

Evaluating e-learning Effectiveness in Higher-education Institutions at
Developing Countries: An empirical study and proposed model

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Abstract

The unprecedented development of communication technologies and Internet, in conjunction with the global trend of most universities towards improved access and quality to higher education system; have stimulated the rapid growth of e-learning as an integrated education systems. , thus e-learning has recently become a promising alternative to the traditional classroom learning, helping university move toward a vision of lifelong and on-demand learning.

Despite that e-learning enhances the teaching and research processes in universities, and create new opportunities for delivering university education, most of the previous published works in e-learning showed that little has been carried out to examine empirically e-learning effectiveness within higher-education institutions and little is known about why many learners stop their e-learning after their initial experience. Moreover, past studies show that there is still a gap in evaluation of e-learning environment's effectiveness in between theoretical level and application level, and much of the literature has undocumented student' experiences. An additional concern is that our preliminary study revealed that e-learning remains irregularly used by university students in Egypt.

Given that for e-learning applications to be used successfully and efficiently for educational purposes; there is an important need to evaluate its effectiveness systematically, especially by higher institutions to ensure that the higher education programs delivered via technology are of high equality. This paper aims to help address some of these gaps in the current body of literature, specifically in the developing countries context, by evaluating empirically the critical factors that affect the perceived effectiveness of e-learning. In sum, the current investigation adds to literature through achieving the following principal objectives: (1) provide better understanding in evaluating e-learning systems and highlight its role in improving higher education, (2) determine the potential critical factors that have the most significant influence on perceived effectiveness of e-learning systems with respect to learner's perspective, for enhancing its application in higher-education institutions (3) develop a mathematical model that can systematically predict the probability of e-learning effectiveness in universities, (4) assess the extent to which e-learning is actually used in Egypt as an example of developing country.

Keywords: Developing countries, e-learning, Evaluating e-learning systems, Higher-education, Perceived effectiveness.

1. Introduction

The unprecedented development of communication technologies and Internet, in conjunction with the global trend of most universities towards improved access and quality to higher education system; have stimulated the rapid growth of e-learning as an integrated education systems. Today, seventy percent of the universities in the US are delivering e-learning education in this information age (Ho & Lin, 2010; Sun et al., 2009; Yuen et al., 2009; Ozkan et al., 2009; Ozkan & Koseler, 2009; Owens & Price, 2010; Alves & Uhomoibhi, 2010).

The same conclusion can also be drawn from other literature, for example, Weller (2009) and Wu et al. (2010) indicated that e-learning systems offer significant opportunities for education suppliers to develop and deliver multimedia material for various disciplines as means of meeting the needs of today's students brought up in the world of digital sciences and provide learners an alternative and innovative learning environment compared with traditional learning.

In this regard Zhang et al. (2010) recommended that in academia, education must be delivered to remote students who do not have physical access to the campus, thus e-learning has recently become a promising alternative to the traditional classroom learning, helping university move toward a vision of lifelong and on-demand learning. Now, it has become one of the fastest-moving trends and aims to provide a configurable infrastructure that integrates learning material, tools, and services into a single solution to create and deliver educational content quickly, effectively, and economically. As such, Research on e-learning has received considerable attention from academic and practitioners, and become an important field of study, a number of research papers have reported on this (Basioudis & Lange, 2009; Limayem et al., 2008; Lim et al., 2007; Weller, 2009; Chang & Chen, 2009; Duan et al., 2010)

2. Research problem and objectives

Despite that e-learning enhances the teaching and research processes in universities, and create new opportunities for delivering university education, as earlier discussed, most of the previous published works in e-learning showed that little has been carried out to examine empirically e-learning effectiveness within higher-education institutions and little is known about why many learners stop their e-learning after their initial experience (Sun et al., 2008; Ozkan et al., 2009).

Moreover, past studies show that there is still a gap in evaluation of e-learning environment's effectiveness in between theoretical level and application level, and much of the literature has undocumented student' experiences (Ozkan et al., 2009; Yuen et al., 2009). An additional concern is that our preliminary study revealed that e-learning remains irregularly used by university students in Egypt.

Given that for e-learning applications to be used successfully and efficiently for educational purposes; there is an important need to evaluate its effectiveness systematically, especially by higher institutions to ensure that the higher education programs delivered via technology are of high equality (Ozkan et al., 2009). Also, comprehending the essentials of what determines this perceived effectiveness can provide universities insights into developing e-learning strategies that allow administrators and instructors to create new educational benefits and values (Wu et al., 2010).

