# Scale Development To Evaluate Students' Intention To Use Technology and E-learning In Libyan Higher Education

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**Abstract -** *This paper describes the development of an instrument to assess student intention to use technology and e-learning in Libyan Higher Education (LHE). Regardless the research that has been conducted to examine the factors that explain students' intention to use technology and e-learning, not many have developed an instrument to determine these factors. Four independent variables used (computer–internet experience, computer self-efficacy, technology-internet quality, and attitudes toward use), intention to use technology and e-learning used as a dependent variable. It is major to know and evaluate the variables that influence student intention to use technology and e-learning. The final retained 29-item intention to use technology and e-learning instrument was acceptable with sample size of 273. Based on the findings, this article proposes guidelines for further investigation by applying statistical analysis on another sample to show the relations between the four independent variables and the dependent variable intention to use.*

***Key Words***: Technology-internet quality, Computer self-efficacy, Computer-internet experience, Attitudes toward using, intention to use.

## 1.INTRODUCTION

Recently e-learning systems have been used in learning and teaching in many higher education institutions, that resulted in changes in education process in those institutions [1]. Furthermore, the use of e-learning systems in universities is an effect of progression of IT. Accordingly the growth of Web application e-learning systems are becoming an important instructional medium in universities [2]. Additionally, with the wide spread use of the WWW, many higher education institutions(HEIs) are taking the opportunity to develop e-learning courses [3]. Furthermore, with the growth of IT, e-learning systems are becoming an integral part of teaching and learning process in HEIs. [4]

Despite that, Learners involved in distance education are more likely to have insecurities about the learning, self-evaluation problems, lack of support services such as tutors and technical assistance, feelings of isolation, and inexperience with this mode of learning, which leads to academic problems. [5]

when applying a learning tool or system for learners, it is necessary to investigate both teachers' and learners' attitudes toward that tool or system. [6]

On the whole from our point of view, there are a number of factors that influence individuals' intention to use technology and e-learning, the most critical of these factors will be reviewed in the next section.

### 1.1 Factors that influence intention to use

Literature on e-learning systems in higher education has identified a number of factors that contribute to students' and instructors' intention to use e-learning systems. These factors include individuals' CSE, CIE, ATE and TIQ .

However a choice of factors of IT acceptance have been examined in past research, CSE is one of these factors and has been recognized as a main key of IT-related ability and the use of IT. [7]

Our first factor is CSE, According to Hayashi et al., The belief in individual's ability has an influence on choice of activities, degree to effort expended, and persistence of effort. Consequently, CSE exerts a significant influence on individuals' affecting reactions to IT, their intention to use IT, and their actual use of IT [8]. Igbaria and Ivari mentioned that, CSE include that "the individuals prefer to avoid computers and less likely to use them" , because, they consider computers too complex and believe that they will never be able to control these computers.[9]

Other studies focused on CIE, Morss concluded that older students who had more experience of the technology used a learning management (WebCT) more than younger students who had less experience [10]. As well, Kerka found that student success in distance learning depends on technical skills in computer process and internet navigation [11].

Abbad, et. al. concluded that, students who are frequent and/or heavy users of the Internet are more likely to use e-learning systems[12]. While Selim reported in his study, Previous student experience with personal computers came as the most critical factor in the category of student motivation and technical compentency for e-learning acceptance.[13]

The third factor is ATE, According to Davis et al., attitude is the degree to which the individual is interested in specific systems, which has a direct effect on the intention to use as well as actual use of those systems[14]. While Venkatesh & Brown defined the Attitude toward behavior is "a person's favorable/unfavorable evaluation of the behavior in question"[15]. Whereas Ajzen confirmed that in general accepted that attitude represents a "summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant, and likeable-dislikeable"[16]. Selim concluded that, individuals' behavioral intention is said to be determined by their

attitude concerning the behavior - whether they feel that performing that behavior is good or bad.[17]
Our last factor is TIQ, several researchers indicated that technology-internet quality significantly affect satisfaction in e-learning. Amoroso et al., found that, Users will be willing to adopt such a tool with few barriers and satisfaction will be improved [18]. Consequently, the higher the quality and reliability in IT, the higher the learning effects will be [19].
Several researchers indicate that technology quality and Internet quality significantly affect satisfaction in e-Learning [20][21]. Users will be willing to adopt such a tool with few barriers and satisfaction will be improved[22][23].

