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Thesis Approval

Analytical Study of E-Learning Platforms

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Abstract:

As technology moves forward and the explosion of the internet, the world has become a much smaller place. While new technology provides the convenience of accessing and increasing amount of information and learning without regard to time or location. E-learning is becoming acceleration in the world, and there are many people who are enrolled in several programs that use e-learning method at several universities. Many colleges and universities around the world are using variant model to transform some programs from traditional learning to e-learning. In the last few years many new e-learning platforms have been developed, it is becoming difficult to compare such e-learning platform and to be able to choose the appropriate one for the customer need.

In this study we try to find the best definition for distance learning and e-learning, and to determine the relation between them. By retrieving the famous definitions for distance learning and e-learning we find that the learners and instructors are separated by space but not necessarily by time. And the learner must use a computer and network to gain access to the materials and interact with instructor through new communication technologies such as Internet.

We present the comparison results of most popular eight e-learning platforms which are widely implemented at many universities worldwide, the comparison is based on their features, those e-learning platforms features are classified into three main categories which are: Learning tools, Management tools and Development tools. We have evaluated these platforms, so that we can determine the best platform according to the available features. Also, we present a mathematical equations that can be used to evaluation an e-learning platforms.

The mathematical equation was test on e-learning platforms, as will as some statistical tests, we got the results on how to determine the best e-learning platform.

الملخص:

نظراً للتطور التكنولوجي المتسارع والانتشار الواسع لشبكة الانترنت، أصبح العالم صغيراً، إذ يمكن الحصول على كميات كبيرة من المعلومات والمواد التعليمية بغض النظر عن المكان أو الزمان، ونظراً لتسارع انتشار التعليم الإلكتروني في العالم أصبح هناك أعداد كبيرة من المتعلمين المسجلين في البرامج التي تستخدم طريقة التعليم الإلكتروني في الجامعات المختلفة. مما دفع العديد من هذه الجامعات إلى استخدام أنظمة مختلفة للتعليم الإلكتروني لتحويل طريقة التعليم لبعض البرامج من الطريقة التقليدية إلى طريقة التعليم الإلكتروني. وقد طور في السنوات الأخيرة العديد من هذه الأنظمة ولهذا أصبح من الصعوبة المقارنة بينها لاختيار الأفضل والمناسب.

في هذه الدراسة حاولنا التعرف على مفهوم التعليم عن بعد والتعليم الإلكتروني وتحديد العلاقة بين هذين المصطلحين وذلك من خلال استعراض أشهر التعريفات التي ركزت في مجملها على وجود مسافة بين المتعلم والمعلم وليس من الضروري أن يكونا في نفس الوقت على أن يستخدم المتعلم الحاسوب والشبكات للحصول على المواد التعليمية المطلوبة والاتصال مع المعلم من خلال وسائل الاتصال الحديثة مثل شبكة الإنترنت.

وقد تم عرض نتائج المقارنة بين أشهر ثماني أنظمة تعليم إلكتروني مطبقة في العديد من الجامعات في العالم، وقد اعتمدت المقارنة على الميزات والخصائص المتوفرة في هذه الأنظمة حيث تم تقسيمها إلى ثلاثة أقسام رئيسية هي: أدوات التعليم، أدوات التنظيم و أدوات التطوير والبناء. كما تم تقييم هذه الأنظمة للحصول على أفضل نظام حسب الميزات المتوفرة فيه، كما تم عرض المعادلة الرياضية التي تم الحصول عليها لتقييم هذه الأنظمة.

تم اختبار المعادلة الرياضية على أنظمة التعليم الإلكتروني، إضافة إلى بعض الاختبارات الإحصائية وحصلنا على نتيجة كيف يمكن تحديد أفضل نظام تعليم إلكتروني.

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Chapter 1

1.1 Introduction

In today's Information Age, learning is no longer confined within the four walls of a classroom. The instructor, armed with a textbook, and a single source of educational experience. Now information resources are everywhere, often separated from the learner by time and space. The modern learning does not only need good learning, but also it needs a good learning system. Good learning system requires good e-learning platform.

