

THE EFFECTIVENESS OF E-LEARNING: Academic and Business Comparison

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ABSTRACT

Countries' success in the knowledge economy increasingly rely on highly-skilled and qualified people, which in turn, requires rapid, effective, and less expensive education and training. In this context, e-Learning has emerged; e-Learning is scalable, less expensive than traditional learning, and clearly advantageous for learners to access educational information and content anywhere and anytime. However, for evaluating the effectiveness of e-learning programs, a definition of '*effectiveness*' should to be established. In addition, understanding the factors influencing the effectiveness of e-Learning programs will help learning institutions to channel resources to significant factors rather than unimportant ones. Accordingly, this study intends to develop measures for the effectiveness of e-Learning and define the factors influencing them, and how both –the effectiveness measures and influencing factors- are perceived by different e-Learning practitioners, in particular, business and academic ones. More importantly, a comparison of both groups' perceptions is examined.

Keywords: e-Learning effectiveness, factors for effective e-Learning, academic and business comparison.

INTRODUCTION

In the new economy, knowledge is a source for a competitive advantage. Economic and social developments are strongly related to the development of human capital, which is associated with education (ESCWA, 2005). Through education and training, countries are able to improve the skills of its citizens, and its national innovation systems, and facilitate bridging the knowledge divide within the country itself and with more developed ones. Therefore, countries' success in the knowledge economy increasingly rely on highly-skilled and qualified people, which in turn, requires rapid, effective, and less expensive education and training. On the other hand, Information and Communication Technologies (ICT) have changed the way people live and work, the ICT evolution increasingly supports innovative methods of learning. In this context, Rosenberg (2001) has observed that e-Learning strategies are leading to changes in the way people learn.

E-Learning is scalable, less expensive than traditional learning, and clearly advantageous for learners to access educational information and content anywhere and anytime. Today, the growth of e-Learning is accelerating, and the development of e-Learning products and online courses are increasing in number every day. Many universities and corporations are investing significant capital in e-Learning.

Therefore, the effectiveness of e-Learning programs should be evaluated to justify this investment on the one hand, and to help developers and managers to improve the quality of their e-Learning programs on the other hand.

However, for evaluating the effectiveness of e-learning programs, a definition of 'effectiveness' should be established. In addition, understanding the factors influencing the effectiveness of e-Learning programs will help learning institutions and corporate universities or training departments to channel resources to significant factors rather than unimportant ones. Accordingly, this study attempts to develop measures for the effectiveness of e-Learning and define the factors influencing them, and how both –the effectiveness measures and influencing factors- are perceived by different e-Learning practitioners, in particular, business and academic ones. More importantly, a comparison of both groups' perceptions is examined; see Figure:1.

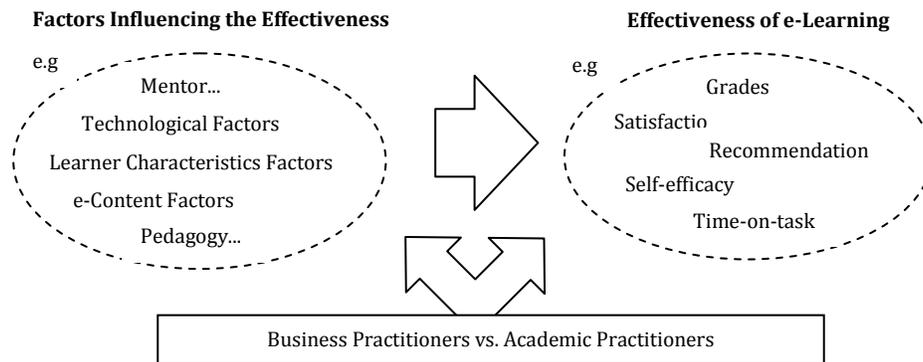


Figure: 1
Theoretical Framework

Therefore, this research addresses the following research questions:

- RQ1: How the effectiveness of e-Learning can be measured?**
- RQ2: Which are the factors impacting the effectiveness of e-Learning programs?**
- RQ3: Which are the main factor-significance differences between the academic and business e-Learning practitioners?**

LITERATURE REVIEW

The Effectiveness of e-Learning

The rapid growth of e-Learning programs has taken experts and researchers to question how the effectiveness of e-Learning programs can be measured. Moreover, a distinction between efficiency and effectiveness should be made. Efficiency is the ratio of output to input, while effectiveness is concerned with outputs (Rumble, 1997). He stated that "an *organization* is effective to the extent that it produces outputs that are relevant to the needs and demands of its clients. This implies the existence of criteria by which the *organizations* success in this respect can be measured". Moreover, the extent to which e-Learning programs respond to their objectives of enhancing "*learning*" is important. Several outcomes have been related to this objective such as: enhancing learners' grades, improving students' satisfaction, helping learners to perform specific tasks more efficiently, and others.

