

Development and Validation of a Scale to Measure Student Attitudes Towards E-learning

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Received: 30 July 2013, Revised: 1 October 2013, Accepted: 3 October 2013

Abstract: The purpose of the study is to develop and validate a Scale to measure student attitudes towards e-learning. The author undertook the following steps to build the Scale: Developing a preliminary draft of the Scale, Try-out of the Scale, Item analysis, Final draft of the Scale, and Defining reliability and validity estimates of the Scale.

The Scale was administered to 200 students enrolled in e-learning courses at the Universities of Bahrain and Kuwait. The results of the study demonstrated high levels of validity and reliability of the developed measure. Implications of the study's findings for online teaching and learning in higher education institutions are discussed.

Keywords: E-learning, scale, attitude, university students, reliability, validity.

INTRODUCTION

Many private higher education institutions around the world are using e-learning in their education curriculum to compete with other institutions and survive financially. Also, institutions are changing to new technologies in education to enhance student learning experiences and to produce better learning outcomes and competencies.

In the history of e-learning, it is important to note that there is no single evolutionary tree and no single agreed definition of "e-learning": Since the 1960s, e-learning has evolved in different ways in business and education, currently meaning quite different things in different sectors. In the school sector, "e-learning" refers to the use of both software-based and on-line learning, whereas in business, training, and higher education, it refers solely to a range of online practices. E-learning in these sectors relates particularly to Internet-based flexible delivery of content and programs that focus on sustaining particular communities of practice (Nicholson, 2007).

Some authors (e.g., Poulouva & Simonova, 2009) who studied e-learning from historical prospective define "e-learning" as "a modern way of education, which uses computer technology, computer networks and appropriate applications" (P. 160). Other authors (e.g., Rosenberg, 2000) emphasize a technological approach to e-learning. They understand it as a tool for designing, updating, distribution and evaluation of the process of instruction, knowledge management run by net technologies and computers with appropriate hardware and software equipment.

Within this context, widely developing information technologies are applied in numerous fields of education and all phases of the process of instruction. Information technology provides an excellent opportunity for the development of educational methods and paves the way for more effective and less expensive advance methods of instruction. The effective use of information technology in tertiary institutions was reflected positively on all aspects of university life, including instructors and students (Abuloum, 2007; Mohammad, Al-Karaki, & Abu-Naba'h, 2008).

However, despite the growing array of technology in higher education, several studies (e.g., Link & Marz, 2006) have advocated that universities have been slow to bring e-learning into the main stream and maximize the potential benefits of this kind of learning inside the class. They discovered that failing to acknowledge the importance of understanding e-learning was an important issue. Many students may lack the skills to use e-learning effectively and are therefore handicapped. Although universities continue to invest large sums of money in automation and electronic communication facilities, they do not necessarily achieve equivalent outputs.

Recent studies (e.g., Marie-Louise, et al., 2009; Ostlund, 2008) identified some important prerequisites and factors for the success of e-learning during implementation in higher education institutions. The expected outcomes of e-learning, however, are substantially influenced by the way students perceive the advantages and disadvantages of this kind of learning. Hence, there is a need to develop a scale to measure attitudes of university students towards e-learning. The importance of such a scale stems from the difficulty to advance e-learning without having a precise idea on how learners feel about this type of learning, and whether they still prefer it over traditional learning. Resolving this issue would, in turn, help university teachers refine students' rooted beliefs about teaching and learning processes (Al-Musawi, 2003).

Attitude is defined as an individual's positive or negative feelings about performing target behavior (Palmer & Holt, 2009). This implies that learners' positive or negative feelings about their participation in e-learning activities through the use of computers would directly influence their behavior in using online learning for different purposes. Understanding students' attitudes towards e-learning can help determine the extent to which students utilize the e-learning system in campus and to direct online courses towards the aims of quality assurance in education (Ong & Lai, 2006).

Perez Cereijo (2006) proposes that student's attitude towards e-learning provides a beneficial construct to predict learning outcomes. Also, Martinze (2004) suggests that the study of students' attitudes towards e-learning can in many ways help managers better prepare with respect to e-learning for the future. Yet, except in the Mehra and Omidian's (2012) study, there is no standardized instrument to measure student attitudes towards e-learning. The current study, therefore, seeks` to develop and validate a scale to measure attitudes of university students towards e-learning.

