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# THE EFFECTIVENESS OF EMPLOYING MOTIVATIONAL DESIGNED E-LEARNING SITUATIONS ON DEVELOPING ACHIEVEMENT IN COMPUTER SCIENCE CURRICULA FOR OPTIMAL INVESTMENT STUDENTS

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**ABSTRACT**

*The current research aims to measure the effectiveness of employing motivational designed e-learning attitudes to develop achievement in computer science curricula for optimal investment students. To achieve the aim of this research, a tool was built to measure the dependent variable, which was an achievement test. The researchers also used a learning management system, Blackboard, to employ motivationally designed electronic learning situations. The current research relied on the experimental approach with quasi-experimental designs to reveal the relationship between the independent variable (electronic educational attitudes based on the motivational design model) and the dependent variable (cognitive achievement). This is done through the application of (60) students from the optimal investment students at the College of Education at Najran University studying the computer science curricula. They were randomly divided into two groups (experimental and control), each of which consisted of (30) students. The results revealed a statistically significant difference between the two research groups in cognitive achievement in favor of the experimental group.*

*Keywords: E-learning positions; motivational design; academic achievement; computer science curricula; optimal investment*

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## INTRODUCTION

The development in the fields of information and communication technology is a quantum leap that affected the educational system, especially with regard to educational attitudes. Education is the first social system on which nations can rely on the way to achieve their progress and the journey of securing their food and medicine and achieving their security [1, 2]. In spite of the great attention given to educational positions provided electronically in terms of ways to present their contents and ways to benefit from them in different contexts. However, there is no corresponding interest in managing these situations [3, 4].

E-learning is an innovative way to provide an interactive environment centered around learners [5, 6]. It is well designed in advance, and is accessible to anyone, anywhere and at any time, using the characteristics and resources of the Internet and digital technologies, in accordance with the principles of instructional design suitable for an open and flexible learning environment [7, 8]. It is any use of web technology and the Internet to bring about learning [9, 10]. There are a number of software packages that have been developed to manage the different processes of e-learning, and they are called e-learning environments [11, 12]. There are also some learning management tools, online learning systems, and web-based course design tools. In fact, there is no simplified definition of this term, but it can be said that the term e-learning management is used to describe the program in any Server that is designed to organize or manage the various learning processes [13]. Such as providing educational materials and following up students; and duties [14]. The management of e-learning takes place through an educational environment that contains texts, images, video clips and audio within only one system. In addition to the ability to deal with a huge amount of databases and provide relatively easy and flexible interactions between the learner and the technology [15]. This educational environment employs information and communication technology such as the Internet and networks to support synchronous and asynchronous interaction between faculty members and students in order to provide educational courses and electronic learning resources in a way that enables teaching staff to evaluate and manage their students electronically [14].

Elfeky, Alharbi [14], Gunasinghe, Hamid [16], Abdel-Basset, Manogaran [17] agree that the educational environments that are provided and managed electronically are beneficial in the fields of education and training in

what develops the beneficiary's response that depends on listening, observing and practicing. By providing an interactive atmosphere that attracts the learner to communicate, interact and learn. In addition, providing the learner with different instructions and tips and in different images (text, audio, pictures, graphics) that serve the content provided, which increases the chances of engaging in the learning environment to achieve its goals [18].

Learning Management System (LMS) provides the infrastructure that can be used as a learning delivery and management platform through a set of software tools to perform various online learning management tasks [19]. The researchers believe that these systems can be employed in the management of e-learning situations [20]. Which allows the provision of video clips, photo albums, Hyperlink, in addition to direct and indirect conversations, which helps in the success of the teaching and learning processes in the light of social education theories [21]. That theory that confirms that learning occurs among learners by observing the behavior of others and trying to criticize, analyze or influence them by recognizing the point of view of their owners, in order to achieve the goals that have been set [22]. Hence, the researchers saw the need to employ these systems to achieve the goals of those situations. Helping learners explain and justify their thinking and openly negotiating their interpretations and solutions to educational tasks drives the establishment of agreed meanings. Participatory learning is one of the strategies that lie at the heart of the constructivist school [23]. Those that are concerned with creating a participatory environment, participatory education is not just concerned with sharing the workload or reaching a state of consensus, but it allows learners to develop multiple perspectives on a topic and compare it, its aim is to evaluate the ongoing discussions and points of controversy [24].

There are many motivational design models, and the ARCS motivational design model is perhaps the most flexible as it has been applied to various types of traditional and electronic learning environments [25]. Many studies and literature dealt with it because it includes procedures that include assessing needs in order to analyze the motivational strengths and weaknesses of the target audience, in order to facilitate the design and planning of the educational situation [26]. This model dates back to John Keller in 1978, and this model offers various solutions to support learners' orientation in various educational situations [27-29].

