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A PROPOSED MODELFOREVALUATINGTHEUSABILITYOF E-LEARNINGSYSTEMS

نموذج مقترح لتقويم قابلية إستخدام أنظمة التعليم الإلكتروني

A Thesis submitted in Partial Fulfillment of Requirements for the Degree of Master in Computer Science

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ABSTRACT

E-learning is considered a primary solution to the educational process development with the rapid development of information technology, communication, and electronic publishing. There are different challenges facing the implementation of e-learning solutions; such as the usability of the capability of the software product to be understood learned, used and attractive to the user, when used under specified conditions. The usability of E-learning systems is one of the major factors contributing to the success of these systems. The ease of use and ease of learning through e-learning system could be evaluated through user interaction with the system interface. Therefore, an evaluation model for e-learning systems has been developed while adopting these challenges as variables. The study proposed a model for Evaluating the Usability of E-Learning Systems, the model consists of the following Analysis, Design, Development, Delivery, Update, Evaluation and Revision. Finally, the proposed model was evaluated through case study in Educational Website.

According to the evaluation results, the implementation of the proposed model for e-learning systems is increasing the usability this systems.

المستخلص

يعد التعليم الالكتروني حل اساسي لتطوير عملية التعليم في ظل هذه التطورات السريعة في تكنولوجيا المعلومات، الاتصالات، والنشر الالكتروني. وهناك تحديات مختلفة تواجه التعليم الالكتروني، مثل قابلية الاستخدام، سهولة فهم الموقع، جاذبية الموقع للمستخدم. إن سهولة استخدام أنظمة التعلم الإلكتروني هو أحد أهم عوامل نجاح هذه الأنظمة، ويتم تقييم سهولة استخدام وتعلم نظام التعلم الإلكتروني من خلال تفاعل المستخدم مع واجهة النظام، لذلك تم اقتراح نموذج لتقييم نظم التعليم الإلكتروني بناءً على هذه التحديات، ويتكون النموذج من التحليل، التصميم، التطوير، التسليم، التحديث والتقييم والتنقيح، وختاماً تم تقييم النموذج المقترح من خلال تطبيقية على دراسة الحالة.

ووفقاً لنتائج التقييم، فإن تطبيق النموذج المقترح لأنظمة التعلم الإلكتروني يزيد من سهولة استخدام هذه الأنظمة.

الإهداء

إلى من تجرع الكأس فارغاً ليسقيني قطرة حب

إلى من كلّت أنامله ليقدم لنا لحظة سعادة

إلى من حصد الأشواك عن دربي ليمهد لي طريق العلم

إلى القلب الكبير **أبي الحبيب**

إلى من أعطتنا من دمها وروحها وعمرها

إلى من أرضعتني الحب والحنان

إلى رمز الحب وبلسم الشفاء

إلى القلب الناصع بالبياض **أمي الحبيبة**

إلى الروح التي سكنت روحي

إلى القلب الذي عانق قلبي

إلى من علمني الصبر وأعانني علي العلم **زوجي الغالي**

إلى القلوب الطاهرة الرقيقة والنفوس البريئة إلى رياحين حياتي **إخوتي وأخواتي**

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1.1 Introduction

E-Leaning refers to the use of both software-based and online learning. In many contemporary sectors, E-learning is often regarded as a 'new' form of learning that uses the affordances of the Internet to deliver customized, often interactive, learning materials and programs to diverse local and distant communities of practice. The term E-learning has only been in existence since 1999, when the word was first utilized at a CBT systems seminar, now E-learning systems are becoming more accepted tools in teaching and learning. For this usability evaluation is becoming important to measure the effectiveness of a system as a whole, determining the acceptance of system by the users.

E-learning systems are very important for researchers and learners, this has led over the years to a great development in all aspects of communication, techniques of saving and retrieving information. E-learning systems are becoming more accepted tools in teaching and learning, since they provide a platform for using computers in order to improve education. Popularity of e-learning systems can be attributed to their key benefits. When applied correctly, they can reduce teaching and learning costs and time. For this reason, the usability of these systems should be guaranteed to increase interest. Usability evaluation is becoming important to measure the effectiveness of a system as a whole, determining the acceptance of system by the users. Users are increasingly becoming more informed and, consequently, have higher expectations from the systems. Moreover "a system interface" has become a commodity. There for, the acceptance of the user plays a major role in the success of the system. the e-learning system can help achieve the motivational aspect of usability, (Shilwant & Haggarty,

2005). this study focuses on usability models of e-learning systems. this study is proposing a model for evaluating the usability of e-learning systems.

1.2 Research Problem

Evaluating the usability of e-learning systems is not a simple task. There are significant challenges such as the increase in the number of learners, technological advancements, and major changes in learning tasks. There should be a model for evaluating the e-learning systems that takes into consideration these challenges.

Usability evaluation of learning interface determines the extent to which the systems fulfill the requirements of a perfect e-learning system covering all-important features of usability.

1.3 Research aim

The aim of this research is to propose a model for evaluating the usability of E-learning systems.

1.4 Research Objectives

The main goals of the research are:

- To study usability models of e-learning systems in the literature, and compare them in order to propose new Model for Evaluating the Usability of E-learning systems.
- To propose a Model for evaluating the usability of e-learning systems.
- To evaluate the proposed model using a case study.

1.5 Research Methodology

The methodology of this research contain the following steps

1. Problem formulation.
2. Literature review.
3. Proposed new Model for Evaluating the Usability of E-learning systems.
4. Evaluate the proposed model through case study.
5. Write thesis.

1.6 Thesis Outline

The outline of the thesis is as follows:

Chapter1	Is an Introductory chapter.
Chapter2	Presents literature review related to E-learning systems.
Chapter3	Describes the research methodology used in the thesis.
Chapter4	Describes the evaluation and results.
Chapter5	Presents the conclusions and recommendations of the research.