Thus, this paper aims to help address some of these gaps in the current body of literature, specifically in the developing countries context, by evaluating empirically the critical factors that affect the perceived effectiveness of e-learning. In sum, the current investigation adds to literature through achieving the following principal objectives: (1) provide better understanding in evaluating e-learning systems and highlight its role in improving higher education, (2) determine the potential critical factors that have the most significant influence on perceived effectiveness of e-learning systems with respect to learner's perspective, for enhancing its application in higher-education institutions (3) develop a mathematical model that can systematically predict the probability of e-learning effectiveness in universities, (4) assess the extent to which e-learning is actually used in Egypt as an example of developing country.

With these objectives in view, the current paper was structured as follows: We defined e-learning concepts, the literature and previous studies were reviewed and followed by the proposed model associated with the research hypotheses. Then our research methodology and data analysis were presented; from our findings, recommendations were suggested that may assist universities in developing strategies for e-learning. Finally, managerial implications, study limitations and the potential for future research were provided.

In our research, e-learning refers to the virtual learning environment in which a learner's interactions (students in our case) with multimedia materials and/or instructors are mediated through all electronic media, including the Internet and other computer networks (Chang & Chen, 2009; Chiu & Wang, 2008; Basioudis & Lange, 2009; Duan et al., 2010). The perceived effectiveness of e-learning system has been defined as the extent to which students believe that e-learning system successfully achieves their objectives (e.g. Johnson et al., 2008; Duan et al., 2010). Today many authors use the terms online learning and Web-based learning interchangeably with e-learning, and that approach will be taken in our paper (e.g. Ozkan et al., 2009; Gladun et al., 2009; Hogo, 2010; Artino, 2010).

3. Literature Review

Literature and past researches were reviewed and integrated sequentially, including a wide range of recently published works, in order to develop more effectively the study's hypotheses and the research model as well as providing a theoretical basis for evaluating e-learning systems in higher-education. The potential benefits of e-learning and main constructs of its effectiveness are discussed below, as cited in literature.

3.1 Assessing e-learning outcomes

An extensive review of the available literature revealed some potential outcomes, positive and negative aspects, that are associated with implementing e-learning in higher-education institutions (Pituch & Lee, 2006; Jiang et al., 2006; Rhee et al., 2006; Jara & Mellar, 2009; Ozkan & Koseler, 2009). In term of positive aspects, Macgregor et al. (2009) stated that the advantages of e-learning are frequently purported in the literature and are generally manifest in the Web. Such benefits include (a) the ability to engage students in non-linear information access and synthesis; (b) the availability of learning environments from any location and at any time; (c) the ability for students to influence the level and pace of engagement with the learning process; and (d) increased opportunities for deploying disparate learning strategies, such as group discussion and problem-based or collaborative learning, as well as delivering interactive learning materials or learning objects.

Other benefits have been documented by Zhang et al. (2010) they argued that the implementation of e-learning showed some benefits for both university student and educational institutions, these benefits are: (a) provides time and location flexibility;(b) results in cost and time savings for educational institutions; (c) fosters self-directed and self-paced learning by enabling learner-centered activities; (d) creates a collaborative learning environment by linking each learner with physically dispersed experts and peers; (e) allows unlimited access to electronic learning material; and (f) allows knowledge to be updated and maintained in a more timely and efficient manner.

This is also confirmed by some authors with a similar orientation such as Limayen & Cheung (2008) they see that students can access and download teaching materials, including both text and video, directly. Students can also make use of an online chat room or video conferencing to communicate with their instructors and fellow other students. Also, Wan et al. (2008) observed that e-learning allows easy adoption of innovative strategies to enhance student' performance. For instance, learner control makes use of features such as hyperlinks that allow learners to navigate through text and multi-media content in their preferred sequence. Learners can skip familiar content and spend more time on topics of interest, as well as scheduling according to their own needs. Furthermore, new ways of presenting learning content can provide richer and more dynamic information display and animation.

Thus it can be concluded that e-learning environment is different from the traditional environment, because information technologies are used as tools to support the learning process. Taking advantage of network infrastructures, e-learning can occur anywhere using many types of resources (Basioudis & Lange, 2009; Henderson & Bradey, 2008).