The model consists of four main attempts. The first axis is attention, which is responsible for preparing, preparing, or preparing for the learning process. The researcher believes that this axis will contribute to the development of achievement by presenting a variety of stimuli in the e-learning situation through LMS, such as drawings, animated films, and raising questions and unsolved problems related to the course [30]. The second axis is Relevant, which is responsible for preparing the positive or negative response to things, topics, situations, or symbols in the environment that provoke this response [31-33]. In order to achieve relevance, there must be a relationship between the content provided through the electronic educational situation and the tendencies and needs of the learner [34, 35]. This axis can contribute to achieving the goals of the current research by paying attention to the educational goals and what they achieve in terms of educational content that is presented in a clear way and linked to the learners' previous experiences and experiences [36]. The third pillar is Confidence, which is responsible for helping the learner form positive expectations of success by making goals clear and providing examples of acceptable achievement. The fourth axis is Satisfaction, which is responsible for the learner's positive sense of accomplishments and special experiences [37]. It is more rewarding than education that leads to mere acquisition of knowledge. Satisfaction stimulates learning and can be achieved through feedback provided through the e-learning situation, providing immediate motivation for correct participation and responses [38, 39].

**Research Problem**

Through the work of the researchers at the University of Najran, and while teaching the computer science curricula course for students of the Diploma in Digital Skills for two years, they noticed a decrease in their academic achievement rate in the first year. This prompted the researchers to think of a practical solution to this problem by trying to present that course in the form of a set of electronic learning situations designed motivationally and managed through LMS. In additions, by reviewing previous studies, including the study of Ertan and Kocadere [40], Wallius, Klock [41], Troussas, Krouska [42], as well as the recommendations of educators to take advantage of technological innovations in removing obstacles facing learners. In light of the foregoing, the current research seeks to know the effect of employing electronic educational situations designed motivationally on achievement in the computer science curricula course for optimal investment students. Hence, the researchers were able to formulate the research problem in the presence of a significant decrease in achievement in the Computer Science Curriculum course, which prompted the researchers to reveal the role of employing electronic learning situations designed motivationally in the development of achievement.

**Research Aims**

**The Research Aims To:**

- Reaching an effective employment of e-learning situations in the development of achievement.
- Identifying the effect of employing motivational designed e-learning situations on the cognitive achievement in the Computer Science Curricula course for optimal investment students.

**Research Importance**

**Research Results May Contribute To:**

- Keeping pace with technological progress in the educational field, which contributes to the employment of learning management systems to serve the areas of optimal investment.
- Developing the cognitive achievement in the computer science curricula for optimal investment students.

**Research Limits**

**The Current Research is Limited To:**

- A sample of optimal investment diploma students at the College of Education, Najran University.
- Computer science curricula.
- Motivationally designed e-learning situations provided through the blackboard learning management system.

**Research Terms**

**E-Learning Management**
E-learning management is a software package for organizing content that provides management and follow-up to the learner in various e-learning situations in terms of his entry and exit and granting him powers [43, 44]. These include logging, scheduling, delivery, tests, connections, and tracking. It also makes it easier to update the courses offered electronically.

**The ARCS Motivational Design Paradigm**
A model that presents a set of conditions and controls concerned with compiling motivational concepts and characteristics towards learning in light of the four categories identified for the learning reinforcement process. They are Attention, Relevant, Confidence, and Satisfaction [45, 46].

**Cognitive Achievement**
The degree of acquisition achieved by the individual in a particular subject or educational / training content. Achievement tests are designed to measure the extent to which learners absorb some knowledge, concepts and skills related to the subject matter or educational / training content at a specific time or at the end of a specific educational period [47-49].

**METHODOLOGY**
The methodology in this research was first, the analytical descriptive approach: This is done through analyzing studies, research, general trends, and expert opinions, in the light of which the scientific content is prepared and designed, and the research variable measurement tool is designed. Second: The experimental approach with quasi-experimental designs: in order to study the effect of employing electronic learning situations designed motivationally on achievement.

