Type of activities in e-learning environment and its relationship to the development of image processing skills

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Abstract:

The current research aims to reveal the relationship between the type of activities in e-learning environment and image processing skills, This required the use of quasi-experimental and learning ecosystem development approaches, Where the research sample was (120) students, It was divided into two groups, each group consisted of (60) students, The first: studied the type of related activities and the second: studied the unrelated type of activities, The achievement test was applied to measure the cognitive side and the observation card to measure the performance side beforehand on the research groups, then they were applied post-test, The results revealed: There are statistically significant differences at the level of ≤ 0.05 between the research groups in favor of the post application in all research tools, the achievement test and the observation card, As well as the presence of statistically significant differences in favor of the type of activity related to the content in both the achievement test and the observation card, Accordingly, the research recommended the need to practice the type of activities associated with the electronic learning environment in developing the knowledge and skills of students in the different stages of learning, and to study the interaction between the type of activities associated with other intermediate and independent variables such as learners' styles or breaks in distanced learning.

Keywords: type of activities - e-learning environment - image processing.

Introduction:

Recently, a number of applications have appeared that edit images, merge images with each other, or add filters to the image, such as snapchat, photo lab... and others, Therefore, it became necessary to familiarize students with images, their importance and methods of processing them, Where images are one of the main components of multimedia, without which no work is complete, as they are among the most widespread and used educational materials in the educational process, As it achieves the different cognitive, skillful, and emotional educational goals in many subjects, and it is suitable for all educational procedures, starting from stimulating motivation to evaluation (Atteya Khamis, 2015).

Images have an important role in activating the communication between the teacher and the learner, as they clarify abstract concepts for the learner, It also helps in building his imagination, especially in case of laboratory and practical experiments, which require a high cost to display, and is also a basic pillar of the multimedia and superior system, as it is the pillar associated with vision, and the visual impact has the greatest ability to simulate the mind without jealousy of the media system (Mohammed Amasha, 2008, p. 169).

Therefore, the importance of developing image processing skills among learners is evident, as it provides them with new areas of self-expression, and provides them with job opportunities in the production of educational images and animations, as well as providing digital technology for teachers and learners with opportunities to access new tools, and organizing the presentation of information and lessons through multimedia In order to use it in any of the fields, especially the educational field (Phelps & Maddisom, 2008, p. 6).

Despite this, some studies have indicated that there is a weakness in digital image processing among learners at different educational stages, Among these studies is the study of Iman Al-Sharif (2008); the study of Muhammad Afifi (2009); and the study

of Ragai Abdel-Gawad (2010); the study of Asmaa Yasin et al. (2017); And the study of Ahmed Taibah (2018), These studies attributed the reasons for this weakness to use modern technology in teaching, and reliance on traditional methods by teachers, Which does not allow the learners to be able to master these skills, and there is no way to master them except by the need to repeat them more than once, and this is what the traditional methods and methods lose.

In general, the process of employing electronic instructional environments in instructional institutions faces many challenges, foremost of which comes a deficiency in the design of electronic instructional environments, and the inability to choose appropriate instructional strategies that provide the best use of available learning resources, as well as the lack of correct design models for electronic instructional environments (Khirwadkar & Joshi, 2004).

An important factor for effective learning is the teacher's ability to design instructional activities that promote the achievement of specific curricular goals. The teacher can, based on his analysis of the educational objectives of those activities, and the characteristics of the students, design them in accordance with their capabilities and the speed of their steps in learning (Young, et al., 2003).

Learning activities are an important component of the curriculum. Because it represents a tool for evaluation, ensuring the achievement of educational goals, and the extent to which students acquire knowledge and skills related to learning, and provides active interactive learning, It gives students the possibility of researching specific points in a deep and thoughtful manner through carefully selected activities from the teacher, so that there is no reliance on the teacher and the textbook as the only source of knowledge, and then the role of the student is a searcher for knowledge and not a receiver for it (Nabil Azmy, 2014, p. 416); Ali Al-Musawi (2010) explained that educational activities help students to reorganize, adapt information, and see the internal relationships between components of scientific content.