According to Liao & Lu (2008) e-learning creates an interactive online atmosphere through computer mediated technologies, such as role-playing, videoconferencing, online references, personalised coaching, project teams, chat rooms, discussion groups, and tutorials. For these reasons, education becomes not only more accessible, but also more powerful. As a result, e-learning is growing at an astonishing rate among all higher-education institutions.

In consistent with the above, Chao & Chen (2009) reported that e-learning provides expediency for learners to study courses or learn professional knowledge without the constraint of time and space. Also, the e-learning can be used as an alternative self-training for assisting or improving the traditional classroom teaching. Therefore many schools and businesses invest manpower and money in e-learning to enhance their hardware facilities and software contents. As a result various e-learning materials in different scientific areas were produced by teachers, multimedia material designers, or consultant companies. Many schools offer a variety of e-learning courses to students. In addition, the e-learning program has also become a strategy to recruit new students in night schools for some private universities or colleges. Finally, it worthy to mention that other administrative and managerial benefits of e-learning are cited, such as cost savings over traditional methods and the relative ease with which teaching materials or courses can be revised (Rhee et al., 2006).

Turning to negative aspects, some weakness have been described in e-learning literature, including delay in response, feeling with isolation, and the danger of arbitrariness (Chiu & Wang, 2008). Strong supports can be found for this argument by other authors, for example Wu et al. (2010) indicated that students in virtual e-learning environment may experience feelings of isolation and confusion or reduced interest in subject matter and student satisfaction and effectiveness for e-learning has been questioned. Given that creating an effective e-learning system is not transferring traditional learning and classrooms to the Internet (Duan et al., 2010), the perceived effectiveness by student should be examined to achieve continuous using and successful application.

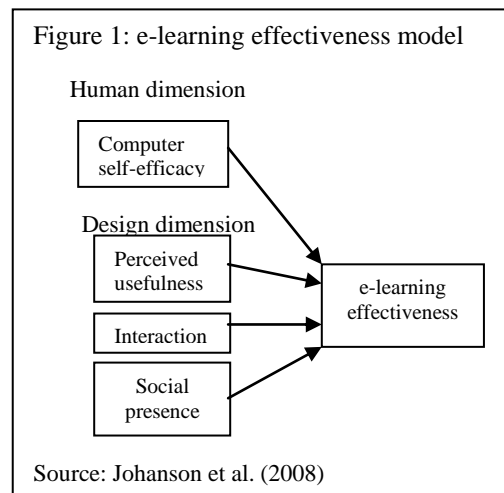
3.2 Evaluating e-learning effectiveness

Analyzing a range of available published studies, combining with insights from a series of in-depth interviews in the preliminary stage of our study led to identification of nine critical factors which expected to have the most influence on the perceived effectiveness of e-learning: perceived usefulness, perceived ease of use, perceived flexibility, perceived availability, interactivity, perceived responsiveness, social presence, perceived compatibility and computer self- efficacy (Johanson et al., 2009; Johanson et al., 2008; Sun et al., 2008; Macgregor & Turner, 2009; Wan et al., 2008; Ozkan et al., 2009; Lin & Chou, 2009; Buchanan & Salako, 2009; Kane et al., 2010; Ozkan et al., 2010).

Perceived usefulness has been defined in literature as the degree of work improvement after using e-learning application. Perceived ease of use is the degree to which a user views usage of the application would be relatively free of effort. Interactivity is the exchange of information between the various stakeholders in the course (e.g. peers, instructors, and other support staff), for example e-learning systems allow individual learners to post comments, review comments made since they previously posted, and respond to these comments.

Perceived compatibility is the degree to which the application is perceived as being consistent with the learner needs, and past experiences. Perceived responsiveness refers to the extent to which instructor’s timely response. For the purposes of this study, we focus on social presence as a learner’s perception of the extent to which the application enables him to create an environment in which he feel is sociable and active. Computer self- efficacy refers to the learner’s ability to perform computer tasks (e.g. Johanson et al., 2008; Lee, 2006; Macgregor, & Turner, 2009; Chiu et al. 2008; Katernyak et al. 2009).