2. LITERATURE REVIEW

2.1 Introduction

In this chapter, there will be an explanation of usability, evaluation and usability of e-learning systems.

Key words used: usability, usability of E-learning, systems, e-learning and e-learning Models.

2.2 Usability definitions

Usability is "The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (ISO 9241-11, 1998).

Usability is "The capability of the software product to be understood learned, used and attractive to the user, when used under specified conditions."(ISO/IEC 9126, 2000-2001).

Usability as "a set of attributes that bear on the effort needed for use, and on the individual assessment of such use by a stated or implied set of users." (ISO/IEC 9126, 3003).
Usability as "The ease with which a user can learn to operate, prepares inputs for, and interprets outputs of a system or component." **(IEEE** Std.610.12, 1990)
Usability is the primary parameter of evaluation of e-learning technologies and systems. Major attributes of usability are efficiency, effectiveness and satisfaction. It stands for quality and putting users and their real needs in as the first priority.

Therefore, investigation of usability and its integration or involvement in the learning process is worthwhile.

This thesis focuses on usability evaluation techniques for e-learning applications and as well as models used in it.

A literature review has been carried out concerning relevant research works to get more focused research on e-learning and usability evaluation and models used in e-learning.

2.3 Usability of E-learning Systems

According to (ISO), usability is defined as the degree to which a particular product is used by particular users to accomplish specific goal with efficiency, effectiveness and satisfaction in a precise standpoint used. The majority of the previous studies on the usability of e-learning systems have been on exploring the usability of interface of e-learning systems and the links between usability features and the e-learning success.(Nicholas Kipkurui Kiget, Professor G. Wanyembi, Anselemo Ikoha Peters, 2014).

Usability is the quality attribute that assesses the ease of using the application by users to accomplish their specified goals effectively, efficiently, and with a high level of satisfaction. In addition to ease of use, a usable e-learning system should be useful for the learners in accomplishing their learning task. (Venkatesh, Morris, Davis, & Davis, 2003). Usability analysis helps increasing the likelihood of a system being classified as not only easy to use but also useful from the learners' perspective.

Apart from the two basic objectives metioned above; researchers have suggested several additions to the usability model. (Constantine & Lockwood, 1999) highlighted, that a usable e-learning system must achieve: the ability to learn, to remember, efficiency and reliability in use and user satisfaction. An effective e-learning system should be interactive and provide feedback, have specific goals, motivate users, communicate a continuous sensation of challenge, provide suitable tools, and help avoid distractions interrupting the learning stream.(Costabile, De Marsico, Lanzilotti, Plantamura, & Roselli, 2005) Incorporating feedback, curiosity,

comprehensiveness, and challenges in the e-learning system can help achieve the motivational aspect of usability.

2.4 E-learning

E-Learning is different from conventional face-to-face classroom teaching. It is a new way of teaching and learning. The E-Learning has many interpretations but mainly, it stands for learning by electronic means. This indicates that learning process is not direct from lecture notes, books or face-to-face from teacher/lecturer but through electronic devices or methods.

Common forms are computer-based training and web based lessons or on-line lessons. With the continuous introduction of advanced technology, lessons may be taken anytime anywhere. These lessons can be made more interesting via using multimedia i.e. combination of text, graphics, sound and animation, Lessons can be delivered to the learner through various means e.g. PC, PDA, mobile phone and TV. Electronic learning (or e-learning) is a kind of technology supported education/learning (TSL) where the medium of instruction is through computer technology, particularly involving digital technologies. E-learning has been defined as "pedagogy empowered by digital technology" (Nichols, 2008). The objectives of e-learning are to facilitate and assist people by delivering appropriate contents and services to fulfill user needs. The increase in demand of learning instantly from anywhere has resulted in e-learning systems on the web with the aim to provide effective and efficient learning platforms which create an environment for knowledge acquirement predominantly in distance learning.

2.4.1 Evaluate the performance of e-learning systems, especially about user interaction with the interface of that system

Researchers highlight the importance of HCI by saying that the human computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. (Preece, 2002). The user seen in an application the interfaces, for this reason the interface has a huge influence on the success or failure of that application, Users want to see the interface of a system according to their needs and demands. If the interface is rigid, complex or boring, it will keep users from using that application. The user interface plays a crucial role in any application, but in e-learning, it is even more complex. The interface is a mediator between human and computer, as interaction and usability are tools that provide measures for effective interaction to achieve specific goals. Usability is the primary parameter of evaluation of e-learning technologies and systems. The major attributes of usability are efficiency, effectiveness and satisfaction. Usability stands for quality and putting users and their real needs in the center, Therefore investigation of usability and its integration or involvement in the learning process is worthwhile.

2.4.2 Benefits of E-Learning

2.4.2.1 Multiple Delivery Options

E-Learning makes it easy for people to deliver training to their workforce through a variety of deployment options over Internet, intranet and CD ROM.

Just-in-Time Training: E-Learning is easily accessible to employees and students. There is no waiting for classes. It can be used right before doing a task at place of work.

2.4.2.2 Administrative Control and Reporting

With learning management software, administrators can quickly and easily access detailed reports to verify student progress, quantify training investments, and plan effectively for the future.

2.4.2.3 Engaging and Effective

Benefit from the powerful combination of audio, animation and software simulations that produce highly engaging multimedia training. Courses today use realistic simulations, hands-on exercises, and role-playing scenarios to help employees "learn while doing".

2.4.2.4 Assessment

Student assessment is of a great and helpful support in the learning process. With many e-Learning products, pre-assessments are available to determine which topics students are already familiar with, so that they can focus on key areas where they need help. This reduces the frustration of training on familiar content. The amount of time spent on training is condensed as much as 50% Students can also take quizzes throughout the training process to test their understanding.