The study of Dalia Baklava (2016) emphasized the importance of employing instructional activities in electronic learning environments, which is a set of assignments and educational tasks required to be implemented by students, for which we should provide space on the system to add comments and inquiries about those activities, and also enable the teacher to set the deadline for receiving the activities education to be evaluated according to criteria for evaluation that are announced to students, Then providing appropriate feedback to students, which increases students' motivation towards implementing instructional activities and achieving educational goals. The study of Salwa Fathi and Weam Muhammad (2019) recommended paying attention to studying activities in the e-learning environment to develop various educational variables.

The practice of instructional activities is one of the basic components of e-learning environments, as e-learning environments have the primary goal of achieving instructional activities. In addition to the ease of remembering the information (Rehab Ahmed, 2021), and accordingly, it is necessary to determine the type and form of activities in the e-learning environment and their relationship to the content and tools used.

It is clear from the foregoing that the studies are prone to differing results about the preference of the type of (related-unrelated) educational activities over learning, but the results reported in their entirety to the positive impact of the activities, which is what the current research seeks to measure in the dependent variables on female students, the current research sample.

Based on the previous presentation, the importance of activities and the close relationship between learning environments and the importance of image processing is clear, the researcher's feeling that there is a relationship between the type of activities (related - unrelated) and image processing, which will provide a better opportunity for female students to develop image processing skills.

Research problem:

The problem of the current research is represented in the following declarative statement: "The need to improve the performance of female students in image processing skills by using instructional activities, and to determine the most appropriate type of activities (related or unrelated), with its impact on both the cognitive and performance aspects of the image processing skills of female students.

Research questions:

The research problem can be addressed through the following main question:

How can an e-learning environment be designed with different types of activities (related - unrelated) to develop image processing skills among prep school students?

From the previous main question, the following sub-questions branch out:

1- What are the image processing skills that prep school students need to acquire?

2- What is the appropriate instructional design for an e-learning environment to develop image processing skills among prep school students?

3- What is the effect of the type of activities (related - unrelated) to an e-learning environment on the cognitive aspect of image processing skills for prep school students?

4- What is the effect of the type of activities (related - unrelated) to an e-learning environment on the performance aspect of the image processing skills of prep school students?

Research aims:

The aim of the current research is to treat the deficiencies in the level of prep school students in the skills of image processing, and this is achieved through:

1- Determining the image processing skills of prep school students.

2- Determining the appropriate instructional design for the type of activities (related - unrelated) to develop image processing skills among prep school students.

3- Examining the impact of the type of activities (related - unrelated) to an e-learning environment on developing image processing skills among prep stage students.

4- Examining the impact of the type of activities (related - unrelated) to an e-learning environment on developing image processing knowledge among prep stage students.

Research importance:

This research presents a model for an e-learning environment based on the type of activities that can be used in the preparation of similar environments aimed at developing some of the skills of prep school students.

1- Preparing suggested content for image processing skills.

2- Directing the attention of educators to the importance of activities.

3-Providing designers and developers of activity-based learning environments with a set of guidelines when designing and developing these environments.

4- Developing an e-learning environment based on the type of activities.

5-Overcoming poor image processing skills by using an e-learning environment based on the type of activities.

6- Availability of research tools that lie in (an achievement test - an observation card) to measure the cognitive and performance aspects of image processing skills.

Research hypotheses:

- There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the pre and post applications to test the cognitive aspect of the image processing skills of preparatory school students, in favor of the post application.

- There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the pre and post applications of the preparatory stage students' image processing skills observation card, in favor of the post application.

- There is a statistically significant difference at the level of ≤ (0.05) between the average scores of the experimental group students in the test of the cognitive aspect of the image processing skills of the prep school students, due to the main effect of the type of activities (related - unrelated).

- There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the performance of image processing skills of the prep school students, due to the main effect of the type of activities (related - unrelated).

Search limits:

Content Limit: Image processing skills using the GIMP program included in the computer and information technology curriculum in the first year of prep school.

Limit of the research groups: A sample of (120) female students of the first prep grade was selected in the Bani Mazar Educational Administration, in Al-Minya Al-Azhar region of Al-Azhar Al-Sharif, who provided them with the basic requirements and resources necessary to implement the experiment (computer, Internet connection, having the skills to deal with computer, dealing with websites on the Internet, and interactive participation), and they were divided into two groups, each group consisted of (60) students.

Time limit: the first semester of the academic year 2022/2023 AD.

Measurement tools:

- An achievement test to measure the cognitive aspect of image processing skills. (Prepared by the researcher).