**Research tool (Achievement test)**
The researchers followed the scientific steps in building and approving the research tool to ensure their suitability for application and use in the research. The following is a presentation of the procedures and steps for its preparation. 1. Determining the objective of the test: measuring the achievement in the "Computer Science Curriculum" course for a sample of optimal investment diploma students according to the three Bloom levels of knowledge, namely: (remembering - understanding - applying), before and after the field experiment of the research. 2. Defining and formulating the test vocabulary: the test vocabulary was formulated based on the educational objectives to be achieved by learning the educational content of the course. It was also formulated to suit the scientific level of the respondents. The test consists of (35) multiple-choice items. 3. Developing test instructions: After formulating the test items, the researchers developed the test instructions. The following was taken into account when drafting it: to specify the objective of the test, for the instructions to be easy, clear and direct. In addition, for the instructions to explain the way and place of recording the answer, for the learner to read each question carefully and accurately before answering, for the learner to make sure of the question number in the question booklet before answering it And clarify the number of questions included in the test and its time. 4. Initial experimentation of the test: by initially applying the test to a group of (10) students from the Optimum Investment Diploma. The objective of the exploratory experiment was the following: determining the time of the test, calculating the stability of the test, and calculating the validity of the test. 5. Determining the appropriate time for the test: by recording the time spent by each student in answering the test, then calculating the average time required to answer the test. The appropriate time for the test = 298 minutes ÷ 10 students ≈ 30 minutes. 6. Calculating the stability coefficient of the test: To calculate the stability coefficient there are methods such as equivalent images, half-partition, and the stability of the test was calculated using the Cronbach alpha equation, where the test stability coefficient (0.87) was reached, using SPSS. Then the results that are obtained can be trusted upon application of the test to the research sample. 7. Checking the validity of the test: A valid test is the one that measures what it is designed to measure. Therefore, this

step aims to verify that the test represents the objectives set for it, by presenting the test in its initial form to a number of arbitrators specialized in curricula, psychology, and educational technology. Who confirmed the validity of the application for the application, and the observations made by the arbitrators were taken into account when final preparation for testing.

**Research Sample**

**Research Sample and Experimental Design**

The research sample in the final experiment consisted of (60) students from the Optimal Investment Diploma. They were randomly divided into two groups, one of which was an experimental group, and the other a control group, according to the experimental design of the research. Each group consisted of (30) students. The researchers also used the experimental approach with semi-experimental designs, and this required the use of the semi-experimental design known as Pre-Post. Test Group Design using two equal experimental groups.

**Table (1):** The quasi-experimental design of the research

| | **Pre-test** | **Treatment** | **Post-test** |
|---|---|---|---|
| Experimental Group | Achievement test | A | Achievement test |
| Control Group | | B | |

Whereas, treatment (A) represents the study of the content of the course in electronic educational situations based on the motivational design model provided through the learning management system. Moreover, treatment (B) represents the study of content in the classroom in the traditional way.

**Research Variables**

- **The Independent Variable:** E-learning situations based on the motivational design model provided through the learning management system.
- **Dependent Variables:** It is represented in acquiring the cognitive aspects (achievement) of the computer science curricula course.

**Research Methodological Procedures**

The content was determined through the course description "Computer Science Curricula", in the Optimum Investment Diploma, Department of Curricula and Teaching Methods, College of Education. Where the content was divided to be presented within ten weeks during the first semester of the academic year 2022. The learners are also a sample of students enrolled in the "Computer Science Curriculum" course. In addition, the analysis of current materials requires an analysis of problems and an assessment of needs to identify positive features and shortcomings. This was done through conducting personal interviews with a group of students of the second level of the optimal investment diploma who studied the course in the first level. Through the interviews, it became clear that there is difficulty for the students in achieving the “computer science curricula” course, due to the complexity and closeness of the subjects. In addition, the subject is mostly theoretical in nature and the lack of interesting methods and methods that help in studying (as it is taught in the traditional way), which led to the difficulty of acquiring this subject.

In the light of analyzing the content objectives, the educational objectives to be achieved (through e-learning situations based on the motivational design model provided through the learning management system) were formulated in the form of behavioral statements that accurately define the change required to be made in the behavior of learners so that they are observable and measurable. Thus, it becomes a guide for adjusting the course of support provided to the learner and preparing the appropriate evaluation tool. A list of learner motivation arrangements is then prepared. Through the researchers preparing the educational content required to achieve the objectives of the course, and distributing the content into five chapters, each chapter includes a set of lessons and educational activities that learners are required to implement individually. And then converting each of these chapters into a set of web pages that reflect the content through text, still images, animation, still graphics, animation, and sound. Taking into account placing a page that progresses the objectives of the unit at its beginning, and not forming links between those pages within the unit, so that these links will then be made in a standard manner through the SCORM standard using the Reload Editor program. That is, compiling those educational modules for the course (after converting them into a ZIP Package compatible with the SCORM standard in the previous step) with the Blackboard system. Which is one of the learning management systems that Najran University provides to its employees. This is by using Blackboard to add activities to the educational site. Where an activity is added after each class that is carried out collaboratively (in addition to the activities that are carried out individually in the lessons of each class). In addition, adding a formative assessment after each activity that follows each chapter of the course based on a question bank created in Blackboard. Adding a discussion forum to exchange opinions and ideas asynchronously, and a chat room for simultaneous communication. Moreover, take advantage of the site's agenda / calendar to link the different events that occur on the site with the date of their occurrence. In addition, take advantage of the site management block that enables the site manager to control the site and the schedule. As well as the activities block, which displays all types of activities and materials available in the course, and the forums search

block to search for any word / in the course forums, in addition to the recent activities block. Which displays what has happened since the last visit of the participant, and the upcoming events block, which displays upcoming events such as activities, calendar and holidays. Moreover, the test results block, which displays the students' results in the formative evaluation of the course chapters in percentage, and the course summary block, which displays a summary of the course submitted through the set of educational situations presented through the website.