To make e-Learning effective in the eyes of the students, we have to look more closely at student satisfaction. Hiltz and Johnson (1990) conducted a study aimed at understanding learners' satisfaction from various systems of e-Learning.

They suggested that the measurement of e-Learning system satisfaction is needed to indicate system effectiveness, and claimed that in order to develop a valid instrument to measure e-Learning systems, learner satisfaction should be included. Most importantly, in their study, they looked at different characteristics of the system (learner characteristics, information quality...etc.) as predictors of satisfaction with e-Learning systems. This study will utilize Hiltz and Johnson's (1990) results, in addition to other studies, in the development of the e-Learning effectiveness measurements, and defining the system of factors affecting e-Learning, however, adapted to the needs and context of this research. Alavi (1994) claimed that prior literature in the area of collaborative learning suggested that learning effectiveness is measured in terms of students' perception of their learning and their evaluation of their classroom experience. On the other hand, Piccoli, Ahmad, and Ives (2001) conducted a study to develop a framework of e-Learning system effectiveness in the context of basic information technology skills training. They proposed three main measures for the effectiveness, namely, *performance, satisfaction, and self-efficacy*.

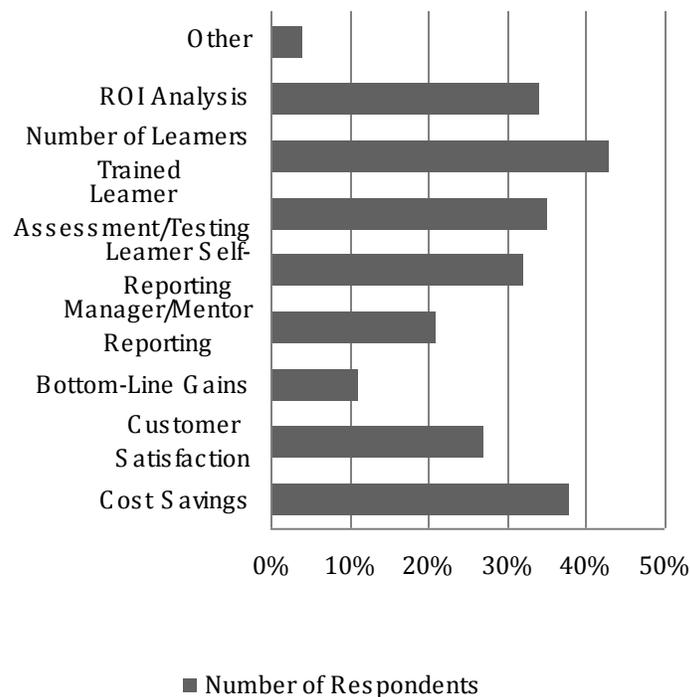


Figure:2
In What Ways Has Your Organization Sought to Gauge Effectiveness?
Source: SRI Consulting Business Intelligence (2003)

Moreover, in a survey performed SRI Consulting Business Intelligence (2003), questions were directed to e-Learning practitioners to rate quality and effectiveness in their e-Learning programs.

In particular, one of the questions was: *in what ways has your organization sought to gauge effectiveness?* Respondents replied that number of people trained, cost savings, learner testing, and ROI analysis were the most used ways they gauge the effectiveness with. Figure: 2 shows results of the survey.

Accordingly, after the extensive review of the literature on e-Learning effectiveness, the following nine measures for e-Learning effectiveness were proposed:

learning achievements (EFF01) -exams score, knowledge retention (EFF02) - the amount of knowledge can be retained after a period of time, time-on-task (EFF03) -the time learners spend using the e-Learning system, learners' satisfaction (EFF04), the recommendation of the program to other learners (EFF05), anxiety (EFF06), development cost (EFF07), operational cost (EFF08), and self-efficacy (EFF09) -ones judgment on his/her ability to perform a task.

Factors Affecting the Effectiveness of e-Learning

What makes e-Learning effective? Various studies deal with the one or few factors affecting the effectiveness of e-Learning, and just very few studies focused on an integrated view. However, some problems arise, mainly the large number of variables which potentially impact on the effectiveness of e-Learning. Leidner and Jarvenpaa (1995) suggest looking at issues beyond the instructor and technology and include also aspects of course content and students' characteristics.

Therefore, for the purpose of this study, factors affecting the effectiveness of e-Learning are defined as "the list of factors associated with the e-Learning environment (technology, learner, teacher, content, pedagogy ...etc.), and has an impact on e-Learning effectiveness".