### 1.2 ICT in Libya

Libyan national policy for Information and Communication Technology (ICT) in education was launched in 2005 and managed by the Ministry of Education and the Ministry of Vocational Training. The government is determined to provide tools and ICT skills on a large scale to all sectors of the country [24]. Though one of the agents to develop the quality of education through ICT is developing open and distance learning as well as continued education. But implementing of E-learning systems in Libya still in determining years [25], the attempt to inspect e-learning systems still as case study because of the lacking of using ICT, i.e. using of ICT is still not widespread. According to [26], the barriers to implement and use e-learning in Libya includes technological barriers, that is, lack of networks and systems infrastructures, lack of experience in using technology; lack of appropriate internet service. In a comparison between Libyan and African institutions, [27] classified the challenges associated to the implementation and using of e-learning and ICT to three categories: lack of ICT infrastructure, lack of qualified personnel, and resistance to change.
Based on the review of the factors that influence using technology and e-learning covered in previous section, our aim in this paper is to develop an instrument for student intention to use technology and e-learning in LHE. [28] suggested a number of rules and steps should be followed in Scale development. These steps are as the following: (1) Generating an item pool, (2) Determining the format for measurement, (3) Content validity and review by experts, (4) Administration of the items to a development sample, (5)Analysis of the psychometric properties, (6) Optimization of the scale.
Thus in this paper, we followed the sequence of steps mentioned before in the development of the scale starting from item pool generation to optimization of the scale to assess student intention to use technology and e-learning in LHE.

## 2. Methods

Based on the goals of the paper an students' questionnaire (STQ), conducted, there are some elements should be considered when we investigating the technology and e-learning in Libyan higher education, we assumed that, students' intention to use technology and e-learning in Libyan higher education is influenced by some factors found against the development and progressing in this field in the country. These factors are, computer self-efficacy (CSE), computer-internet experience (CIE), , technology- internet quality (TIQ) and attitudes toward technology and e-learning (ATE).

### 2.1 Generating an item pool

In the beginning, a pool of items correlated to intention to use e-learning and ICT was generated, sufficient review and investigation of the existing literature, covering student intention to use ICT and e-learning. At this phase a list of 33 items were recognized, To ensure the content validity of the scales, a set of items selected must be representative of the concerned domain content [29][30]. Therefore, validated items adapted from prior studies were used to measure computer self-efficacy, computer and internet experience, technology-internet quality, attitudes toward technology and e-learning, and intention to use technology and e-learning [10][11][14][15][16][31][32][34][35][36][37]. These items reflect a latent association with concept of using ICT and e-learning. Both positively and negatively worded statements were included in the pool.

### 2.2 Determining the format of the scale

At this step, different scaling options have been reviewed. Then, the Likert scale was chosen because of its ease of use, common use in intention measurement, higher reliability coefficients with less items, and method of summated ratings [38]. Therefore, we used the following two scales : The first, four-point scale to evaluate computer and internet experience(CIE) given with the numerical values assigned to each point: (1=Never, 2=Monthly, 3=Weekly, and 4=Daily). For the other four constructs we have used five-point scale to evaluate : computer-internet self-efficacy(CSE), technology-internet quality(TIQ), Attitudes toward technology and e-learning(ATT), and intention to use technology and e-learning(IUT) with the numerical values assigned to each point progressive from 1 to 5.

### 2.3 Content Validity

Content validity is defined as the degree to which the elements of an assessment of instrument are relevant to and representative of the targeted construct for a particular assessment purpose [39]. Therefore, as mentioned before, validated items adapted from prior studies were used to measure computer-internet experience, computer self-efficacy, technology-internet quality, attitudes toward technology and e-learning, and intention to use technology

and e-learning. The participants indicated their answers with using a four-point and five-point Likert-type scale. we measured demographic information: gender, age, field of work, teaching experience years, and scientific grade.

### 2.4 Administration of the Items to a Development Sample

A 33 items questionnaire was conducted in five constructs, each of which contains a number of items, then, the questionnaire was translated to Arabic language and distributed to a sample of 273 students in LHE (Zawia University, and institutions of the national authority for technical education) in the academic year 2017/2018. Given that, for scale development a large sample would reduce subject variance [40]. [41] advice a ratio of 5 to 10 subjects per item. [42] suggest a sample size for analysis N≥50+8M, or N≥ 104 +M. where M is the explanatory variables. So, distribution of the questionnaire containing 33 items to a sample size of 273 was measured suitable. Of the 273 surveys, a 63% response rate was achieved (172 usable responses). However this was considered as adequate at this instrument.