The factors discussed above are based mainly on technology acceptance theory, and drawn from e-learning, e-commerce and e-library literatures and cover nearly most aspects of e-learning effectiveness, however, they have never been integrated into one model or framework subject. For instance, the extended e-learning effectiveness model presented by Johnson et al., (2008) included only four constructs (factors) as shown in figure 1.



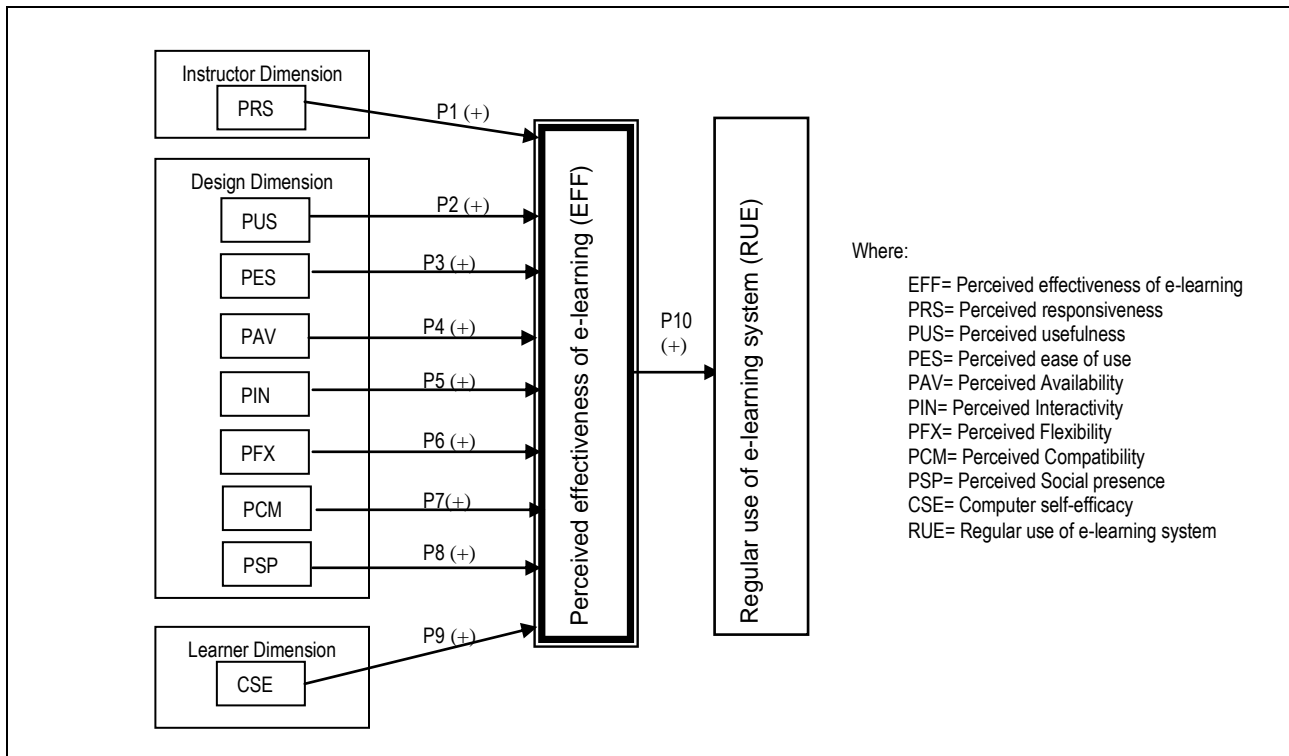
Thus this research attempted to develops such a model including those factors together to effectively meet key research objectives, and help in better refining the research problem.

However, it is reasonable to assume that factors influencing the perceived effectiveness of e-learning significantly vary in their relative importance, and differ from one context to another. For instance, the empirical evidence from surveying Malaysian learners’ perspective by Hussin et al. (2009) has put a strong emphasis on the impact of two particular factors on e-learning, perceived ease of use and interactivity.

4. Developing the Research Model and Hypotheses

In contrast to previous works, the current study extended the research by combining the most critical factors identified in literature and developed a comprehensive model including these factors, which have never been integrated into one framework, to examination simultaneously for validation and relationship. The proposed model, containing ten structural paths, presented in Figure 2 was based on the theoretical foundation discussed earlier as well as the feedback arising out of our preliminary study and prompted by a related empirical study examining the perceived effectiveness of e-learning systems applied in higher-education. In order to validate this model a number of validity tests have been applied and relationships among its variables have been empirically tested.