At the end of the last century many terms raised like e-learning, distance learning, distance teaching, online learning, distributed learning, web-based learning (WBL), and computer-based training (CBT) widely used as interchangeable terms. So, several definitions have been introduced. Distance learning is defined as "a planned teaching/ learning experience that uses a wide spectrum of technologies to reach learners at a distance" (Greenberg, 1998). While e-learning is defined as "covering a wide set of applications and processes such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration" (Nina, 2004). And the computer-based training (CBT) usually delivered via CD-ROM or Web download and that it is usually multimedia-based training(Zahm, 2000). Although, all of these terms are related to each other, they have significant differences. On the other hand some authors exceed from the variety of these terms and consider an e-learning concept as indicative for all.

To implement e-learning process, many platforms were presented for that reason. Since, the platforms of e-learning depend on the needs and objectives of learning including tools using as stand alone system of learning. Basically, E-learning involves content providers, facilitators or infrastructure providers to transmit these contents to the learners and the consultants to provide an enabling environment for the learner and to interact with providers and facilitators for effective learning. Thus, the consultants have a major role in effective implementation of e-learning projects (Agarwal, 2004). These platforms have different features classified into three main categories (a) Learner tools, (b) Management tools and (c) Development tools.

There are many e-learning platforms, however one of the most important feature is a learning management system (LMS) used to administer one or more courses to one or more learners

(Nina,2004), it provides an instructor with a way to create and deliver content, and provide learners with the ability to use interactive features such as threaded discussions. Since there are several LMSs to facilitate moving course content and related information from one platform to another, the Advanced Distributed Learning (ADL) created the first version of Shareable Content Object Reference Model (SCORM), (DigitalThink.com). So they can be easily shared among different learning management systems (LMSs), which anyone can develop models of learning contents and delivery.

Learning is a lifelong detection where training and retraining become strategies for both individual and corporate success. E-learning uses communications technologies to use the vast collection of resources available and motivates the development of lifelong learning skills. A variety of technologies are used for e-learning to serve as the critical connection between the educational institutions and the outside world. The traditional universities developed new ways to distribute their basic education to non-traditional learner populations. These new learners will speak multiple languages and live all over the world. The basic education will reach remote campuses, in government and business workplaces, and directly to learners in their own homes.

In this study we try to present the definitions of distance learning and e-learning and relate them to other concepts to reach a suitable definition. In the last few years many new e-learning platforms have been developed, but the problem is how to compare these different e-learning platforms, and on what bases can we choose the best one? Additionally, we try to investigate the e-learning platform features in order to determine the best platform according to its features by testing it via our generated mathematical equation based on those features.

Special questionnaire designed and delivered worldwide to e-learning experts in order to gather the needed data for ranking the investigated e-learning platform features. Many statistical tests theories were applied using Statistical Package for Social Scientists (SPSS) software. Therefore, we could classify the investigated features into two types: (1) the essential features; that must be owned by any e-learning platform as possible, thus the absence

of any of these features will mainly affect the platform efficiency. (2) the optional features; that give the platform additional advantage in case of its availability.

Some statistical tests were applied to determine the effective features subset within optional features set. As a result, we could generate mathematical equations that represents the effective optional features subset to be used for evaluating any e-learning platform.

After successful testing our mathematical equation. We have implemented it on the eight candidate e-learning platforms. Consequently, the WebCT Camp. Ed6. and Blackboard6 platforms are the best two e-learning platforms based on optional features availability. With respect to the open source platform Atutor1.4.3, LON-CAPA1.3, and Moodle1.4 have the same level. Noting that four of them are Open Source platform which are Atutor1.4.3, LON-CAPA1.3, Moodle1.4, and Sakai2. The others are commercial platforms which are Desire2Learn7.4, Blackboard6, WebCt camp. Ed.6, and eCollege AU+

The structure of thesis as follows: this chapter includes the objectives and the scope of the study, chapter 2 reviews the previous studies that discuss the comparisons among e-learning platforms. Chapter 3 is devoted to the definition of distance learning and e-learning and the distinction between these concepts. Chapter 4 discusses the e-learning platforms and their features by classifying them into three categories: Learner tools, Management tools and Development tools. Chapter 5 includes the analysis method of e-learning platform features which present the essential and optional features. Finally, chapter 6 generates the evaluation model that aims to find the best platform among the famous eight e-learning platforms and discusses. The conclusions and recommendations will be provided.

1.2. Problems and objectives

Many universities implemented several e-learning programs all over the world, and unlimited universities partially implemented e-learning programs. To do that, several e-learning platforms are improved. But what is the best method for the selection of an e-learning platform? In case, there are several methods for the evaluation of these platforms, and each method concentrates on several criteria. Besides the fact that most of the evaluation focuses on software engineering or system design more than interest in services or features which are provided by these platforms.