2.4.2.5 Increased Productivity

Training is a proven benefit and incentive to employees, giving them the opportunity to advance their skills and careers. Employees who have the

skills and abilities to successfully do their jobs will be more motivated, effective, and productive.

2.4.2.6 Lower Cost

E-learning is available at a fraction of the cost of classroom learning and is provided right to student's desktops, eliminating the need for travel and other expense.

2.5 E-learning Models

To ensure the quality, effectiveness, and usability of the e-learning site, it is necessary to choose the suitable models when needed to design a site. For this, people should be studying models used in these sites and determine all about their effectiveness and how limited they are, so they can improve the new design of models.

2.5.1 ADDIE Model in brief

Florida State University initially developed the ADDIE framework to explain the processes involved in the formulation of an instructional systems development (ISD) program for military interservice training that will adequately train individuals to do a particular job and which can also be applied to any interservice curriculum development activity. The model originally contained several steps under its five original phases (analyze, design, develop, implement, and evaluate). The idea was to complete each phase before moving to the next. Subsequent practitioners revised the steps, and eventually the model became more dynamic and interactive than the original hierarchical version. By the mid-1980s, the version familiar today appeared.

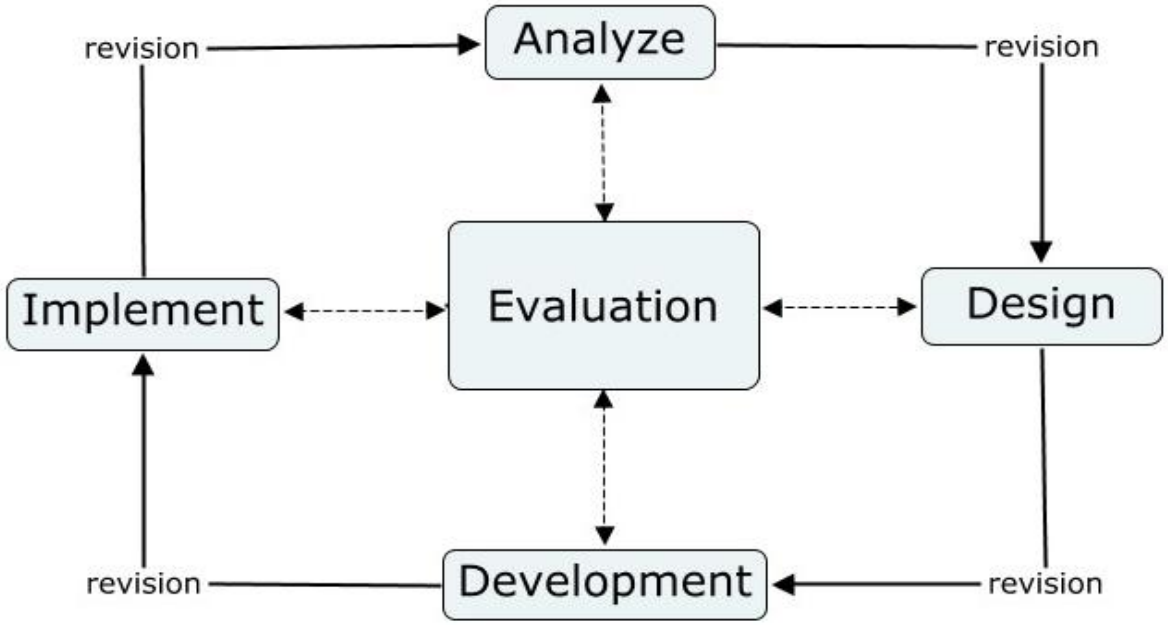

Figure 2-1 ADDIE Model

2.5.1.1 Analysis phase

The analysis phase clarifies the instructional problems and objectives, and identifies the learning environment and learner's existing knowledge and skills.

Questions the analysis phase addresses include:

Who are the learners and what are their characteristics?

What is the desired new behavior?

What types of learning constraints exist?

What are the delivery options?

What are the pedagogical considerations?

What is the timeline for project completion?

2.5.1.2 Design phase

The design phase deals with learning objectives, assessment instruments, exercises, contents, subject matter analysis, lesson planning, and media selection. It should be systematic and specific. Systematic means a logical, orderly method of identifying, developing and evaluating a set of planned strategies targeted for attaining the project's goals. A more specific meaning is that each element of the instructional design plan must be executed with attention to details. The design phase may involve creation of 'design document/design proposal' or 'concept & structure note' to aid in final development.

2.5.1.3 Development phase

In the development phase, instructional designers and developers create and assemble content assets blueprinted in the design phase. If e-learning is involved, programmers develop or integrate technologies. Designers create storyboards. Testers debug materials and procedures. The project is reviewed and revised according to feedback.

2.5.1.4 Implementation phase

The implementation phase develops procedures for training facilitators and learners. Training facilitators cover the course curriculum, learning outcomes, method of delivery, and testing procedures. Preparation for learners includes training them on new tools (software or hardware) and student registration. Implementation includes evaluation of the design.

2.5.1.5 Evaluation phase

The evaluation phase consists of two aspects: formative and summative. Formative evaluation is present in each stage of the ADDIE process, while summative evaluation is conducted on finished instructional programs or products.

2.5.1.6 Addie Strengths and Weaknesses

2.5.1.6.1 Strengths

The strength of the ADDIE models comes from the fact that it is very linear. It is a step by step instruction on how to teach an individual lesson. Objectives and goals are neatly organized and clearly defined. This model would be helpful if someone is out for a day and they need to leave easy to follow instructions for a substitute. He/she can easily show their principal or parent the objectives that they set for their students and how they will measure their progress.