## 3. Data analysis

The reliability alpha coefficient for the scale with 33 items was tested and found 0.81, which indicated that the items in the scale were highly inter correlated and were all measuring the same attribute, i.e. intention to use technology and e-learning. Then we investigated additional optimization of the instrument by examining the reliability coefficient of each construct independently. We found that the 6-item construct1(CIE) had a reliability coefficient of 0.79, 12-item construct2(CSE) had a reliability coefficient of 0.89, 5-item construct3(TIQ) had a reliability coefficient of 0.49, 7-item construct4(ATE) had a reliability 0.90, and 3-item construct5(IUT) had a reliability 0.74, indicating high inter-item correlation within all these constructs. According to [43], Cronbach's alpha is reliable if its value is at least 0.7. But, we were concerned in understanding how many constructs or variables underlay the set of 33 items in the scale. Therefore, we performed exploratory factor analysis on the sample.

Examining factor analysis using principal components factor extraction and VARIMAX rotation was conducted to identify the factors in our work. Four commonly rules were applied to decide which factors to be retained: (1) minimum eigenvalue of 1; (2) deleting items with factor loadings less than 0.5 on all factors, or greater than 0.5 on two or more factors; (3) a simple factor structure; (4) scree test. Items that did not success these rules were excluded. Table 1 shows all factors with their number of items, eigenvalue, explained variance.

scree test in Figure-1 show ' deflect ' at 6 calling for retaining 5 factors.

Table 2 shows the factor loading of the items with a loading of 0.40 or greater.

## 4. The result

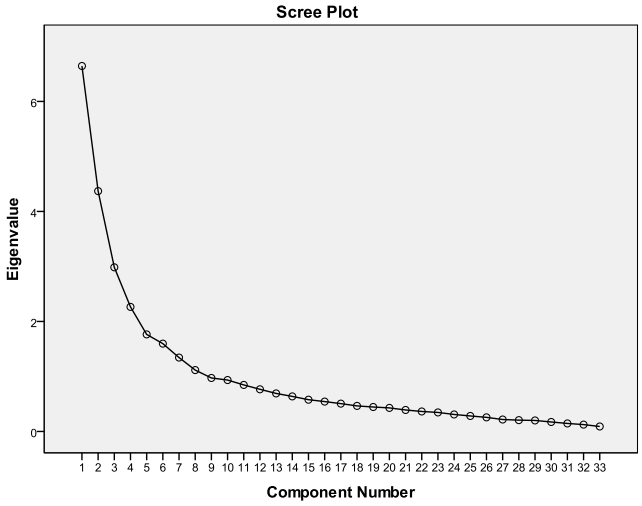
The result show that, 9 items (from construct1 - CSE) in factor1 had a loading ranging from .503 to .797 and 3 items were eliminated, 6 items (from construct2 - ATE) in Factor 2 had a loading from 0.716 to 0.937 and one item excluded, 6 items (from construct3 - CIE) in factor 3 had loading from .597 to .790, 3 items (from construct4 - TIQ) in factor 4 had loadings from .806 to .823, and 2 items were eliminated, and 3 items (from construct5 - IUT) in factor 5 had loading from .532 to .622, all the items have been accepted are positively worded.

Consequently, we could accept the 27 items with explained variance (54.63%) and identify the 5 factors – Factor1 involving 9 items that were related to the attributes of *computer self-efficacy*, factor2 contains 6 items related to

**Table-1:** Identified factors with number of items, eigenvalue, and explained variance

| Factor | Label | Number of items | Eigen - value | Explained variance (%) |
|---|---|---|---|---|
| 1 | Computer self-efficacy | 12 | 6.644 | 17.268 |
| 2 | Attitudes toward technology and e-learning | 5 | 4.370 | 14.427 |
| 3 | Computer-internet experience | 6 | 2.984 | 10.028 |
| 4 | Tech nology-internet quality | 5 | 2.265 | 6.958 |
| 5 | Intention to use technology and e-learning | 3 | 1.764 | 5.946 |
| | | | | **54.63** |

**Figure-1:** scree plot



*attitudes toward technology and e-learning*, factor3 linking 6 items that related to *computer-internet experience*, factor4 involving 3 items that were related to *technology-internet quality*, and factor5 linking 3 items that related to *intention to use technology and e-learning*.