Piccoli, Ahmad, and Ives (2001) conducted a study to develop a framework for e-Learning system effectiveness in the context of basic information technology skills training. Moreover, they proposed different factors related to *learners* (such as maturity, motivation, previous experience, and computer anxiety), *instructors* (such as, teaching style, availability, and technology control), *technology* (such as quality, reliability, and availability), *content* (conceptual knowledge, procedural knowledge, and factual knowledge), and others. In more recent study, Osika et al. (2005) have listed the critical factors, such as, student's technical competency, motivation, interaction with other students and with the teacher, clear objectives, assessment, learner-centered, using other online resources, etc. Levy (2006), conducted a study to assess the effectiveness of e-Learning systems. The main research question focuses on learner's perceived effectiveness of an e-Learning system. He measured the learners' value and satisfaction for each e-Learning system characteristics in order to indicate the learners' perceived effectiveness of e-Learning systems. Most importantly, Levy (2006) suggested various factors that measures learners' perceived satisfaction and perceived value of the e-Learning system, such as, technical support, system errors, internet speed, availability 24/7, availability of other content, availability of assignments, amount of teacher-learner interaction, teacher attitude, amount of interaction with classmates, cost of the course, family support...etc.

Based on the intensive review of literature, this study proposes 44 factors affecting the effectiveness of e-Learning programs were identified. In particular, these factors were specifically proposed in the literature with direct links to a specific survey item, whereas other factors affecting e-Learning were noted vaguely.

However, due to the nature of technology and the fast progress made in the last years in learning technologies, existing literature may lack some of important factors that influence the effectiveness of e-Learning. Therefore, the factors were examined through quantitative supported by qualitative questionnaire targeting worldwide e-Learning experts from both the academia and business contexts.

RESEARCH METHODOLOGY

To identify which are the differences between academic and business contexts, the Delphi method was used. The Delphi method works well when the goal is to understand problems, opportunities, solutions, or to develop forecasts. For instance, Duncan (1995) used a two-round Delphi approach to identify the characteristics and metrics of a flexible IT infrastructure. In the first round, the participants rated flexibility characteristics that were identified by a literature review. Participants were also afforded the opportunity to add characteristics not on the initial list. In the second round, they discussed the results of the first round. Similarly, to refine the system of factors and the e-Learning effectiveness measures built from the prior literature, a web-based -quantitative supported by a qualitative- questionnaire was developed to allow participants (e-Learning experts from both business and academic contexts) to rate and add new factors to the system proposed. E-Learning experts, firstly, are aware of the existing elements of the e-Learning program, and secondly, updated with the latest technologies and approaches for e-Learning due to the research activities and practices they undertake. Later on, results from this round were discussed in a second round.

Participants and Sampling

Sampling is to select a small subset of a population representative of the whole population (Fowler, 2002). However, to obtain valid and reliable results this research study, the involvement of the appropriate participants is critical.

This becomes even more critical when the conclusions are based mainly on the experts' knowledge and experience. For the objective of this study, experts in e-Learning were targeted. However, it is not an easy task to define a complete list of the population; therefore, one hundred experts were selected from different fields and different countries. Experts were defined as people who are known to be active in the design, development, implementation, research, and teaching in the field of e-Learning. The identification was done mainly based on two sources:

- Experts known from their writings/publications and their academic reputation. Therefore considered an academic expert.
- Experts know from their technical expertise in the field, and identified by their publications and the positions in an organization in the field of e-Learning. Therefore, they are considered business experts.

Regardless of our classification of those experts between the two contexts, they have been asked to classify themselves before answering the questionnaire, so that further analysis will have more validity.

Survey Administration

For what regards the first round of the study, the questionnaire was divided into three main parts, general information and demographics part, e-Learning effectiveness measures part (9 items), and the factors influencing the effectiveness part (44 items).

Respondents have been asked to rate the measures for e-Learning effectiveness and the importance of each factor in influencing the effectiveness using five-point Likert scale, this approach is commonly employed in online education research (Roberts et al. 2005). The first part collects information concerning age, gender, experience, role, and most importantly, the field in which they work in (academic or business).

The second part focused on rating the measures of e-Learning effectiveness. Each expert ranked each proposed measure from *1-Not at all*; to *5-Greatly* measures the effectiveness of e-Learning. Finally, the third part of this questionnaire asked the experts to rank the extent in which each proposed factor influences the effectiveness of e-Learning from *1-Not at all*; to *5-Greatly* influences the effectiveness. Moreover, experts have been asked to add (if any) new factors that are not mentioned and they think they are important.

