities. The percent of (56%) was for faculty members concern about students' attitude towards e-learning. The lowest percent in this stage was (51%) of faculty members are having concerns about evaluating the impact of using e-learning on students.

F. Stage 5 Collaboration

This stage had a percent of (56%) of faculty members are focusing on organizing and cooperating with others concerning the use of the e-Learning. The presented percent gives indication that more than half faculty members are concerned with collaboration and team work. The highest percent in this stage was (58%) and it was related with faculty members concern of developing working relationships with others to be able to develop and produce better e-learning content. The same percent of (58%) was related to faculty members concerns of coordinating their efforts with others in order to maximize e-learning effects. The percent of (57%) faculty members have showed positive attitude towards familiarizing other departments and colleagues with the progress of using e-learning as a complementary approach towards learning. Another percent of (57%) faculty members showed concern on knowing what other faculty member are doing in this area. The lowest percent of (52%) came for faculty members' attitude towards helping other faculty in their use of e-learning.

G. Stage 6 Refocusing

The refocusing stage had the percent of (55%) for the faculty members concerns. This stage points out that faculty members are mainly focusing on investigating method to have more benefits from using e-learning, and the benefits can include making main changes to the practices and tools used within e-learning. The highest percent for this stage was (72%) as faculty members expressed that they would consider modifying the use of e-learning based on the experiences of students. The second highest percent was (62%) and it was related to concerns of faculty members revising their use of e-learning. The percent of (57%) faculty members expressed that they have concerns related to determining how to supplement and enhance e-learning. The percent of (51%) faculty members showed that they have positive attitude towards revising e-learning's instructional approaches. The lowest percent of (31%) came for teachers' current capability in having other approaches to learning that might work better when using e-learning.

VIII. DISCUSSING THE INVESTIGATION PHASE - GENERAL RESULTS

The use of CBAM's stages of concern will give results for the uppermost results that will prove where the focus and concerns of faculty members currently is in relation to the use of e-learning. In addition, it will give an overview of other stages and provide indication of faculty members' current level of concern with respect for each stage. The following table provides a summery on the previous results presented for each stage. The results are showing that the highest percents for faculty members in regard for their use of e-learning are within

the two stages of information and management. Those stages are concerned with faculty members having the information on how to use e-learning and how to manage their time and resources with respect to other responsibilities that they are having. Another significant information that is shown using SoC is the categorization of stages as (Impact , Task and Self). The highest percentage are for the task category which gives indication that most faculty members in Jordanian universities are focusing more on the task and how to use and implement it within educational context.

TABLE III. STAGES OF CONCERN SECTIONS RESULTS

Groups	Mean	Std. Deviation	%
Group - s0	2.71	0.822	54%
Group s1	4.17	0.714	83%
Group - s2	2.98	0.811	60%
Group - s3	3.63	1.064	73%
Group - s4	2.93	0.738	59%
Group- s5	2.82	0.675	56%
Groups- 6	2.73	0.540	55%

TABLE IV. STAGES OF CONCERN CATEGORIES RESULTS

Categories	Sections	Mean	Std Deviation	%
Impact	4,5,6	2.83	0.651	57%
Task	3	3.63	1.064	73%
Self	0,1,2	3.44	0.768	69%

IX. CONCLUSION

Assessing faculty members' use of innovation and technology within educational context is a hard procedure that requires careful consideration for selecting and using the appropriate assessment tool. Most of the provided tools are found to be missing comprehensiveness and systematic approach for validating and verifying results. CBAM provides set of three different tools that can be used to have a systematic approach for evaluating the use of any innovation tool within educational context. CBAM's stages of concern have been used in order to define the stage of concern of faculty members in Jordanian universities. The results obtained from 138 faculty members showed that most Jordanian faculty members are to be classified in stage 1 (Informational) and stage 3 (management). The Stages of concern enables the classification to be according to more than one stage. Thus the results defined the current stage of participants. Another classification that is provided by SoC is the categories classification that shows that faculty members are defined to be in the Task category. However, in order for the users to be classified in higher category such as impact, they need to have more motivation and training on the use of e-learning tools and systems. Thus Jordanian universities needs better considerations for providing more training session on the use of

e-learning and to ensure students participations through the control of e-learning content quality.

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Nasim Matar has finished his PhD degree in Computer Science from Anglia Ruskin University, UK; his research focused on designing a unified flexible e-learning structure for universities in the Middle East focusing on reusing learning objects from the educational repository. Currently he is working at Applied Science University in IT faculty, Software Engineering Department Amman- Jordan. Dr. Matar published many Journals and books in his field of work, and contributed in many other. He is also lecturing in different Jordanian universities and giving different workshops and seminars with different international and local agencies. He worked as head of e-learning center in Zarqa University for the period of 2 years. His research interest and work are all subjected to the e-technologies and services.