## 5. Optimization of the Scale

The factor analysis identified 27 items in five groups, as Factor1, Factor2, Factor3, Factor4, and Factor5, the Cronbach's reliability was tested for the 27-item scale and found .801, after that, we investigated extra optimization of the instrument by examining the reliability coefficient of each factor independently.
We found that, the 9-item Factor1 had a reliability coefficient of .897, 6-item Factor2 had reliability coefficient of .941, 6-item Factor3 had reliability coefficient of .788, 3-item Factor4 had reliability coefficient of .729, and 3-item Factor5 had reliability coefficient of .739. Thus, indicating high inter-item correlation within all the factors and indicating that these factors could be used to involve an instrument to measure students' intention to use technology and e-learning.

## 6. Conclusion and future research

The results of this study demonstrate that this developed instrument is an initial tool to assess intention to use, other extra variables included in future studies may support or affect our result, as well using different sample ( size, quality) could influence or strengthens our result. The result of such study would inform policy makers and authorities for planning and curriculum development purposes in Libyan higher education. Finally, with technology use in higher education becoming wide spread globally, a comparison studies could be conduct between countries or cultures to identify the culture variables that influence faculties' intention to use technology and e-learning.

**Table-2**: factor loading
**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Computer self-efficacy (CSE)** | | | | | |
| **CSE1**: How confident do you feel when you scrolling around the monitor screen. | **.797** | | | | |
| **CSE2**: How confident do you feel when you using internet search engines. | **.781** | | | | |
| **CSE3**: How confident do you feel when you finishing the Internet program | **.767** | | | | |
| **CSE4**: How confident do you feel when you printing materials from the Internet, | **.749** | | | | |
| **CSE5**: How confident do you feel when going to next pages using ''forward'' button | **.737** | | | | |
| **CSE6**: How confident do you feel when you going To previous pages using ''back'' button | **.721** | | | | |
| **CSE7**: How confident do you feel using the internet | **.681** | | | | |
| **CSE8:** How confident do you feel when you click on the screens you want | **.664** | | | | |
| **CSE9:** How confident do you feel when you click on the screens you want | **.617** | | | | |
| **CSE10***:* How confident do you feel when downloading or upload materials from internet | - | | | | |
| **CSE11***:* How confident do you feel when you selecting right terms for Internet search | .503 | | | | -.571- |
| **CSE12***:* How confident do you feel when locating necessary information on the internet | .521 | | | | -.545- |
| **Attitudes toward technology and e-learning (ATE)** | | | | | |
| **ATE1**: I believe using internet is helpful for learning | | **.937** | | | |
| **ATE2**: I believe that it gives me a feeling of psychological stress greatly | | **.917** | | | |
| **ATE3:** I believe that it is only advisable for people with a lot of patience | | **.898** | | | |
| **ATE4**: I know that it is very difficult | | **.881** | | | |

**Table-2**: factor loading
**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **ATE5**: I know that it is very complicated | | .862 | | | |
| **ATE6**: I believe that it makes a person more productive at his/her job | | .716 | | | |
| **ATE7**: I believe that Traditional face-to-face learning is more familiar than e-learning | | - | | | |
| **Computer-internet experience (CIE)** | | | | | |
| **CIE1**: How often do you use internet browser | | | .790 | | |
| **CIE2**: How often do you use internet for information search | | | .742 | | |
| **CIE3**: How often do you use e-mail | | | .688 | | |
| **CIE4**: How often do you download free software | | | .671 | | |
| **CIE5**: How often do you use the word processing program. | | | .618 | | |
| **CIE6**: How often do you listen to audio and watch video | | | .597 | | |
| **Technology-internet quality (TIQ)** | | | | | |
| **TIQ1**: How satisfied are you with the communication quality of the Internet | | | | .823 | |
| ***TIQ2***: How satisfied are you with "There are some difficulties on connecting the internet at any place/time | | | | .808 | |
| **TIQ3**: How satisfied are you with the internet fee | | | | .806 | |
| **TIQ4**: How satisfied are you with the speed of the Internet | | | | - | |
| **TIQ5**: How satisfied are you in general with the information technology infrastructure | | | | - | |
| **Intention to use technology – e-learning(IUT)** | | | | | |
| ***IUT1***: I am willing to participate in learning courses opportunities using internet and technology | | | | | .622 |
| ***IUT2:*** I think learning using internet and technology should be implemented in classes | | | | | .606 |

**Table-2**: factor loading
**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **IUT3**: I intend to use technology and Internet to assist my learning | | | .442 | | .532 |

*Extraction Method: Principal Component Analysis.*
*Rotation Method: Varimax* with Kaiser Normalization.
a. Rotation converged in 7 iterations.

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