THE PRESENT STUDY

Most Arab universities have successfully integrated internet-based instruction into their educational settings. Kingdom of Bahrain and State of Kuwait, however, are largely considered as pioneers in inaugurating e-learning centers that implement online instruction along with the traditional, face-to-face teaching. Internet laboratories and facilities were established in all colleges. Many web-based courses and the corresponding on-line assessment tools were also introduced. Huge material and financial resources were utilized to ensure high standards of student learning.

The basic function of the University of Bahrain as an important institution of social control is to build students' personality and thought, and to establish a profound base and active environment for student learning. In such an environment, teachers are encouraged to hold consistent and reasonable beliefs about e-learning and e-teaching, and to share these beliefs with their peers and students, thus promoting high standards of teaching and learning (University of Bahrain, 2010).

According to the last available statistics, the number of students involved in e-learning courses is 4800 students at University of Bahrain (2008), and 3990 students at University of Kuwait (2007). The e-learning courses are usually taught using WebCT, Blackboard, power point presentations, and e-mail. Some tertiary courses are Internet-based courses because they are taught using the mixed-method approach that combines e-learning with conventional lectures and seminars (Al-Ghannam, 2009).

The e-learning project at the University of Bahrain is run by ZAIN E-learning Center, which was opened in 2004. The Center organizes all kinds of activities and tasks that are associated with e-learning and supervises online teaching of more than 200 e-courses throughout the University. In Bahrain, male and female students attend the same e-learning class and actively participate in classroom discussions and debates.

The Gulf University for Science and Technology (GUST), which is a pioneer private university in Kuwait, established an E-learning Center of Excellence and started using e-learning to support tertiary teaching in 2005. It was the first university to use e-learning in the region. English is the teaching language and computers are widely integrated in the curriculum. At the GUST, male and female students attend separate classes in the same locations (Al-doub, Goodwin, & Al-Hunaiyyan, 2008).

The students in Universities of Bahrain and Kuwait are taught by both male and female instructors, and Internet access is available for all of the students in labs and through a wireless network at campus, and hence e-learning is accessed anywhere and anytime. Also, all students enjoy using internet at home, where they are able to access the Databases at University libraries, such as ERIC, Education Research Complete, and EduSearch, an Arabic Database, for research and study purposes. Given these circumstances, unveiling students' attitudes towards e-learning might contribute to the wider use of this alternative way of learning in Arab gulf countries.

METHOD

Subjects

A total sample of 240 students was randomly recruited in the study. Two hundred students completed the instrument at the campus, including 100 students enrolled in Kuwait University and 100 students - in Bahrain University. A simple random sampling technique was used to guarantee that each of the potential students has the same probability of being in the student sample actually selected. 65% of participants were female. The participants' age ranged between 18 and 26, with 77% under 24 years. All participants have used e-learning facilities in and outside the university.

Instrument

The series of steps that were taken to develop the scale to assess students' attitudes towards e-learning were as follows:

Step I: Developing a preliminary draft of the scale

An analysis of the current literature was undertaken to determine how "attitude" is perceived and evaluated in studies closely related to the study (U. S. Department of Education, 2008) and in standards for evaluating e-learning that are developed by the Commission for Academic Accreditation (2007) of the Ministry of Higher Education in the United Arab Emirates. As a result, a need was identified for a tool that assesses students' attitudes towards e-learning in practical situations in higher education.

Items for the draft of the scale were developed after consulting with experts in e-learning. A total of 50 items were compiled using a five-point Likert scale. Half of the items were phrased in a negative direction.

For positive items, score of 5 was given for strongly agree, 4 for agree, 3 for undecided, 2 for disagree and 1 for strongly disagree. Scores for the negative items of the scale were assigned in the opposite direction. The

summed score of the items provided the total score. The items were developed in the following domains as shown in Table 1.