2.5.1.6.2 Weaknesses

The weaknesses of ADDIE model are that learning is not linear, and therefore this model is not designed to accomplish deep learning. It also does not allow for flexibility within the lesson/unit. There is no continuous assessment. Assessment is only done at the conclusion of the lesson. This does not allow for the teacher to reflect on the skills that need to be taught, that have been taught, and the possibility of needing to go over what had been taught. It does not allow for much exploration for the student. Students cannot discover ideas/concepts on their own.

2.5.2 Salmon's 5-stage model in brief

The five-stage-model provides a framework or scaffold for a structured and paced program of e-tivities. The five-stage-model offers essential support and development to participants at each stage as they build up expertise in learning online. For online learning to be successful and happy, participants need to be supported through a structured developmental process.

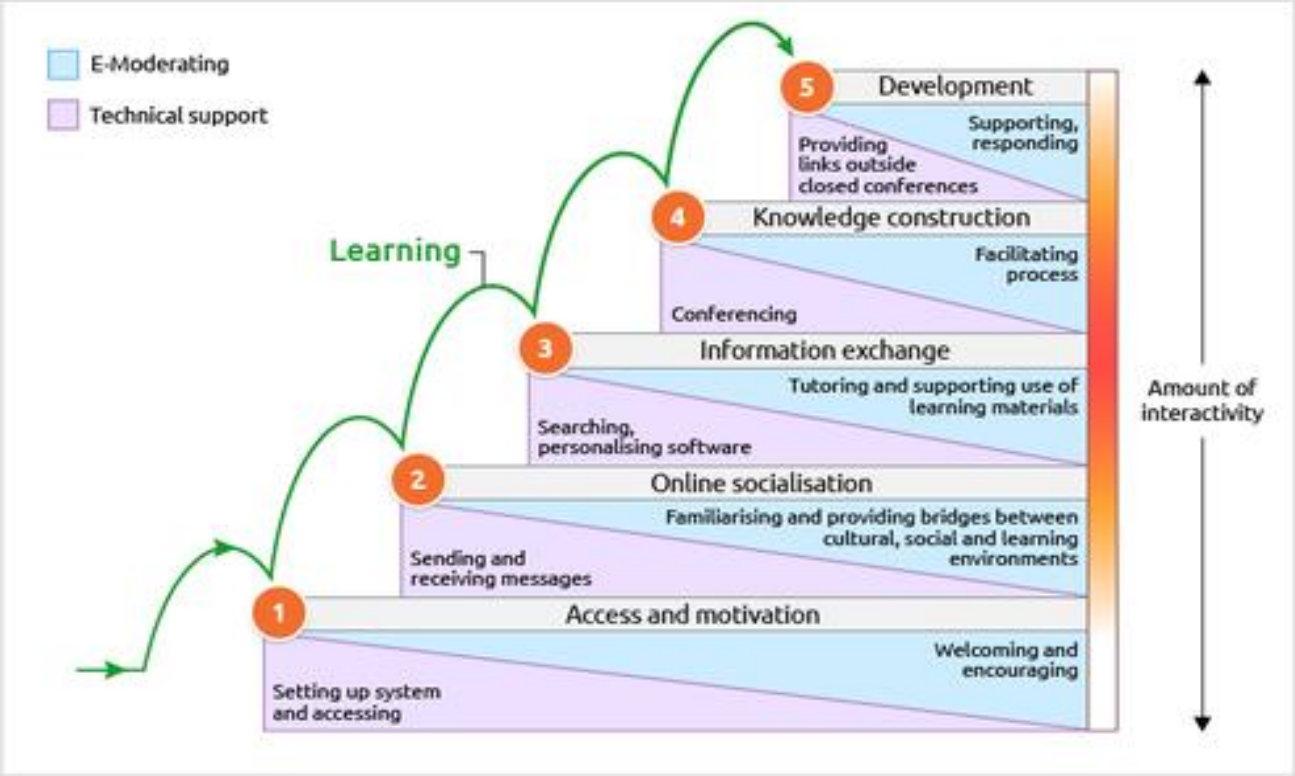

Figure 2-2 Salmon's 5-stage Model

Stage 1: (at the base of the flight of steps) includes individuals' essential prerequisites for effective participation: access and the ability to benefit from remote group work for learning.

Stage 2: Involves individuals establishing a personal online identification and then finding others with whom to interact.

Stage3: participants give and receive relevant and useful information about the course, and undertake course-related learning tasks. Up to and including Stage 3, a form of co-operation occurs through support by other participants for each person's goals.

Stage 4: More complex constructive tasks are possible, discussions occur and the interaction becomes more collaborative.

Stage 5: Participants look for more benefits from the system; they want help in achieving their own goals, in exploring how to integrate their online experiences into other forms of learning and in transferring and applying their learning. At this stage sophisticated individual learning may occur, that includes reflection on and transfer of knowledge.

There are further concerns that the model is dominating discourse in learning technologies, being seen as a template for the design of all online teaching and learning environments regardless of the context. There is a broad concern that the reification of models of learning and teaching, while meeting organization needs for transferable, multi-use products, will dominate and stifle professional practice development.

2.6Comparison between ADDIE and Salmon's 5-stage models Table 2-1

Models	Acronym of	Similarities	Differences
5 stage vs ADDIE	**ADDIE (**Analysis, Design, Develop, Implement, and Evaluate**).**	Both models have stages for designers to follow. The Addie Model consists of five stages: Analysis, Design, Develop, Implement, and Evaluate. The 5stageModel consists of five stages: Access and motivation, Socialization, Information Exchange, Knowledge construction, Development. Both ADDIE and 5stage Design are popular established methods for e-learning	The ADDIE methodology emphasizing quality at the end of the process during the "Evaluation" phase. It is during this phase that e-learning teams and project stakeholders work together to determine the effectiveness of the work product and make any adjustments. The 5stage methodology serialization.