- An observation card for measuring the performance aspect of image processing skills. (Prepared by the researcher).

Research Methodology:

- Descriptive studies in the study, analysis and design stage in order to choose the educational design model, prepare the theoretical framework for the research, analyze the content and prepare the research tools, and this was done by looking at previous studies and literature.

- The semi-experimental approach when measuring the relationship of the type of activities (related - unrelated) on the dependent variables, the cognitive and performance aspects of the image processing skills of female prep stage.

Search variables:

- The independent variable: the type of activities (related-unrelated) in an e-learning environment.

- The dependent variable: the skills of image processing in both its performance and cognitive aspects.

Search terms:

Activities: It is the activity that is presented at the appropriate time, in its various forms, and which is presented electronically to prep school students through the educational platform, to develop image processing skills. It is either related to the educational content being taught or unrelated to the educational content being taught.

E-learning environment: It is the space that includes electronic learning tools that enable prep school students to interact with it according to the goals and knowledge of each individual learner, and find in it all the educational needs he wants to develop image processing skills and achieve educational goals.

Image processing skills: It is a program that enables prep school students to process images quickly and with the highest degree of accuracy at the same time, and it is measured using an achievement test for the cognitive side and a observation card for the performance side of image processing skills.

Theoretical framework and previous studies

The first axis: the type of activities

Magdy Zamil (2016) defines it as the elements of designing training courses in a style that allows learning easily and takes into account the individual differences among the trainees, and develops their cognitive, emotional and performance skills and helps in employing teaching and training methods that are different from traditional learning, by employing modern technology in training.

Classification of instructional activities:

1- Classification based on the location of educational activities: Activities may take place during learning according to the following:

- Introductory activities: at the beginning of the lesson, such as showing pictures, transparencies, and slides to make comparisons between two different topics, or using a movie or displaying an educational board.

- Structural activities: usually follow the introductory activity, and take up most of the class time, and include explanation, presentation, discussion, asking questions and answers, recitation, reading, proving theories, interpreting information and making drawings, maps and illustrations.

- Closing activities: summarizing, writing reports and summaries, and doing homework.

The activities under current research represent constructive activities if their timing is associated with the educational tasks within the electronic learning environments.

2- Classification on the basis of relevance to educational content: activities may be carried out according to the degree of their relevance to the educational content provided to the learner according to the following:

- Related: It is the educational activities such as video - games...etc. It is linked to the educational content to be taught to the learner.

- Unrelated: It is the educational activities such as video - games...etc. It is not linked to the educational content to be taught to the learner.

The educational activities under current research represent both related and unrelated activities, provided that they are presented constructively, either to assist in the educational process and

understand the scientific content to achieve the desired goals (related), or to remove the learner from the educational process with one of the activities and return him to the educational content with greater activity and energy without fatigue or fatigue. Boredom to achieve the desired goals (unrelated).

The importance of instructional activities in electronic learning environments

The electronic learning environment differs from the traditional learning environment in many dimensions, which include multiple forms of information and types of interactions, and educational activities are among the basic components of the electronic learning environment Muhammad Attia (2015, p. 110), and (Bonwel, 2014) mentioned the importance of educational activities as : help achieve the desired educational goals; Promote the principle of teamwork and participation among learners; It helps build the learner's personality and develop his self-confidence.

The results of many studies that focused on electronic activities showed their effectiveness in developing students' thinking skills, achievement and self-learning, and increasing motivation to learn from them (Lutfi Al-Khatib, 2011; Tarifa Abdel-Rahman, 2010; Rania Boubaker, 2008; Ahmed, 2013; Aktas, et al. , al., 2011).

The study of Jamal Al-Shami and others (2013) concluded that electronic activities according to multiple intelligences had an effective effect on achievement and motivation, and a positive impact on learners' satisfaction with educational courses, The study of Mahrousa Salem (2013) found the effectiveness of employing electronic activities in developing the skills of people with special needs and helping to increase their ability to learn and educational integration, And the study of Majdi Akl (2012) found the effectiveness of an electronic strategy for managing electronic activities and interactions in developing the skills of designing learning elements in learning repositories, The study of Muhammad Al-Ali (2014) also found the effectiveness of a strategy based on electronic activities in improving reading skills

for people with learning disabilities, and the study of Maija (2010) concluded the importance of using electronic activities in learning languages.