Given that the sample of the study is composed of Arab students, the items of the scale were originally developed by the authors in Arabic. Utilizing methodology suggested for development of translated tests (Brislin, 1986), the Arabic version of the test was translated into English by the author. This English version of the scale was subsequently back-translated into Arabic by an independent bilingual professor of education. The original Arabic version and the back-translated Arabic version of the scale were then administered to 40 bilingual students (15 men and 25 women) to check for the equivalence of meaning between them. The Pearson product-moment correlation of students' scores on the two versions of the scale was .94, which was considered evidence of the cross-language equivalence of the two forms of the scale.

Table 1
Domains of the Scale of Student Attitudes towards E-learning

Domain	No. of Items
Advantages and disadvantages of e-learning use	12
The student's experience in using e-learning at campus	24
Technical and Pedagogical Support at campus	14

Step II: Try-out of the scale

The scale was administered to 200 students from two countries, Bahrain and Kuwait. Scoring was done in line with specifications given in step I.

Step III: Item Analysis

The total scores for the 100 students from Bahrain and 100 students from Kuwait were arranged in descending order. 27% of the high scores and 27% of the low scores were identified. Then, for each of the 50 items, a t-value was computed for the higher and the lower groups to find out the discriminating power of each item. On the basis of the t-ratio value, 6 items were rejected as they did not discriminate even at the .05 level of confidence. The t-value for the items are displayed in **Table 2**.

Step IV: Final draft of the Scale

The final draft of the Scale comprised of 44 items divided into three domains (See **Appendix 1**). Positive and negative items of the Scale are shown in **Appendix 2**.

Step V: Reliability and validity of the Scale

Cronbach's alpha coefficients for internal consistency reliability varied between .75 and .94. This was an indication of internal consistency. The alpha coefficients were encouraging and so no changes were made to the scale. **Table 3** shows the reliability value of each subscale.

Table 2
Values of t-ratios for items of the first draft of the Scale

Domain 1: Advantages and disadvantages of e-learning use		t-values	
		Bahrain	Kuwait
1	E-learning can solve many of the educational problems	4.65	4.18
2	E-learning gives the chance to reinforce student's information and to sharpen his/her skills in the field of specialization	3.46	3.91
3	Online learning makes teaching and learning more flexible	4.64	4.87
4	Adopting e-learning as a learning style shall help students strike a balance between study and family requirements	2.98	3.26
5	My colleagues advise me to use the multiple benefits of e-learning	2.88	3.47
6	I think that e-learning made the learning process more enjoyable	3.67	4.11
7	I believe that e-learning has contributed little to teacher-student interaction and communication	2.54	3.69
8	I think that e-learning has limited effectiveness in improving teaching and learning	3.44	2.67
9	E-learning saves time for both teachers and students	3.87	4.05
10	I think that e-learning had little impact on my achievement	2.86	2.72
11	Access to education is increased through e-learning	3.62	1.82*
12	E-learning has created more problems than it solved	2.59	1.18*
Domain 2: The student's experience in using e-learning at campus			
13	Online learning increases my ability to understand subject matter	3.02	2.78
14	E-learning will improve my achievement in the online courses	4.16	4.68
15	E-learning allows me to deliver the course requirements in time	4.93	4.71
16	I find it difficult to use e-learning to express my ideas in writing	2.73	3.56
17	E-learning encourages me to conduct research in my field	3.57	2.66
18	I find it difficult to get significant information through e-learning	2.91	2.81
19	I feel depressed when I think of learning the subject matter online	3.66	3.28
20	I hardly prefer e-learning as it leads to social isolation	2.82	3.14
21	I find using e-learning both easy and possible	4.76	4.73
22	E-learning helps me compensate for missed classroom lectures	3.54	3.79
23	I prefer face-to-face learning to learning by using Internet	3.22	3.44
24	I advise my friends to use the Internet for reading lecture notes online	3.77	2.94
25	I avoid using electronic sources for learning and research because I fail to use them efficiently	2.77	4.18
26	I feel nervous and tense when I fail to use e-learning effectively	2.84	2.73
27	E-learning at campus consumes much of my time and effort	3.72	3.63