Figure 2: The proposed research model



As shown in figure 2 the proposed model contains nine independent (predictor) variables within three dimensions, which are expected to have the most influences on the perceived effectiveness on e-learning system as the dependent variable. The structural paths of the model represent the hypothesized relationships and advanced the following hypotheses to be tested.

H₁: The perceived effectiveness of e-learning system is positively influenced in higher-education institutions by certain factors such as:

H_{1a}: Perceived responsiveness (P₁)

H_{1b}: Perceived usefulness (P₂)

H_{1c}: Perceived ease of use (P₃)

H_{1d}: Perceived availability (P₄)

H_{1e}: Perceived Interactivity (P₅)

H_{1f}: Perceived Flexibility (P₆)

H_{1g}: Perceived Compatibility (P₇)

H_{1h}: Perceived Social presence (P₈)

H_{1i}: Computer self-efficacy (P₉)

H₂: The greater the perceived effectiveness, the more likely that e-learning system will be used regularly (P₁₀)

H₃: Higher education students at developing countries tend to use e-learning systems in irregularly base

Symbolically, the initial prediction formula of the research model (*FOI*) can be presented as follows:

$$EFF = a + b_{PRS} PRS + b_{pus} PUS + b_{PES} PES + b_{PAV} PAV + b_{PIN} PIN + b_{PFX} PFX + b_{PCM} PCM + b_{PSP} PSP + b_{CSE} CSE$$

In the formula, *EFF* is the criterion variable perceived effectiveness, *a* is the Intercept, *PRS* is the predictor variable perceived responsiveness, *PUS* is the perceived usefulness, *PES* is the perceived ease of use, *PAV* is the perceived availability, *PIN* is the perceived interactivity, *PFX* is the perceived flexibility, *PCM* is the perceived compatibility, *PSP* is the perceived social presence and *CSE* is the computer self- efficacy.

It is worth noting that the regression analysis was selected because it is a powerful and flexible statistical technique for dealing with associative relationships between a metric dependent variable and one or more independent variables, and that is the case in our current study (e.g. Castillo et al., 2008; Nusair & Hua, 2010).

5. Research Methodology

The methodological approach used in the overall empirical study is a combination of quantitative and qualitative methods. This two-stage research study was undertaken so as to interpret the data more meaningfully and to reflect our research methodology. The research process involved the following major stages.

5.1. Preliminary qualitative study

In this stage, a series of in-depth interviews were carried out with some Egyptian professors; the interviews sought to enhance our understanding of the nature and essence of e-learning. Prior works (notably Johanson et al., 2009; Sun et al., 2008) formed a rough guide for these interviews. The issues arising from this stage, combined with the literature findings, were used as a basis for the next quantitative study.

5.2. Quantitative study

The quantitative stage in the form of questionnaire survey was conducted to collect empirical data from a private Egyptian university (Pharos University). The underlying assumption for sampling a private university is that private-run universities in Egypt have tapped into foreign resources including universities overseas, and may have a more favorable e-learning environment (Holmes, 2008). The research population was located in seven different faculties (Business, Dentistry, Pharmacy, Tourism and Hotels, Language and Translation; Law and Engineering). The sample was the higher-education undergraduate students of the academic year 2009/2010 at these faculties. Simple random sampling was carried out in order to gain as many representative samples as possible.

5.3 Instrument development and Validity

To develop our instrument a number of prior relevant studies were reviewed to ensure that a comprehensive list of measures were included. The questionnaire consisted of two parts including a portion for respondent's basic data and another for responses to the research model constructs. The questions of part two were evaluated on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree), while the usage rate of e-learning system was measured on scale containing three items (1: nonuser, 2: irregular user, 3: regular user).

Before conducting the main survey, a pre-test was performed to validate the instrument. The pre-test involved iterative personal interviews with experienced e-learning instructors and students. Respondents were asked to comment on listed items that corresponded to the constructs, including the wording of the scales, the length of the instrument, appropriateness of instrument, the format of the questionnaires, and other comments on how the questionnaire could be improved. Feedback served as the basis for correcting, refining and enhancing the final updated version of the questionnaire. Therefore the instrument has confirmed content validity.