Criteria for designing e-learning activities in learning environments:

Omar Nasrallah (2006, p. 210) identified some of the things that must be taken into consideration when preparing educational activities are:

- Educational effectiveness: It means the educational behavior that the student must perform in order to reach the learning outcomes by achieving the educational activities required of him.

- Attention: An educational part that the student contributes to the instructional task and effectiveness. It appears in the internal stages that the student passes through, such as the information that the student reaches from observations. Attention is used as a work tool for the student, which affects the student's personal abilities that are difficult to access.

- Learning outcomes: Learning outcomes are an essential aspect of educational goals, and we get learning outcomes after giving and defining educational tasks to students, and learning outcomes help give the student a sense of self-esteem after reaching them by completing the required educational tasks.

The second axis: image processing skills

Concept of digital image processing:

(Bernd, 2007, p. 17) defined digital image processing as the process of making improvements to the image to raise its quality without compromising its structural structure. The inputs of this process are an image and the output is an image, Hind Shaaban (2008, p. 7) and Hassanein Shafiq (2009, p. 93) agreed that it is "one of the branches of computer science (informatics), concerned with performing operations on images with the aim of improving

them according to specific criteria or extracting some information from them."

The researcher defines digital image processing as employing a set of commands in the Gimp program to make some adjustments to digital images taken using a computer or digital camera, or images converted from analog to digital using a scanner, saving and printing them.

Methods of processing digital images:

The graphic processing of digital images inside the computer lies in storing and displaying them in two main ways, Yasser Al-Jabarti (2008, p. 262): (Chamberlin, 2004, p. 39):

1- Raster graphic: It is the common system in which images or graphics are formed on the computer screen by many pixels that represent the elements of the image, and this method is of high quality compared to the Vector method, but this method has a very large storage space due to the high quality that You enjoy it, in addition to that the more the image is reduced or enlarged, the lower its quality and the more distortion appears.

2- Vector graphic: This system shows an image and its graphics by means of a series of straight and curved lines, and therefore the graphics of this system do not need a large storage space, in addition to that its graphics can be enlarged to any degree without changing or losing its quality, and then this system uses it in its graphics Engineering, architecture and large illustrations such as maps, but this system is faulty for its inability to give high quality.

The importance of developing digital image processing skills for learners:

The importance of developing digital image processing skills among learners is due to the effects that digital images can play in the educational process in terms of their ability to display things that are difficult for the teacher to embody, It reduces dependence on verbal as it depends on the sense of sight, describing things and

focusing on them for ease of understanding, in addition to its ability to enlarge and reduce things, clarify them, and attract the attention of learners and excite them during the presentation (Muhammad Amasha, 2008, p. 170).

Search procedures:

First: Instructional design for the learning environment: The researcher chose the model of Muhammad Khamis (2003) for educational design and development, because it is comprehensive in all its stages, It has a great deal of flexibility commensurate with the nature of the content and learning topics, and provides a complete guide to follow its steps, which helps the designer to follow the stages of work and through which he can control the stages of production. It is also a comprehensive vision for designing education in a progressive way, and has the ability to deal with all Types of electronic environments, and the following is a detailed description of these stages:

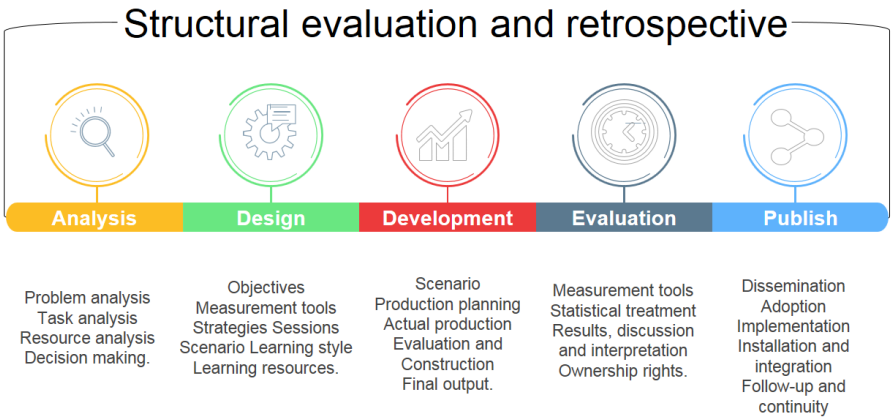

Figure (1) the instructional design model for Attaya Khamis 2003 with a procedural version