2.7 Summary

In this chapter was studies ADDIE Model and Salmon's 5-stage model in the literature and compare them in order to propose new Model for Evaluating the Usability of E-learning systems.

3. METHODOLOGY

3.1 The Proposed Research model

After studying and reviewing the ADDIE and Salmon's 5-stage models it used in e-learning systems the proposed model was developed by choosing the most suitable criteria, after studies ADDIE and Salmon's 5-stage models criteria. Will be described the main features of the proposed model in point 3.2.

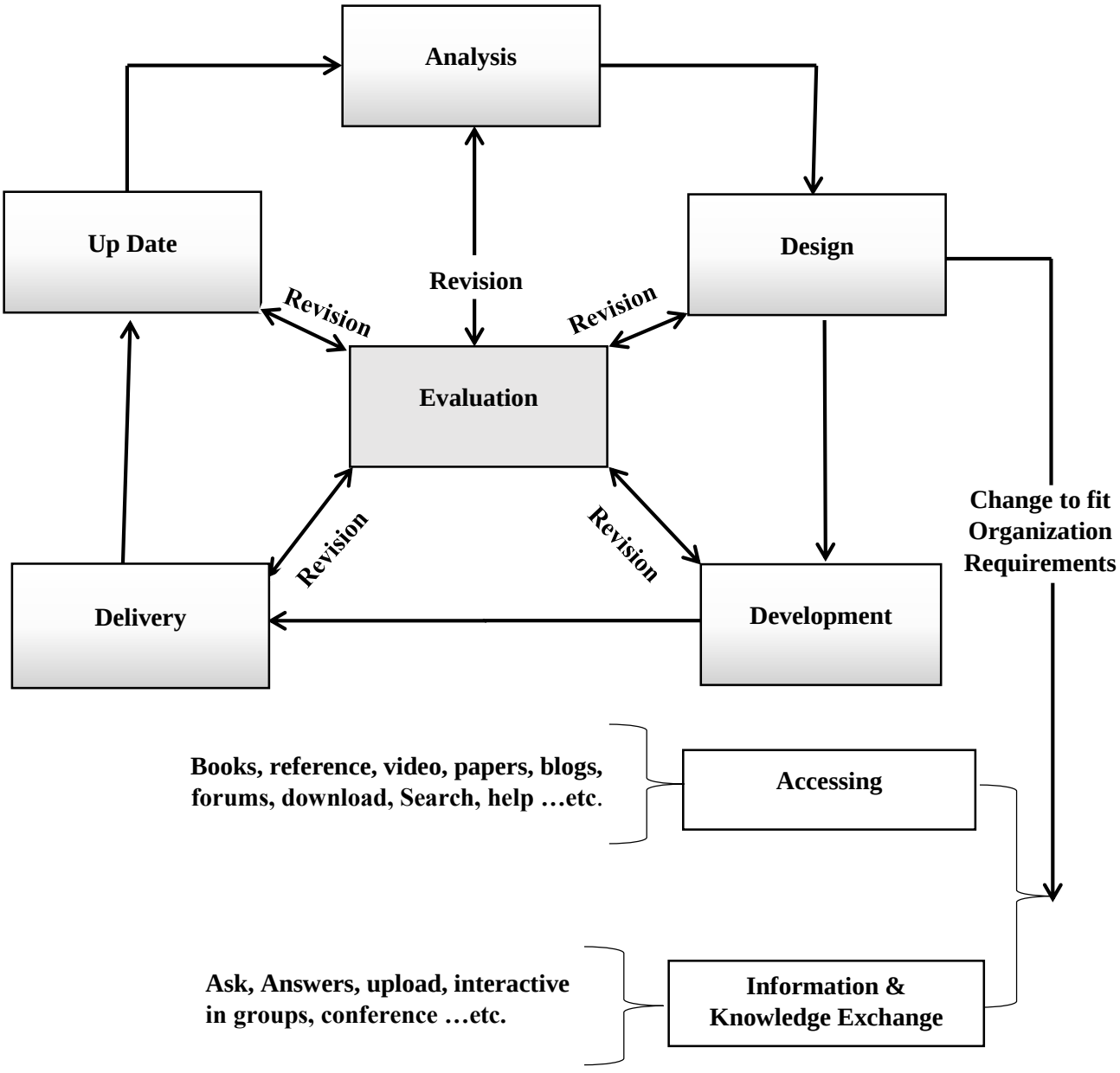

Figure 3-1 **ELSM (E-Learning Systems Model)**

3.2 The main features of the proposed model

3.2.1 Analysis

This stage is one of the most important stages of the model in which problems are identified, educational process are analyzed and thereafter suitable solutions are found to meet the required purpose of the system.

- **Characteristics Learners:** characteristics of learners such as

  Age: Adults.

  Educational levels: university students, graduates, researchers and scholars.
  Cultural: people who can use computers.

- **Teaching Method:** was Teaching Method was determined by educational content and educational media. It helped uploading different types: documents, sound, pictures, and video in site.
- **Educational Content:** existing available by documents in the site, admin can add any new aspect/content.

3.2.2 Design

- The system design fit learners' needs, it facilitates learning and usability. Since e-learning systems should be easy to learn and use so that we can learn from them without having to learning it and studying them before studying.
- The system design using usability guideline, these are more efficient in speed of response to the user's request, as well as the easy and quick presentation of information, ability of the system to perform the tasks

for which it is designed, and the accuracy of the information it provides.