The second round was conducted through e-mail questionnaire. E-Learning experts who participated in the first round were resurveyed. In the light of first round results, 24 e-mails were sent in order to investigate the potential reasons of the differences between the two groups (academic and business).

DATA ANALYSIS AND RESULTS

Refining the Effectiveness Measures and Influencing Factors

The questionnaire was sent to 100 e-Learning experts and took one month. 24 responses returned giving 24% as a response rate. Generally, the roles of the experts were diversified: postdoctoral and scientist researchers, professors in education or related fields, system analysts, HR and training specialists, CIOs, and others.

However, 58% (14) respondents were males and 42% (10) were females. In addition, the ratio of academic to business experts was satisfying, giving 54% (13) of the responses from the academia and 46% (11) from the business practitioners. To refine the measures of the effectiveness of e-Learning, and system of factors affecting the effectiveness of an e-Learning program, the *mean* has been calculated for each of the measures and items. The criteria used to evaluate the items are the same used by Fozdar and Kumar (2007) for studying the perception of students on the effectiveness of mobile learning:

- Mean scores for responses to each of the items (measures of the effectiveness and the factors influencing it) which are below 3, indicate relative unimportance.
- Mean scores between 3 and 3.2 shows it to be neither important nor unimportant.
- Mean scores greater than 3.2 indicate relative importance.

The items with mean score less than 3 (unimportant items) have been removed from the system of items. In addition, the items proposed by at least 20% of the respondents were added to the system -without conducting another survey round to measure their importance. Experts rated the 9 measures proposed to measure the effectiveness of e-Learning as a result of the first phase of the research. Furthermore, the *learners' learning achievement (exams results)*, *the time students spend on studying and learners' satisfaction* were the most important measures respectively.

Accordingly, as suggested by Fozdar and Kumar (2007), the measures were classified to be unimportant, neither important nor unimportant, and important. The classification is shown in Table.1.

As a result, and using the criterion of removing the unimportant measures from the study, three measures have been removed, these are: the *anxiety, development cost, and operational cost*.

Table.1
Classification of the Effectiveness Measures and the Influencing Factors

Unimportant (less than 3)	Neither Important nor Unimportant (3 – 3.2)	Important (more than 3.2)		
EFF06		EFF01	EFF04	
EFF07		EFF02	EFF05	
EFF08		EFF03	EFF09	
F08	F04	F01	F20	F33
F15	F18	F02	F21	F34
F16	F19	F03	F22	F35
		F05	F23	F36
		F06	F24	F37
		F07	F25	F38
		F09	F26	F39
		F10	F27	F40
		F11	F28	F41
		F12	F29	F42
		F13	F30	F43
		F14	F31	F44
		F17	F32	

Similarly, results of experts ranking of the factors influencing the effectiveness of e-Learning programs are shown in Table.1. The factors were classified into *unimportant, neither important nor unimportant, and important* categories. As a result, three factors were located in the neither important nor unimportant category, and three factors were located in the unimportant category, and therefore, were not considered as significant influencing factors. The next stage of validating the system of factors influencing the effectiveness by the e-Learning experts is to add the proposed ones after the analysis of the qualitative part of the survey. Considering the proposed factors mentioned in some way or another by at least 20% of the respondents. Accordingly, one factor was added to the list of factors. The *use of learning games* was proposed by about 20% (5) of the respondents but with different phrases, such as: learning games, role playing games, and gaming and simulations.

Comparing the perception of Academic and Business e-Learning Practitioners

The third question (RQ3) of this research dealt with examining the differences in how academic and business practitioners evaluate the significance of each of the effectiveness measures and factors influencing an e-Learning program. To achieve this objective, different statistical tests were performed. The *t-test* was used to compare the two groups of experts. The *t-test*, as suggested by many authors, is a powerful parametric test when its assumptions: normality (tested using *Skewness and Kurtosis* test), independence and homoscedasticity (tested using *Levene's test*) are met (Hair et al., 2005).

Results of *Levene's test* showed that the Levene statistic was significant ($p < 0.05$) for four variables F03, F09, F35 and F39 with $p = 0.04$, $p = 0.004$, $p = 0.038$, and $p = 0.017$ respectively.

Therefore, when using the *t-test*, equality of variance was not assumed for these four variables. In addition, the non-parametric alternative of the *t-test*, the *Mann-Whitney test*, was used to confirm the results of the *t-test*.