Analysis stage:

- Analyzing the problem and assessing the needs: The research problem was identified through what was recommended by the results of previous research and studies on the need to use electronic learning environments and the type of activities to develop the knowledge and skills of students in the different stages of education. Through her work as a computer and information technology teacher, the researcher found that the students receive a large amount of information and concepts in this course in order to be able to process it and keep it in their long-term memory. Accordingly, she explained the educational need for this research in determining the impact of the type of activities in an e-learning environment in developing processing skills. Pictures of prep school students.

- Analysis of educational tasks: the researcher reviewed the second unit of the book, to extract vocabulary, facts, skills, concepts and terminology and write them down in the analysis form. - Graphic design and creation, 4- Moving and scaling tools, 5- Handling image layers.

- Validity of the analysis: The researcher calculated the validity of the analysis, as the researcher used other analysts from computer teachers at Al-Azhar Al-Sharif, and each of them analyzed the second unit of the computer and information technology book for the first year of prep school, first semester, and the agreement coefficient was calculated between the researcher and the other analysts at the level of the five elements For the content, it was found that the coefficient of agreement between the researcher and the first analyst was 0.97, and the coefficient of agreement between the researcher and the second analyst was 0.99, and they indicate a very high coefficient of agreement. Adjusting the list in light of their opinions, as the modifications they recommended have been implemented.

- The stability of the analysis: the researcher calculated the stability of the analysis by conducting the analysis process twice in a row for the same analysis sample with a one-week interval.

- Analyzing the characteristics of learners and their entrance behavior: the target group is the first grade preparatory students enrolled in the academic year 2022-2023 AD, as this age group belongs between childhood and adolescence, and they have cognitive, mental and perceptual characteristics that allow them to develop their skills in image processing, and they have the main skills To use the computer and the Internet, and have a desire to participate in the learning environment.

- Analysis of resources and constraints in the environment: Several elements were analyzed to find out the reality of educational resources, facilities, constraints and determinants for using the type of activities in the e-learning environment for the application of the research experience as follows: It was not linked to a specific place of study as the content was studied on students' personal devices "ONLINE" It has also been confirmed that all female students meet the requirements of online study, and there is also a computer lab inside Al-Azhar Institute with a number of computers equipped with the Internet, and female students are allowed to bring their smart phones to computer classes. It coincides with their study times.

- Making the final decision on the educational solutions that are most appropriate to the problems and needs: In the analysis of the research problem, the most important skills required tobe developed, the characteristics of the learners, and their needs to develop image processing skills, it was decided to design a learning environment based on the type of activities.

Design stage:

- Designing, analyzing and classifying educational objectives: In the light of what was reached in the results of the content analysis, the general objective of the research was formulated, as the e-learning environment based on the type of activities aimed at developing image processing skills using the GIMP program among prep school students. The educational objectives of the GIMP program are that the phrases are behavioral and procedural so that they are observable and measurable. The list of objectives

was prepared in its initial form, and then presented to a number of experts in the field of educational technology to seek their opinions on the correctness of its formulation. It was modified in light of what the arbitrators showed Opinions, and then the list of goals is in its final form.

- Design of referential measurement tools: to verify the type of activities (related - unrelated) in an e-learning environment and its relationship to the development of image processing skills among prep school students. The skill/performance aspect of image processing.

1- Cognitive achievement test:

The objective of this test is to measure the achievement of the cognitive aspect of the skills of image processing using the Gimp program for the first grade students of the prep stage, by applying it before and after, and using the results of the application to verify the validity of the research hypotheses.

1/1- Determining the type of test vocabulary and its formulation: Two types of objective tests were selected, namely multiple choice and complementary, distributed over learning topics according to the educational objectives of each topic.

1/2- The initial form of the achievement test: The test in its initial form included (44) items, (19) complement items, (25) multiple-choice items, in addition to the test instructions represented in: the purpose of the test, the number and type of questions, and how to answer on her.

1/3- Test scoring system: A score of one was given in the case of the correct answer for the item, and (zero) was given in the case of the incorrect answer.