- The system is firstly more secure as it has ability to prevent unauthorized persons from accessing the database, secondly safer as it links to the operating system or internet browser in safe ways that do not cause problems, thirdly it gives attention to request data that distinguishes each student from the other registered in the course, and finally it does not allow modifying the data within the decision without writing the secret code of the person
- The system is very objective, the site does not involve any intolerance of gender, religion or race, no bias in sources of the included site, the site is free of advertisements to take up the contents of the site and present it objectively.
- The Navigation in system uses a simple and easy way to scroll between content of the site, positioning of navigation tools within the site pages, all pages have the back to home button, uses left and right arrows to move between pages, uses graphical navigation tools such as graphical icons.
- The system is more consistent, it uses the same page layout throughout the entire site, standardizes the provision of assistance in all parts of the site, standardizes the method of writing the curriculum, uniformity between sizes and places of presentation of elements of non-textual content such as images and animations so that the learner is not distracted.

Successful system design is essential to successful system delivery, which in turn is essential to user and stakeholder satisfaction.

3.2.3 Development

The system is suit the needs of users, was developed based on the analysis stage in terms of interaction on the site, Characteristics learners, teaching method and educational content the provision and exchange of information and knowledge, lectures and books anywhere and anytime.

In the development phase, was production of the system is carried out, and was collected materials prepared in the design phase and the educational material is in all its forms and prepared for testing.

3.2.4 Delivery

After finishing from developing system was prepared, to enter courses, and educational environment, teaching methods, instructions, equipment, tools and introduction of the product, the initial target audience to discover errors and evaluate and produce the final product.

The success of delivery phase is assessed by success factors: use, user satisfaction and net benefits.

3.2.5 Update

Use web content management system, because a web content management system (WCMS) allows non-technical users to make changes and update to a website with little training. A (WCMS) typically requires a systems administrator and-or a web developer to set up and add features, but it is primarily a website maintenance tool for non-technical staff.

Most sites are not updated as often as they should be, for this reason it is essential that managers and staff be able to update the website without having to go a web designer or technical staffer. This is because the technology is

improving rapidly; it forces users to update their e-learning system. Websites will be very effective if they are kept up to date.

3.2.6 Evaluation

Evaluation is the key component of any e-learning site or system that focuses on continuous improvement. Evaluation in this prototype enables us to:

- Determine the quality, effectiveness, continuous improvement of e-learning, understanding all pros and cons of e-learning courses or programs, and make improvements.
- Most people believe that evaluation occurs after e-learning site has been completed, which is not true, evaluation occurs:
    - Before the creation of e-learning site (needs assessment) to plan e-Learning site.
    - During the creation of e-learning site (formative evaluation) to make improvements.
    - After the completion of creation of e-learning site (summative evaluation) to determine outcomes.

This phase is ongoing throughout all processes to ensure all stated goals of learning process will meet the specified needs, and uncover any obstacles that may have emerged, then, by making revisions, adjustments and corrections as needed, to insures the success of the next phase.

3.2.7 Revision

The revision process is task at all stages of the system, the process is evaluated by the developer, by comparing the requirements of the each stage with the stage outputs.

3.3 Usability factors/attributes

In order to evaluate the e-learning systems, the following usability attributes/factors/goals were proposed:

Table 3-1 Usability factors/attributes Table

No	Characteristics	Description
1	Authority	*Identify the author's name author, e-mail and telephone.
2	Effectiveness	*Is the capability of producing a desired result or the ability to produce desired output
3	Accessibility (Search Engine)	*All function or button is clear for learners. *Link each page to its predecessor. *Should deal with the number of students enrolled in the site. *An index to display keywords or topics *Provide search engines with decision (search engine).
4	Learnability	*The system should be easy to learn so that the user can rapidly start getting some work done with the system
5	Efficiency	* The ability to do things well, successfully, and without waste.
6	Accuracy	* Recording teacher and learner data so as to facilitate communication and interaction with them. * Do not increase or prolong the request for personal data of the learner. * The site is free of design errors and programming. * Consider the accuracy of the selection of graphics, sounds and video clips. * References and sources can be consulted to validate the site.

7	Safety	* Links to the operating system or Internet browser safe do not cause problems. * Attention to request data that distinguish each student from the other registered in the course. * Do not allow to modify the data within the decision without writing the secret code of the person
8	consistency	* Use the same page layout throughout the entire site. * Standardize the provision of assistance in all parts of the site. * Standardize the method of writing the curriculum. * Uniformity between the sizes and places of presentation of elements of non-textual content such as images and animations so that the learner is not distracted.
9	Objectivity	* The site does not involve any intolerance of gender, religion or race. * No bias in the sources of the included site * The site is free of advertisements * To take up the contents of the site and present it objectively.
10	Links	* The site includes links to appropriate learning resources. * Characterize the link in a different color or put under it a line. * The links in the site are correct. * Change the color of the link that was used before. * The main links are specific and fixed in all pages of the site.
11	Navigation	* Use a simple and easy way to move between elements of the content of the site. * Positioning of navigation tools within the site pages. * All pages have the Back to Home button.

		* Use left and right arrows to move between pages. * Use graphical navigation tools such as graphical icons.
12	Multimedia	* Text appears on the screen clearly. * Use three styles of lines as a maximum. * Use three sizes of fonts as maximum. * Use of easy-to-read and comfortable lines of the eye. * Color contrast text font with background color * Sound is clear. * Avoid using music and sound effects at the same time. * Avoid having the screen contain more than one video clip. * Minimize the use of video clips as much as possible because they cause slow load of the site. * Avoid using crowded images in detail. * Colors in images and graphics are realistic.
13	Orientation And Help	* Provide guidance and instructions to help the learner in dealing with the site. * The clarity of the site instructions of the learner. * Explain what the error is and why it happened and what the learner can do when the error site. * Routing and ongoing assistance on all pages. * Help and guidance phrases are specific, simple and short phrases.

3.4 Summary

In this chapter was proposed new Model for Evaluating the Usability of E-learning systems and determined the Usability factors/attributes.