5.4 Research design

The research design for this study involved a cross-sectional survey methodology. The questionnaire was originally developed in English, and subsequently translated into Arabic language. Faculties were promised a concluded report on the results of the research as an incentive for their cooperation. The questionnaires with cover letter about the purpose of the survey were distributed around the campus during the final week of lectures and completed in controlled conditions. Due to the conventional expectation of low survey response rates in survey studies a contact person has been assigned for each target faculty who was placed in charge of distributing the questionnaires. Among a total of 500 questionnaires that were delivered, 237 valid responses were received and used in data analysis, achieving a 47.40 percent usable response rate for the overall survey. The highest number of responses was received from faculty of business and faculty of Pharmacy.

6. Data Analysis and Model Testing

The collected data were processed and analyzed using the statistical package for social sciences (SPSS), and four data analysis methods were employed in this study: Multiple regression analysis with its associated statistical inference tests (*F test and t-test on b*), correlation with its corresponding test (*t-test on r*), Durbin-Watson statistic and descriptive analysis. We used 9 variables as regressors and perceived effectiveness of e-learning systems as regress.

6.1 Reliability and Multicollinearity

Cronbach's alpha values were computed to establish the internal consistency and reliability of each variable. The values of the alpha coefficients exhibited an acceptable degree of reliability (all values ranged from 0.79 to 0.89). To determine whether any multicollinearity effects existed, total correlation matrix of the research model was reviewed in-depth, and the results showed that there was no evidence of multicollinearity problem among regressors. Finally, the *Durbin-Watson statistic* for detecting serial correlation was used, the value of 1.92 (less than 2) indicated that the autocorrelation problem does not exist. The results of testing each of the three hypotheses are given below:

6.2 The results of testing hypothesis H₁

Hypotheses H₁ was accepted based on the results of multiple regression analysis summarized in table 1. The structural paths of the research model presented earlier were collectively tested and the significant testing findings in Table 2 supported this acceptance.

Table 1: Summary output of the multiple regression analysis

Coefficients ^a	Symbols	Values
<i>Regression Statistics</i>		
Multiple correlation coefficient	Multiple R	0.9436584247
Coefficient of multiple determination	R ²	0.89049122252
Adjusted R Square	Adjusted R ²	0.88614946483
Standard Error	SEE	0.610767535
Observations	N	237
<i>ANOVA^b</i>		
Regression	SS _{reg}	688.58642
Residual	SS _{res}	84.67939
Total	SS _{total}	773.26581
F-test overall model	F	205.09924427*
Degrees of freedom	df ₁ , df ₂	9, 277

^a Criterion variable: *EFF*

^b Predictors: (constant), PRS, PUS, PES, PAV, PIN, PFX, PCM, PSP, CSE

*Significant at ($p < 0.0000$ level)

Table 2: Variables included in the research model equation

Factors	Regression Coefficients		Beta Coefficients		t-test	
	Symbol	Value	Symbol	Value	Value	Sig.
PRS: Perceived responsiveness	b_{PRS}	0.26651	B_{PRS}	0.245	1.37633	0.170073
PUS: Perceived usefulness	b_{PUS}	0.42361	B_{PUS}	0.458	11.2478	0.000000
PES: Perceived ease of use	b_{PES}	0.25709	B_{PES}	0.339	3.41724	0.000749
PAV: Perceived availability	b_{PAV}	0.22117	B_{PAV}	0.278	2.77628	0.000106
PIN: Perceived Interactivity	b_{PIN}	0.00472	B_{PIN}	0.004	0.06564	0.947721
PRL: Perceived flexibility	b_{PEX}	0.05844	B_{PEX}	0.053	0.30638	0.759595
PCM: Perceived compatibility	b_{PCM}	0.20038	B_{PCM}	0.185	1.94660	0.052815
<i>PSP: Perceived social presence</i>	b_{PSP}	0.18932	B_{PSP}	0.172	1.66049	0.098194
<i>CSE: Computer self-efficacy</i>	b_{CSE}	0.34262	B_{CSE}	0.440	5.45569	0.000000
Intercept	a	0.65773				
df	n-k-1	227				
Notes:						
<i>n</i> =sample size						
<i>k</i> = No. of independent v						

Examination of table 1, suggests that a strong positive meaningful association is existed between perceived effectiveness of e-learning systems and the above mentioned factors (*Multiple R*= 0.9436584247). The *F* statistic value ($F=205.09924427$ at $p < 0.0000$ level) is statistically significant indicating that the results of the model could hardly have occurred by change.