28	I hardly prefer e-learning over traditional learning because it lacks the direct interaction with the teacher	3.14	3.69
29	E-learning helps me acquire effective communication skills with other people	5.22	5.68
30	I feel comfortable with performing the e-learning activities and tasks related to the e-course	4.63	4.57
31	I have a strong desire to register in e-learning courses	4.27	4.16
32	I find it difficult to learn the course using the Internet	2.82	2.70
33	I prefer reading from a printed source rather than from websites or e-books	3.94	3.12
34	I wish I could choose more online courses on campus to study	4.30	4.11
35	I dislike using e-learning as it lacks appropriate content	2.09**	2.97
36	I think positively about e-learning	2.96	2.44**
Domain 3: Technical and pedagogical support at campus			
37	The slowness of network is an obstacle to my learning online	2.94	4.28
38	My university has got the technological base that is necessary to deliver e-learning	2.77	5.97
39	My university systematically updates the e-learning websites	3.86	3.19
40	In my university, faculty members prefer traditional ways of teaching and research	2.71	2.89
41	Faculty members at my university are very motivated to use e-learning on a wide scale	6.72	5.97
42	The faculty members at my university are inclined to use the internet for research more than for teaching purposes	5.89	4.13
43	I think that in the visible future my university should be a completely electronic facility	5.33	5.83
44	I think that the adoption of e-learning as a learning style at the university will help solve the students' problems effectively	4.92	3.87
45	My university's library really lacks electronic periodicals necessary to conduct research and to perform activities	8.27	7.55
46	In my university, faculty members encourage me to use e-learning in doing educational research and activities	6.14	4.77
47	I assume that the slowness of network decreases the level of effectiveness of e-learning on campus	4.66	5.87

48	The e-learning system at my university lacks the technical support necessary for the management of e-courses	3.59	4.76
49	I find it easy to use the library of my university for e-learning	1.22*	3.01
50	More funding is required to purchase the updated technology	2.38**	2.95

* t-ratio is not significant at .05 level ** t-ratio is not significant at .01 level

Table 3
Cronbach's Alpha Reliability Estimates for the domains of the Scale

Domain	Cronbach's Alpha		Correlation Coefficient between Domain and Total Score	
	Bahrain	Kuwait	Bahrain	Kuwait
Advantages and disadvantages of e-learning use	.94	.91	.60	.56
The student's experience in using e-learning at campus	.86	.88	.69	.70
Technical and pedagogical support at campus	.79	.73	.55	.59
Total Scale	0.84		-	

Reliability of the Scale was estimated by determination of inter-item and inter-total correlations, as well as alpha-if-deleted values. Average inter-item correlation coefficients of the three subscales ranged from .38 to .46, item-total correlation coefficients ranged from .55 to .70. The alpha-if-deleted values indicated that the scale would not be improved by the removal of any items and, therefore, the 44-item scale was accepted. Alpha for the Scale was equal .84 while Alpha values for the three subscales ranged from .73 to .93. The obtained figures clearly demonstrate the high internal consistency and homogeneity of the items of the developed measure.

In this study, **content validity** was achieved by submitting the developed measure to 10 faculty members in Universities of Bahrain and Kuwait, whose majors are in the fields of information technology and educational assessment. They were asked to give their opinions with respect to the clarity of items and to the relevance of each item to its domain. In the light of the specialists' remarks and comments, few changes were made to the relevant statements and to the scale as a whole.

Analysis of the internal structure of the scale can indicate the degree to which the relationships among test items and test components conform to the construct on which the proposed scale score interpretations are based. For the sake of **construct validation**, then, the exploratory factor analysis (EFA) was used. Implementation of EFA yielded three factors that tap the dimensions of the developed Scale.

To assess the **criterion-related validity** of the Scale, the student's attitude towards e-learning was used as the predictor, and the student's end-of-semester score on the related e-learning course was used as the criterion. The high correlation coefficient value ($r = 0.82$, $p = .000$) between the overall mean of the Scale, on the one hand, and the mean of the total score on the e-learning course, on the other hand, clearly indicated high predictive validity of the designed instrument.

Discriminant validity was achieved by applying the scale to a pilot group of 60 students. The highest and the lowest means of 25% of the students' responses were collected to check for statistical

differences between them. T-test was conducted to examine the differences between the two means. As a result, significant differences found between the means corroborated the discriminant validity of the designed scale.