4. IMPLEMENTATION

4.1 Introduction

This research is composed of a case study to evaluate the usability of the interface of an e-learning system in real time scenario. Methods used for the usability evaluation of the e-learning applications are based on methodology in HCI research and practice with a focus on flexibility and efficiency.

Some basic factors, that every system should satisfy, were selected according to individual needs and the needs and requirements of the organization.

4.2 Measuring the Factors/Attributes

In order to measure the attributes of the usability evaluation model, the metrics described in Table (4-1) are going to be used, Table (4-2) describe the grades used to measure the attributes of the model.

Table 4-1: **Proposed Factors/Attributes to evaluating e-learning systems**

No	Factors/Attributes
1	Identify the author's name author, e-mail and telephone.
2	Ability to produce required result.
3	All functions or buttons are clear for learners.
4	Link each page to its predecessor.
5	Deal with the students registered in the site.
6	An index to display keywords or topics
7	Provide search engines.
8	The system should be easy to learn.
9	The system should ability to do tasks very well, successfully, and without mistakes.

10	Recording teacher and learner data to facilitate communication and interaction with them.
11	Decrease the request for personal data of the learner.
12	The site is free of design errors and programming.
13	The accuracy of the selection of graphics, sounds and video clips.
14	References and sources in site is valid.
15	Links is safe do not cause problem.
16	Requesting login data that distinguish each student from the other in the site.
17	Writing the secret code of the person in case the modify.
18	Use the same page layout throughout the entire site.
19	Uniformity the assistance form in all parts of the site.
20	Uniformity the method of writing the curriculum.
21	Uniformity between the sizes and places of presentation of elements of non-textual content such as images and animations so that the learner is not distracted.
22	The site is free of any intolerance of gender, religion or race.
23	The all sources in the site without bias.
24	The site is free of advertisements.
25	The contents of the site and present it objectively.
26	The site includes links to appropriate learning resources and references.
27	Characterize the link in a different color or put under it a line.
28	The links in the site are correct.
29	Change the color of the link that was use before.
30	The main links are specific and fixed in all pages of the site.
31	Use a simple and easy way to move between elements of the content of the site.
32	Positioning of navigation tools within the site pages.
33	All pages have the Back to Home button.

34	Use left and right arrows to move between pages.
35	Use graphical navigation tools such as graphical icons.
36	Text appears on the screen clearly.
37	Use three styles of lines as a maximum.
38	Use three sizes of fonts as maximum.
39	Use of easy-to-read and comfortable lines of the eye.
40	Color contrast text font with background color.
41	The Sound in the site is clear.
42	Use just music or sound effects at time.
43	The screen contain one video clip maximum.
44	Minimize the use of video clips as much as possible because they cause slow load of the site.
45	Used simple images and clear.
46	Colors in images and graphics are realistic.
47	Provide guidance and instructions to help the learner in dealing with the site.
48	The clarity of the site instructions of the learner.
49	Explain what the error is, why it happened, and what the learner can do in site.
50	Routing and ongoing assistance on all pages.

Table 4-2 Factors/Attributes Percentage Evaluation

Grade	Interpretation
2	Usability factor is available.
1	A good percentage of the factor is available.
0	Usability factor is NOT available

4.3 Case Study Background

To evaluate the proposed model the evaluate Educational Website based on the proposed model. The Educational Website is one of e-learning systems that consists of different Communities as Audio, Books published, Conferences, Deanship of library Affairs, External Relations, Graduation Projects and Theses and Dissertations...etc.