This study is interested in studying the features availability provided by these platforms and finding scientific method for evaluating these platforms with respect to services and features availability. Palestinian universities still follow the traditional way of learning; none of them has a complete e-learning program.

The main objective of this thesis is to find the relationship between distance learning and e-learning through their definitions to study the most famous e-learning platforms through their features and to present the mathematical model to evaluate any e-learning platform. So, the detailed purposes will be summarized as follows:

1. Present the definitions of distance learning and e-learning and to reach a suitable definition for each of them.
2. Investigate the importance degree of e-learning platform features in order to determine the best platform according to its features.
3. Design a literature model to be used for comparing e-learning platform through the features.
4. Design a mathematical model to be used for evaluating the e-learning platforms.
5. Provide some results and recommendations to those who are interested in the core study.

1.3 Related Work

The growth of e-learning systems has increased greatly in recent years, to support learners for its flexibility and economic pressures on educational institutions. There are many researchers used for evaluation or comparison e-learning platforms several criteria such as usability, functionality, efficiency ..etc. (Chua & Dyson,2004, Munoz & Duzer, 2005, Karin V.D.Berg, 2005). Network learning environment for installation (Blackboard Inc. , 2004). Pedagogical and technical aspects (Pinter & Radosav). Support most number of common features (Lislie S. ,2003). Technical Aspects(Open Polytechnic of New Zealand, 2004). Therefore, There is no specific method to evaluate e-learning platforms, specially there are several criteria that may be chosen by researchers or companies

1.4. Motivation

During our work at Al-Quds Open University (QOU), the only university in Palestine that implements open education principles in its several programs. (QOU) going to process of enhancing the uniqueness of open education by providing e-learning tools for some related courses such as Electronic Commerce (4224) and Computer Principle (0102). In addition to that, (QOU) is partially transferring to web-based applications through course assignments, student profiles…etc. During the next few years, the university will completely transfer from open education to distance education.

In order to follow the rapid transfer of (QOU) traditional way of teaching, to web-base application and distance learning, we are became interested in knowing more and more about distance learning and e-learning. We tried to distinguish between many related terms to distance learning, and he got an idea about many e-learning platforms implemented by many international universities. We are need to know how to determine the best platform? What are the critical success factors for the best platform? Are these platforms valid for implementation by Palestinian universities? What is the infrastructure needed to implement e-learning programs by Palestinian universities? And do Palestinian universities need unique platform to fit their needs?

We tried to find answers for the above questions. Unfortunately, we did not find any local or international literature study that answer these questions, most articles literature were interested in how the learning methods are applied on e-learning and how the learners interact with the materials? And most of new studies emphasized collaboration and interactional learning. For that reason we decided to deeply search and investigate to answer questions about e-learning and its possible implementation by the Palestinian universities.

1.5 Contribution

Our study present the definition of distance learning and e-learning. Additionally investigate the e-learning platform features in order to determine the best platform according to its features by testing it via our generated mathematical equation based on those features.

1.5.1. Research Questions

In this study, we try to answer the following questions:

a) **Is it possible to generate a mathematical model to evaluate the e-learning platform depending on the platform features? And can this model be applied to select the best platform?**

b) **What is the best e-learning platform that has the capacity of the acquisition of many features?**

In order to answer these questions, we also answer the following sub-questions:

1. What are the main features that must be available in any e-learning platform?
2. What are the optional features that increase the performance and importance of the e-learning platform?
3. Do all the features have the same degree of importance for the evaluation of any platform?

1.5.2. Research Methodology

To answer the above questions, many statistical tools are used. A special questionnaire was designed to evaluate e-learning platforms to determine the importance degree for each feature. The main idea of evaluation is to let some e-learning experts fill the questionnaire, by ranking each feature through (1 to 5) with respect to its importance in the platform, then taking the

average of their answers in order to grant special importance weighing for each e-learning platform feature to formulate the literature model. After that, some statistical tools were used to formulate the mathematical model to evaluate any e-learning platform taking into account their features in general.