1/4- Validity of the test: The validity of the test is represented in:

The validity of the content or the arbitrators: The validity of the test content was verified by presenting it in its initial form to a number of arbitrators specialized in educational technology, where

they recommended the reformulation of some vocabulary and the modification of some other alternatives. The observations recommended by the arbitrators were taken into account, and the test became valid. The arbitrators agreed 100% on the appropriateness of the test phrases for the research group, as well as on their suitability for the test measure.

Internal validity: The validity of the internal test was verified by applying it to a survey sample of (30) female students, then the correlation coefficients were calculated for the degree of each question of the test and the total score of the test, and the correlation coefficients ranged between (0.45: 0.87), all of which are coefficients Statistically significant correlation at the level of significance (0.01, 0.05), which indicates the internal consistency of the test.

1/5- Exploratory Experimentation of the Test: To adjust the test, it was applied to a survey sample with the aim of calculating: stability - ease, difficulty and discrimination coefficients for each item - test time, which are as follows:

- Reliability of the test: The reliance of the test was calculated through Alpha Cronbach equation (α), where its value was (0.94), and it is statistically significant at the level of 0.01, which indicates the reliance of the test.

-Ease coefficients: The ease coefficients ranged between (0.30, 0.65), which indicates the appropriateness of the test questions in terms of their degree of ease and difficulty.

- Difficulty coefficients: Since the relationship between ease and difficulty is an inverse relationship, so their sum is equal to (1), the difficulty coefficients ranged between (0.70, 0.35), which are acceptable ease and difficulty coefficients, which indicates that the test has acceptable ease and difficulty coefficients, and the validity of the test for application.

-Discrimination coefficients: The discrimination coefficients were calculated for each of the test items separately, following the

steps specified by Kelly, then the Johnson equation was used. Where the degree of distinction, and this is an indication that the test items have an appropriate discriminatory ability.

1/6- Test time: The test time was calculated by recording the time it took for each student of the survey sample to answer the test, then calculating the average time for the students' answers, calculating the expected average of the scores, and the experimental average of the scores, then calculating the test time. The test time is (30) thirty minutes, as this time was adhered to during the pre- and post-test application.

1/7- The final version of the test: The test in its final form included (44) items, (19) items for completion, (25) multiple-choice items, and the maximum end of the test was (44) marks, and the time was (30) minutes.

2- The performance observation card:

This card aimed at measuring the performance aspect of image processing skills using the Gimp program for female first graders.

2/1- Vocabulary formulation: The skills of the observation card were formulated in the form of main skills and sub-skills. The observation card in its initial form included (14) main skills and (90) sub-skills in the form of procedural phrases that can be observed using direct observation.

2/2- Observation Card Score Rating System: The researcher relied on the quantitative estimation method by degrees. A graduated scale between (0:3) was set for each indicator, and the observer should mark (√) in front of the level of performance performed by the student for image processing skills.

2/3- The validity of the observation card:

- The validity of the arbitrators: The card was designed in its initial form and presented to a group of arbitrators in educational technology to know their opinions, and the modifications they

recommended were made, and thus the card became valid and usable, and the evaluation method used to observe the performance of the students, and to calculate its stability.

- Validity of peripheral comparison: the learners' scores were arranged in descending order to determine the higher quartiles to represent a group of female students with a high level of skills by (25%), and the lower quartiles to represent a group of female students with a low level of those skills by (25%), and the significance of the differences between the two groups was calculated. It is clear that all values are statistically significant at the level of significance (0.01, 0.05), which indicates the validity of the card and its ability to distinguish between groups.

2/4- The stability of the observation card: The stability of the observation card was calculated using the observers' agreement method "the percentage of agreement" on the performance of one student, where the researcher, along with two other observations, observed the performance of (30) students, who are the survey sample, then the stability of the evaluation card was calculated. By calculating the correlation coefficient between the three evaluators, the correlation coefficient was calculated between the scores, and it became clear that the values of the stability coefficients were high among the three evaluators at the significance level (0.01), which indicates that the observation card has a high degree of stability.

2/5- The final image of the observation card: The final image of the observation card included (13) main skills and (84) sub-skills, and thus the maximum end of the card is (252) degrees.

- Designing content organization strategies: The content was presented by displaying textual information in the form of videos and written texts accompanied by illustrations, still images, and infographics. The presentation of the content was organized in a hierarchical analysis method from top to bottom, starting from the top of the general tasks and graduating down towards the subtasks. Where the content was identified in its initial form, then the validity of its content was verified by presenting it to experts

in the field of educational technology, and the content was determined in its final form.