DISCUSSION

As a whole, the obtained results of this study suggest a high level of reliability and validity of the Scale that measure student attitudes towards e-learning. Furthermore, the findings of this study are in line with the findings of previous studies (Al-doub, et al., 2008; Al-Ghannam, 2009; Mohammed, Qaraeen, & Al Qodah, 2008) that point to the need for the student concerns to be given greater weight when e-learning courses are delivered, and suggest that if research is to influence classroom practice, then it is vital that teachers be given extended opportunities for further professional study to provide them with knowledge and expertise to engage in e-learning activities that would enhance their teaching online.

Results of the study ought to be discussed in the light of the five sources of validity evidence that were used to validate the developed scale to ensure that the process of scale development conforms to the Standards for Educational Testing (Joint Committee on Standards for Educational and Psychological Testing, 1999). **Evidence of content validity** came from positive judgments of the relationship between parts of the scale and the construct. The major domains of students' attitudes towards e-learning were clearly specified and faculty members were asked to assign scale items to the categories defined by those domains, and to judge the extent to which the chosen set of items adequately represent the target trait and make amendments to the wording and formats of the items, if necessary. As for the **evidence based on response processes**, analysis of individual responses to the items of the measure showed that students responded to the items with a high level of integrity and responsibility and the capabilities of individual students that were irrelevant or ancillary to the construct have not influenced their performance.

As for **evidence based on internal structure** of the scale, the conceptual framework for the scale implied three dimensions of behavior that proved to be homogeneous but also distinct from each other. This was obviously demonstrated by high values of correlation coefficients between each domain and the total score on the whole scale and also by the reliability estimates of the domains (see **Table 3**).

An important source of validity stems from the **evidence based on relations to other variables**. This was achieved through analysis of the relationship of scale scores to variables external to the scale. External variables included measures of some criteria that the scale is expected to predict. The student's end-of-semester score on the related e-learning course was chosen as a criterion, and the high correlation coefficient value, which was obtained between the overall mean of the scale and the mean of the total score on the e-learning course clearly indicated a high level of predictive validity of the designed measure. Moreover, the significant differences that were found between the highest and the lowest means of 25% of the students' responses largely contribute to the evidence of discriminant validity of the measure.

Finally, **evidence based on consequences of testing** relates to the benefits of testing that go beyond direct uses of the developed instrument in this study. In fact, attitudes of university students towards e-learning may be advocated on the grounds that their use will improve student motivation to e-learning and might encourage changes in instructional practices by holding faculty members accountable for valued learning outcomes. The validation process in such cases would be informed by evidence that the anticipated benefits of testing were realized in an efficient manner.

CONCLUSION

The current study sought to develop and validate a scale to measure attitudes of university students towards e-learning. Given that the designed measure has proved to have good psychometric properties, it can serve as a useful tool to assess the extent to which university students in Bahrain and Kuwait are satisfied with e-learning as an effective alternative to traditional, teacher-centered classroom learning at the campus.

Consequently, the construction of objective tools to assess students' attitudes towards e-learning is considered an important step in achieving quality assessment and improving teaching and learning in institutes of tertiary education. The e-learning aspects covered by the measure in this study, the high estimates of reliability and validity, the appropriate length of the scale, and the relatively short time needed to complete it within the classroom lecture time limit, are seemingly clear advantages of the designed instrument as compared to similar measures of attitudes of university students towards e-learning (Mehra, & Omidian, 2012).

Despite the sound psychometric properties of the developed scale, it is important for educators to be aware of the degree to which each of the evidences of validity can be generalized to a new situation without further study of validity in that new situation. In local classroom assessments, as McMillan (2008) pointed out, "teachers must rely largely on non-statistical procedures to establish the validity of their uses and inferences" (P. 32), thus establishing a solid background to "integrate various strands of evidence into a coherent account of the degree to which existing evidence and theory support the intended interpretation of test scores for specific uses" (Joint Committee on Standards for Educational and Psychological Testing, 1999). The validity of an intended interpretation of test scores, in turn, relies on "available evidence relevant to the technical quality of a testing system, including evidence of careful test construction, administration, scoring, and equating" (P. 17).