Many statistical tools is used at this thesis in order to analyze the data and investigate the results. Those tools are:

1. Spearman's Coefficient of Rank Correlation " rs".

Spearman's rank order correlation determines the relationship between two sets of ordinal data (usually paired) that initially appear in rank order or have been converted to rank order.
http://www.revision-notes.co.uk/revision/181.html

2. Chi-square as Test of Independence "$\chi 2$".

The chi-square test of independence is used to test whether two populations or variables are related or independent to each other with respect to some characteristic.
http://www.isixsigma.com/dictionary/Chi_Square_Test-67.htm

3. One way analysis of variance.

The one way analysis of variance (ANOVA) is an inferential statistical test that allows you to investigate and model the relationship between a response variable and one or more independent variables, and to test if any of several means are different from each other. It assumes that the dependent variable has an interval or ratio scale, but it is often also used with cordially scaled data.
http://www.minitab.com/support/docs/rel14/14helpfiles/Statistics/AnalysisofVariance.pdf

4. T-test.

A one sample t-test is a hypothesis test for answering questions about the mean where the data are a random sample of independent observations from an underlying normal distribution.
http://www.stats.gla.ac.uk/steps/glossary/hypothesis_testing.html#1sampt

5. Cronbach Alpha.

Cronbach's alpha measures how well a set of items (or variables) measures a single one-dimensional latent construct. When data have a multidimensional structure, Cronbach's alpha will usually be low. Technically speaking, Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency) of a psychometric instrument.

Chapter 7

Conclusion and Future work

There are several methods to evaluate e-learning platforms, each one is based on various criteria which may be interest of a researcher or a company. So, there is no one standard method to choose the best platform. This thesis studied the e-learning platform features to evaluate e-learning platforms which are studied to select the best one.

7.1 Conclusion

The optional features of e-learning platforms were investigated to construct a mathematical model for the evaluation of e-learning platforms. In the first chapter, a number of questions were formed. The answers of these questions will now be given. Through that, we arrived the following conclusions:

1. The platform features are classified into three sets: Learner tools, Management tools and Development tools, each set is devided into subsets of features.
2. Refering to the questionnaire, it is found that the features of the different platforms don't have the same rank of importance, therefore they are ranked within (2 to 5) scores.
3. Two types of features are available in each platform: essential features which have greatest importance and they should be provided by any existing or new platform. Thus, the absence of any of these features will mainly affect the platform efficiency. And optional features that give the platform additional advantage in case of its availability, and contribute to reinforcing and increasing the importance and performance of the platform.
4. With respect to the essential features, the Desire2learn is the first in order from the eight studied platforms.
5. With respect to the optional features, the WebCT Camp. Ed. and Blackboard platforms achieve the best results at the same level since they contain these features..
6. According to the Open Sourse platforms, Sakai and Atutor1.4.3 platforms get the best results at the same level with respect to the essential features. While the Moodle1.5, Atutor1.4.3 and Lon-Capa1.3 get the best results at the same level with respect to the optional features.

The contributions of this thesis take two directions, the ones who want to evaluate e-learning platform. The other is the contribution to scientific research. The goal of this thesis is to produce a model to evaluate e-learning platforms in case of their features availability. It can be used to determine the best e-learning platform from a list of canidates. And try to help the administrators of universities and the interested people to facilitate the process of selecting the suitable e-learning platform.

In conclusion, there are many studies concerned with the evaluating and comparing e-learning platforms. Those studies are not enough to cover this important field of e-learning because some studies are not very precise or contain weak criteria, therefore, we still need more studies and metrics to evaluate and compare effectively the organization's needs.

During the final stage of our study, there were contacts between WebCT and Blackboard companies about the posibility of merger in one company. At the beginning of the year 2006 this merger actually took place. After implementation of our mathemetical model on the eight studied platforms, WebCT and Blackbaord platforms get the highest percentage in their optional feature availability. The merger of the two companies renforces the results of our study and gives credibility to the mathemetical model. This supports our results which contribute to the evaluation of e-learning platforms with respect to the studied availability of features.

7.2. Future Work:

In this study we have studied the importance of the features available in the e-learning platforms. And we have presented a mathematical equation to select the best platform according to optional features availability. In terms of future work we recommend to study how these features are designed and programmed, also, we recommend to extend the selected features to include curriculum features. The infrastructure and development of e-learning platform is an important field to implement any e-learning platform. So, studying the capacity and capability of the platform will be an important issue to present. We also recommend researchers to conduct new studies related to Software Engineering for e-learning platform features. On the other hand, as there are many e-learning platforms is there are any possibility of merging between two or more platforms to perform as single platform.