The coefficient of determination, *multiple R-square* showed that these predictor factors explained the major proportion (89.05 %) of the variability observed among Egyptian students ($R^2 =0.89049122252$), which reinforce our confidence in the hypothesis testing results and provides support for the above mentioned association.

Furthermore, the *adjusted R²* of the model, which is a more conservative estimate of variance by considering error variance, is 0.88614946483. Thus, the overall *explanatory power* of the research model is considered high and quite capable of explaining the variance of the perceived effectiveness (The criterion variable *EFF*). Using the values of the regression coefficients, shown in table 2, the perceived effectiveness of e-learning systems can be predicted, in this study, by the following final predictive formula (*FO2*):

FO2: The final predictive formula of the research model

$$EFF = 0.65 + 0.26 PRS + 0.42 PUS + 0.25 PES + 0.22 PAV + 0.01 PIN + 0.05 PFX + 0.20 PCM + 0.18 PSP + 0.34 CSE$$

However, the values of standardized beta coefficients of each predictor variables and t-tests in Table 2 suggested that within 9 independent variables, included in *FO2*, four variables are considered to have critical statically significant relationships with the criterion variable *EFF*. Those variables are perceived usefulness ($B_{PUS} = - 0.458$, $p < 0.0000$), Computer self- efficacy ($B_{CSE} = 0.440$, $p < 0.0000$), perceived ease of use ($B_{PES} = - 0.339$, $p < 0.0007$) and perceived availability ($B_{PAV} = - 0.278$, $p < 0.0000$), more specifically perceived effectiveness of e-learning systems is primarily affected by the perceived usefulness. In other word, the results provide further practical evidence and confirmed that the perceived usefulness is the most critical factor influencing the learner’s decision to use e-learning systems in higher education.

6.3 The results of testing hypothesis H₂

Strong support was found for H_2 based on the results of Pearson correlation analysis summarized in table 3. A strong positive association is existed between perceived effectiveness and the usage rate of e-learning system ($r = 0.641257737484748$), while the t statistic value ($t = 12.811114$ at $p < 0.0000$ level) indicated that this relationship is highly statistically significant.

Table 3: Pearson correlation results

Correlation between <i>EFF</i> and <i>RUE</i>	correlation Coefficients		<i>t</i> -test	
	Symbol	Value	Value	Sig.
	r	0.641257737484748	12.811114	0.00000

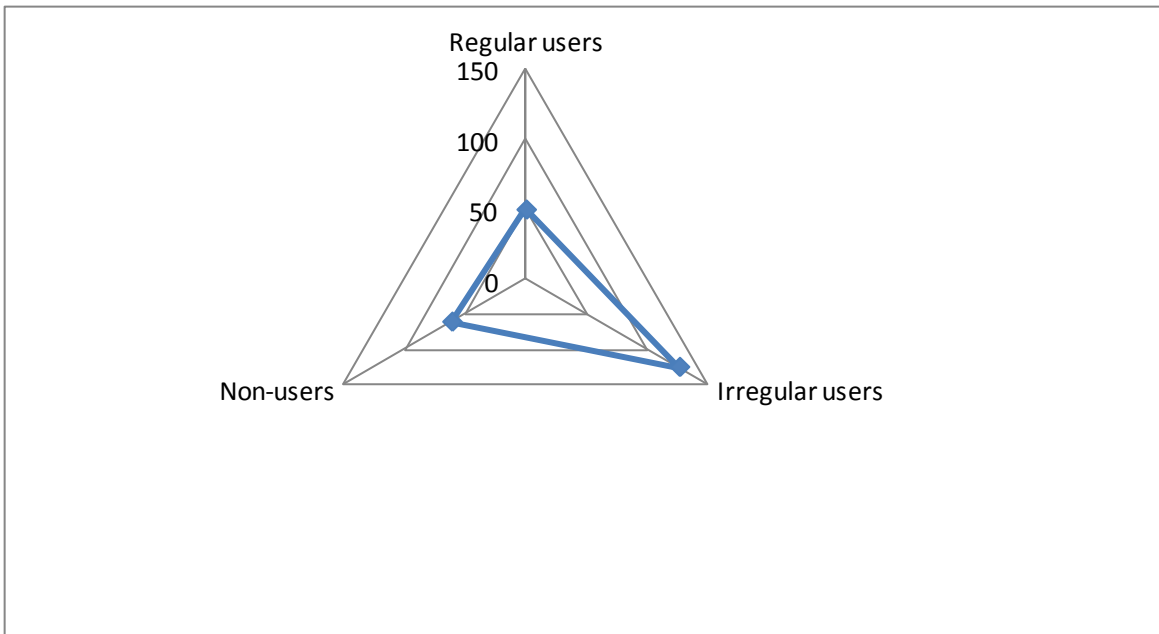
6.4 The results of testing hypothesis H₃