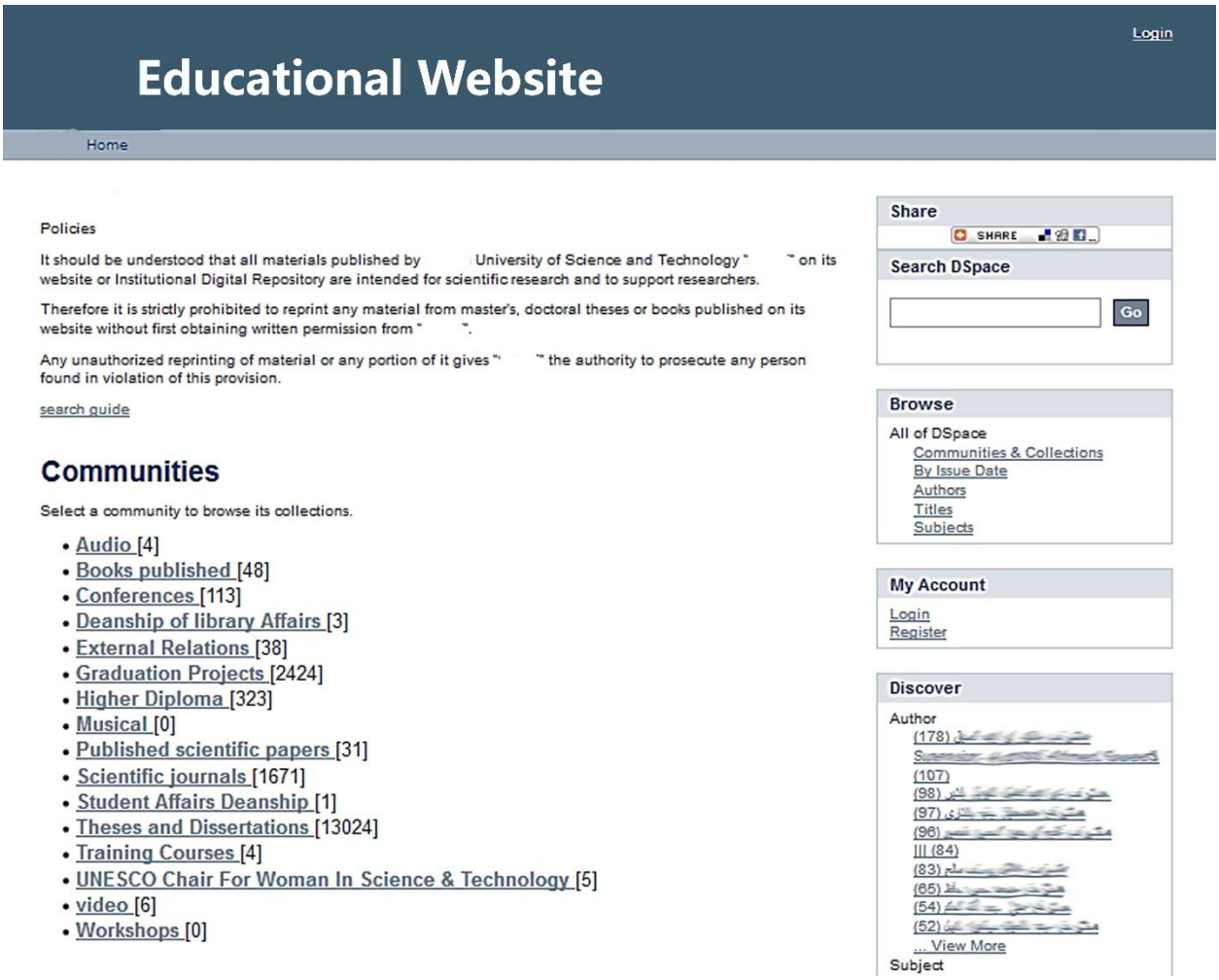

Figure 4-1 **Educational Website**

4.4 Evaluation

In the evaluation part, the case study (Educational Website) was tested by anther developer, the level of experience for him: expert in web application. Was evaluated the site based on the proposed factors/features for evaluating the e-learning systems, described in Table (4.1). The grades used to measure the factors/attributes of the (case study) described in Table (4.2). The result of the evaluating was show in Table (4.3).

4.5 Results and Discussions

4.5.1 Results

Table 4-3: Evaluating e-learning system (case study)

No	Factors/Attributes	%
1	Identify the author's name author, e-mail and telephone.	1
2	Ability to produce required result.	1
3	All functions or buttons are clear for learners.	2
4	Link each page to its predecessor.	2
5	Deal with the students registered in the site.	2
6	An index to display keywords or topics	2
7	Provide search engines.	2
8	The system should be easy to learn.	2
9	The system should ability to do tasks very well, successfully, and without mistakes.	1
10	Recording teacher and learner data to facilitate communication and interaction with them.	1
11	Decrease the request for personal data of the learner.	2

12	The site is free of design errors and programming.	2
13	The accuracy of the selection of graphics, sounds and video clips.	2
14	References and sources in site is valid.	2
15	Links is safe do not cause problem.	2
16	Requesting login data that distinguish each student from the other in the site.	2
17	Writing the secret code of the person in case the modify.	2
18	Use the same page layout throughout the entire site.	**2**
19	Uniformity the assistance form in all parts of the site.	2
20	Uniformity the method of writing the curriculum.	2
21	Uniformity between the sizes and places of presentation of elements of non-textual content such as images and animations so that the learner is not distracted.	2
22	The site is free of any intolerance of gender, religion or race.	2
23	The all sources in the site without bias.	2
24	The site is free of advertisements.	2
25	The contents of the site and present it objectively.	2
26	The site includes links to appropriate learning resources and references.	2
27	Characterize the link in a different color or put under it a line.	0
28	The links in the site are correct.	2
29	Change the color of the link that was use before.	0
30	The main links are specific and fixed in all pages of the site.	2
31	Use a simple and easy way to move between elements of the content of the site.	2
32	Positioning of navigation tools within the site pages.	2
33	All pages have the Back to Home button.	2
34	Use left and right arrows to move between pages.	2
35	Use graphical navigation tools such as graphical icons.	0
36	Text appears on the screen clearly.	2

37	Use three styles of lines as a maximum.	2
38	Use three sizes of fonts as maximum.	2
39	Use of easy-to-read and comfortable lines of the eye.	2
40	Color contrast text font with background color.	2
41	The Sound in the site is clear.	2
42	Use just music or sound effects at time.	0
43	The screen contain one video clip maximum.	2
44	Minimize the use of video clips as much as possible because they cause slow load of the site.	2
45	Used simple images and clear.	2
46	Colors in images and graphics are realistic.	2
47	Provide guidance and instructions to help the learner in dealing with the site.	2
48	The clarity of the site instructions of the learner.	2
49	Explain what the error is, why it happened, and what the learner can do in site.	2
50	Routing and ongoing assistance on all pages.	2
	Total	**88**

4.5.2 Discussions of the Result

After designing the proposed model and suggesting the factors/ attributes that e-learning system designers should take into consideration when designing the system, the Educational Website (case study) was tested to show the factors/attributes includes in the Educational Website, The features/factors available in the site were identical to the features/factors suggested in the Table 4-1 at an high rate.

5. CONCLUSIONS AND RECOMMENDATIONS

5. 1 Conclusions

The main objective of this research was the evaluation of the usability of user interface of e-learning systems. The research proposed a usability model of e-learning systems could be used as a benchmark for e-learning organizations to efficiently implement e-learning systems.

Usability evaluation was done empirically on case study (Educational Website), the reported analyzed the results showed the impact of the attributes/factors of the model on determining the usability of the e-learning system.

5.2 Recommendations

It's recommended that:

- To insure a better implementation of e-learning solution develop should consider the model of the usability evaluation E-Learning Systems Model (ELSM).
- Adding more feature to the model that could have an impact on usability such as satisfaction, learnability, usefulness, and so on.

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