The *t-test* was utilized to test the hypothesis of no significance difference in the mean scores of each variable between the two groups. Consequently, significant difference between the two groups was found in five items; *learner satisfaction (EFF04)*, *amount of system errors (F03)*, *funding source (F19)*, *amount of material in the course (F24)*, and *the organization of user interface (F27)* with $p= 0.034$, $p= 0.048$, $p= 0.02$, $p= 0.013$, and $p= 0.029$ respectively. However, since the Levene's test results showed significant value for the variable F03, and therefore equality of variance was not assumed, the *t* value that should be considered for this variable is (2.028) at $p= 0.058$; as shown in Appendix. A. Consequently, only four variables are considered to be significantly different between the two groups; these are: *learner satisfaction (EFF04)*, *funding source (F19)*, *the organization of user interface (F27)*, and *the amount of material in the course (F24)*. In addition, to increase the credibility of the *t-test* under, the non-parametric alternative (*Mann-Whitney test*) was used to test the differences between the two samples. Results of the *Mann-Whitney test* reveal the significance in the same four factors, supporting the results from the *t-test*. Appendix A shows results of the *Mann-Whitney test*.

However, to understand why the different groups (Academic and Business) perceive the factors of effectiveness a questionnaire was sent to the e-Learning experts participated in the online survey. Results revealed that business and academic objectives are different which has an impact on the meaning of effectiveness and factors influencing it.

Academic e-Learning experts perceived *learner satisfaction (EFF04)* to be an important measure for the effectiveness of e-Learning, while business e-Learning experts did not. The interpretation for this is when looking at the mission statement of an academic institution, providing high quality learning and satisfying learners are essentials.

Whereas, by implementing e-Learning, business practitioners aim to increase return on investments, sales ...etc. Determining if the learner "liked" a particular training program is useful information; such measures do not provide the evidence of business value that is required (Rosenberg, 2006).

In addition, academic e-Learning experts perceived the *funding source (F19)* and *the organization of user interface (F27)* as important factors influencing the effectiveness of e-Learning. Regarding the former, one explanation might be that companies generally fund the training of its employees, so they perceived it as unimportant factor, while at universities it is not the case.

Whereas what concerns the later, the organization of the user interface is important and influencing the effectiveness of e-Learning according to the academic practitioners because they have more amount of material and a curricula to follow, while it is not the case for business practitioners since they focus on short and focused trainings regarding a specific problem or issue. Furthermore, business practitioners perceived the *amount of material in the course (F24)* as an influential factor. Actually, companies often need to solve work problems and redundancy in material may delay the time required for the problem to be solved, and therefore, affects the business as a whole. In other words, the learning initiative should bring benefits to the business, by enabling people to learn more quickly (Rosenberg, 2006).

LIMITATIONS

Some problems arise, mainly the large number of variables which potentially impact on the effectiveness of e-Learning. Therefore, it is impossible to list all factors for e-Learning effectiveness. It is probable that other researchers will suggest other factors. Moreover, other researchers may suggest different measures for the effectiveness of e-Learning, but the refinement of the measures and systems of influencing factors through the experts' survey supports the list provided here. In addition, though many researchers argued the difficulty of generalizing the results to a wider population due to sample size (Schmidt et al., 2001) and their geographic location (Brancheau et al., 1996). However, as an attempt to reduce this threat, a sample of 100 experts from 8 countries was selected.

RESULTS HIGHLIGHT AND FUTURE WORK

To define the factors affecting the effectiveness of e-Learning, the measures of the e-Learning effectiveness should be defined first. This phase of the research targeted e-Learning experts in both the academic and business contexts. Experts rated the proposed measures of the effectiveness of e-Learning.

Results revealed a new measurement group for the effectiveness of e-Learning. Subsequently, the experts rated the factors influencing the effectiveness of e-Learning and unimportant measures and factors were eliminated. In addition, one factor was suggested by the e-Learning experts, the use of learning games, and has been added accordingly. Furthermore, a comparison between the two groups of practitioners (academic and business) was conducted. Using two different tests, results show that there is a significant difference in appraising only one of the effectiveness measurements, and three factors influencing it, *learner satisfaction (EFF04)*, *funding source (LC12)*, *amount of material in the course (CON04)*, and *organization of the user interface (CON07)*. Future research may classify the factors in distinctive categories. Quantitative research may statistically identify these categories, and consequently, study how they can predict the effectiveness of e-Learning programs. Another research stream may address the cultural differences in perceiving the effectiveness of e-Learning. Cultural factors may influence how e-Learning effectiveness is measured.

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After finishing his master in Business Innovation Leadership, he has been granted a full-time PhD scholarship from the Italian ministry of education and research in which he worked on *evaluating the effectiveness of e-Learning programs*. Currently, he is a Researcher at the e-Business Management Section–ISUFI (Italy) and managing some e-Learning related projects in some Mediterranean countries.

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