**RESULTS**

After monitoring the results of the achievement test in the pre and post applications, these results were analyzed statistically using SPSS V.11.

**Ensure the Homogeneity of the Two Study Groups in Achievement before the Experiment**

To confirm the validity of this hypothesis, the researcher conducted a one-way ANOVA analysis of variance for the pre-measurement of each of the achievement test (experimental and control), and the result was as follows:

**Table (2)**: Significance of differences between the two groups (experimental and control) in the pre-measurement in relation to the achievement test

| | **Sum of Squares** | **DF** | **Mean of Square** | **F. ratio** | **Sig.** |
|---|---|---|---|---|---|
| **Between Groups** | 20.5 | 1 | 20.5 | 3.62 | 0.475 |
| **Within Groups** | 327.4.800 | 58 | 6.92 | | |
| **Total** | **347.9** | **59** | | | |

The results of the statistical treatment, as shown in the previous table, indicated that the percentile reached a value of (3.62), which is not significant at the level of (0.05). This means that there is no statistically significant difference at the level (0.05) between the pre-application of both experimental and control groups in the cognitive achievement related to the Computer Science Curricula course.

**Post Application Results**

After presenting the study procedures, completing the basic experiment, and monitoring the scores of the students of the two groups (experimental and control) in relation to the achievement test (pre-post). In the following, we will discuss the statistical methods used by the researchers. In order to test the validity of the hypothesis (There is a statistically significant difference at the level 0.05 between the modified earning ratio for the scores of the students of the experimental group and the control group in cognitive achievement in favor of the experimental group). To test this hypothesis, the researchers used the Independent-Samples T-test to determine the significance of the differences between the ratio the adjusted gain of the scores of the students of the two groups (experimental and control) in cognitive achievement. The results shown in Table (3) have been reached:

**Table (3)**: Significance of "T" for the difference between the average earning percentage for the scores of students of the two groups (experimental and control) in the achievement test

| **Group** | **M** | **SD** | **M-Difference** | **T. Ratio** | **Sig**. |
|---|---|---|---|---|---|
| Experimental Group | 20.8 | 2.98376 | 4.1 | 5.149 | .035 |
| Control Group | 16.7 | 4.72184 | | | |

From the previous table, it is clear that the value of "T" for the difference between the adjusted earning percentage for the scores of students of the two groups (experimental and control) in the achievement test amounted to (5.149). The average score of the control group students was (16.7), while the average score of the experimental group students was (20.8). Thus, we find that the value of "t" is statistically significant, and in such cases the statistical significance is directed in favor of the group with the highest average, which is the experimental group, as the arithmetic mean for it was (20.8) by an increase of (4.1) over the control group.

Thus, the statistical significance is directed in favor of the higher group on average, which is the experimental group (which is taught by electronic educational situations based on the motivational design model provided through the learning management system). Accordingly, the hypothesis of the study is accepted, "There is a statistically significant difference at the level of (0.05) between the modified earnings ratio for the grades of the students of the experimental group (which is taught in electronic educational situations based on the motivational design model provided through the learning management system). In addition, the control group (which is taught in a room class in the traditional way) in cognitive achievement in favor of the experimental group.

**DISCUSSION**

The results shown in Table (3) indicated that there was a statistically significant difference at the level of (0.05) between the modified earning percentage for the scores of the students of the experimental group taught in electronic educational situations based on the motivational design model provided through the learning management system. In addition, the control group taught in the classroom in the traditional way in cognitive achievement in favor of the experimental group. Based on the above, the study hypothesis is accepted. This is a good indicator illustrating the importance of e-learning attitudes based on the motivational design model provided through the learning

management system, which would lead to the development of cognitive achievement related to the computer science curriculum course for Optimum Investment Diploma students.

**RECOMMENDATIONS**

In light of the findings of the current research, the researchers offer a set of recommendations to take advantage of, as follows:

- Benefiting from learning management systems in other courses.
- Encouraging the use of motivational design to support the educational process through designing various educational courses in a motivational manner.
- Preparing training programs for faculty members and students to develop the skills of using learning management systems.
- The need for a general framework to develop the benefit of electronic courses via the Internet in the light of cooperative learning strategies.

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