SUGGESTIONS AND RECOMMENDATIONS

This study has demonstrated that the developed Scale represents a valid and reliable measure of student attitudes towards e-learning. University teachers can easily use the Scale in typical educational settings to assess the attitudes of their students in the field of e-learning, and to pinpoint the basic problems encountered in teaching courses using the Internet. The developed scale in this study can also be used for quality education and accountability purposes as well as by individual students for self-assessment of attitudes. Faculty members are expected to be involved in e-learning in order to improve the rationality and justice of their own practices, to increase the quality of their teaching and to solve the problems that come up in their universities in a meaningful and constructivist manner. Accordingly, institutions of higher education need to deeply understand the concerns of students involved in e-learning and to accommodate them adequately and timely. This is the key factor in achieving high standards of quality of education in Bahrain, Kuwait and all countries worldwide.

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APPENDIX 1

Items of the Scale of Students' Attitudes towards E-learning

No.	Item Statement
1	E-learning can solve many of the educational problems
2	Online learning increases my ability to understand subject matter
3	E-learning gives the chance to reinforce student's information and to sharpen his/her skills in the field of specialization
4	E-learning will improve my achievement in the online courses
5	Online learning makes teaching and learning more flexible
6	E-learning allows me to deliver the course requirements in time
7	I find it difficult to use e-learning to express my ideas in writing
8	The slowness of network is an obstacle to my learning online
9	My university has got the technological base that is necessary to deliver e-learning
10	My university systematically updates the e-learning websites
11	E-learning encourages me to conduct research in my field
12	I find it difficult to get significant information through e-learning
13	I feel depressed when I think of learning the subject matter online
14	I hardly prefer e-learning as it leads to social isolation
15	Adopting e-learning as a learning style shall help students strike a balance between study and family requirements

16	I find using e-learning both easy and possible
17	E-learning helps me compensate for missed classroom lectures
18	My colleagues advise me to use the multiple benefits of e-learning
19	I think that e-learning made the learning process more enjoyable
20	I prefer face-to-face learning to learning by using Internet
21	In my university, faculty members prefer traditional ways of teaching and research
22	I advise my friends to use the Internet for reading lecture notes online
23	I avoid using electronic sources for learning and research because I fail to use them efficiently
24	I feel nervous and tense when I fail to use e-learning effectively
25	E-learning at campus consumes much of my time and effort
26	I hardly prefer e-learning over traditional learning because it lacks the direct interaction with the teacher
27	E-learning helps me acquire effective communication skills with other people
28	Faculty members at my university are very motivated to use e-learning on a wide scale
29	The faculty members at my university are inclined to use the internet for research more than for teaching purposes
30	I believe that e-learning has contributed little to the teacher-student interaction and communication
31	I think that e-learning has a limited effectiveness in improving teaching and learning
32	I feel comfortable with performing the e-learning activities and tasks related to the e-course
33	E-learning saves time and effort for both teachers and students
34	I have a strong desire to register in e-learning courses
35	I think that in the visible future my university should be a completely electronic facility
36	I find it difficult to learn the course using the Internet
37	I think that the adoption of e-learning as a learning style at the university will help solve the students' problems effectively
38	I prefer reading from a printed source rather than from websites or e-books
39	My university's library really lacks electronic periodicals necessary to conduct research and to perform activities
40	In my university, faculty members encourage me to use e-learning in doing educational research and activities
41	I assume that the slowness of network decreases the level of effectiveness of e-learning on campus
42	I think that e-learning had little impact on my achievement
43	The e-learning system at my university lacks the technical support necessary for the management of e-courses
44	I wish I could choose more online courses on campus to study

APPENDIX 2**Positive and Negative Items of the Scale**

Domain	Positive Items	Negative Items
Advantages and disadvantages of e-learning use	1-3-5- 18-19-33	15-30- 31-42
The student's experience in using e-learning at campus	2-4-6-11-16-17- 22- 27-32-34-44	7-12-13-14-20-23-24- 25-26-36-38
Technical and pedagogical support at campus	9-10-28- 37-40	8-21-29-35- 39-41-43