The descriptive analysis outputs presenting central tendency and variability in Table 4 showed a relatively moderate level of using e-learning ($\bar{X} = 1.9535864978903$, $S^{\sim} = 0.6842336164284$ and $Skewness = 0.0588066915873$), a small percentage of student (21.10%) are regular e-learning users, while a large proportion is considered either irregular users (53.16%) or non-users (25.74%). As such, our results partially support hypothesis H₃. The graphical presentation in Figure 2 clearly illustrates the findings discussed above; the values of the spider diagram strongly tend toward the right side, reflecting the irregular use of e-learning in the Egyptian higher-education institutions.

Table 4: Descriptive analysis output of e-learning usage in Egyptian higher-education institutions

e-learning usage	Number	Percent
Non-users	61	25.74%
Irregular users	126	53.16%
Regular users	50	21.10%
Total	237	100.00%
<i>Notes:</i>		
\bar{X} : Mean		1.9535864978903
S^{\sim} : Standard deviation		0.6842336164284
Skewness		0.0588066915873
Scale: 1= non-users, 3=Regular users		

Figure 2: The spider diagram of e-learning usage in Egyptian higher-education institutions



7. Conclusion and Implications

As stated previously, the main objective of this paper was to contribute to both theory and practice in e-learning and to help address some gaps in the current body of literature, through expanding the research in this area by developing a comprehensive empirical model that can predict and identify the critical factors that have the most influence on e-learning effectiveness, and have never been integrated before into one framework, to examination simultaneously for validation and relationship. More specifically, this study has made a number of important managerial and academic implications.

In term of managerial implications, the importance of e-learning system and its potential positive aspects have been highlighted throughout this study, and practical assessment of e-learning systems applied in higher-educations has been provided, after reviewing up-to-date relevant literature and examining over 40 previous works. These findings are particularly important for universities at developing countries in formatting strategies aimed to enhance the teaching and research processes, strengthen their current e-learning practices and create new opportunities for delivering university educational content effectively.

From academician perspective, the results of the present paper might be seen as useful potential theoretical contributions to the specialized literature concerning this issue. The findings of this study provide support for the research model that has a high overall explanatory power, and reinforce its robustness in predicting the e-learning effectiveness in higher-education institutions. Our research attempted to integrate and encompass the most frequently cited factors in the literature, and applied them in the local context in order to best examine the phenomenon. Thus, the proposed research model contained various variables with different dimensions that have not been tested simultaneously in previous works.

8. Limitation and Future Research

Although this study is differentiated from other work and expands existing models, it is not without certain limitations, as with any empirical research, and also represents opportunities for future research. Firstly, the research model was validated using sample data gathered from Egypt and therefore the findings may be specific to the culture in this developing country. Secondly, it should be noted that the research scope was focused on the full-time higher-education undergraduate students; this will limit the extent of the generalization of findings to other population, such as part-time students or mature learners or care should be taken when interpreting the results.

Since the study is cross-sectional in design, a further examination of our argument using a longitudinal study is recommended in the future to investigate our model in different time periods. Finally, we must point out that although the majority of the hypothesized relationships were validated, and significant, the levels of coefficient of determination, multiple R-square (R^2) obtained, indicated that there are other variables that may influence our finding.

Consequently, it is necessary to develop more complex models which may introduce alternative variables (for example government regulations and language issues) to gain a complete picture or examine variance across different e-learning systems; such models might open future research lines. However, the finding presented in this paper will be value for future research that could further examine the current proposed model in other countries with different cultures, and make comparisons, to see whether it can be applied, thus providing more insight into the phenomenon under investigation.

9. References

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