- Design of educational activities: The e-learning environment included two types of activities (related - unrelated) to the educational content. These activities are presented during the session breaks. Related Activity: It is an activity related to the educational content that is presented, and these activities varied between group collaborative activities applied on the GIMP program, drag-and-drop activities, and competitions; Unrelated Activity: It is an activity that is not related to the educational content that is provided, and these activities varied between educational electronic game activities, drag-and-drop activities, competitions, and entertaining educational videos; These two types of activities were presented to a group of arbitrators specialized in the field of educational technology to seek their opinions, and a list of both types of activities was reached.

- Designing a scenario for instructional interaction strategies: This stage aimed to define the roles of the teacher and the learner, the sources, the form of the environment, and the pattern of interactions in relation to the objectives of the content and learning topics. The interaction of the students with the teacher; interaction between the students; the students were encouraged and stimulated their responses by providing appropriate feedback and reinforcement.

-Determining the style and methods of learning: The style of learning was determined in small groups because it is appropriate to achieve the instructional goals, the content of learning and the e-learning environment based on the type of activities and the type of activities.

- Designing the general learning strategy: It is the general and organized plan that consists of the specific educational procedures that the student must follow through the type of activities (related - unrelated) in the electronic learning environment to access the educational content in an appropriate sequence. The general

learning strategy is designed to achieve Learning objectives for the time period.

-Selection of learning sources and multiple means: Learning resources were prepared in the e-learning environment based on the type of activities in light of the educational objectives, provided that they serve the educational content that was previously selected and identified, taking into account that the sources are multiple and varied to take into account the individual differences between the students, and raise their interests and increase of their motivation to learn.

-Description of learning resources and its various means: The research included several learning resources and various means in order to achieve the educational goals, and these sources include text files; image files; video files.

- Deciding on obtaining or producing resources: The decision was taken in the light of analyzing the resources and constraints in the educational environment, and in light of what was reached in choosing multimedia as sources necessary for production. Some sources were used from the Internet and others were produced. All sources and means in the light of educational conditions and standards.

Development stage: This stage means transforming the educational objectives, conditions, educational standards, and technical standards into complete educational products ready for use in the scientific reality to verify the mastery of their preparation.

- Preparing the scenario: The broad lines developed by the researcher to detail the educational procedures and attitudes were translated on paper, taking into account the requirements that were prepared in the analysis and design phases. Accordingly, the scenario was designed for the e-learning environment based on the type of activities (related and unrelated) in light of the educational objectives and content. After its completion, the scenario was presented to a group of arbitrators specializing in educational

technology to seek their opinion, and after making the necessary modifications as agreed upon by the arbitrators, the form of the scenario was formulated in its final form in preparation for the production of the learning environment.

- **Planning for production:** The requirements for producing the learning environment based on the type of activities (related - unrelated) were divided into two parts: physical production requirements; Software requirements.

- **Actual production:** This step includes a set of elements within it, namely: multimedia production included in the learning environment; Producing an e-learning environment.

-Evaluation and construction processes: Each stage of the educational design of the learning environment was arbitrated and presented to a group of arbitrators in the field of educational technology to express their opinions and make the necessary adjustments.

- **Final Output:** After completing the production of the e-learning environment for all groups, it was set and verified for application, and the modifications approved by the arbitrators and the survey sample were made.

Final evaluation stage:

-Preparing the evaluation tools: It is the preparation of measurement tools for the research experiment, and it included the achievement test to measure the cognitive side and the observation card to measure the performance side of the image processing skills using the Gimp program.

- **Field use in real situations:** It is an application of the type of activities (related - unrelated) in an e-learning environment in the actual research experiment on the current research groups.

- **Application of measurement and evaluation tools:** It is the immediate post-application of the achievement test and the observation card.

- Processing and statistics: Appropriate statistical methods were used for the experimental design of the research, and research hypotheses were tested using SPSS to perform statistical operations.

-Analyzing, discussing and interpreting the results: In light of what the results of the research hypotheses test reveal in terms of statistical treatments, they will be interpreted and discussed, with reference to learning theories and previous studies and literature related to the subject of the research.

- Determining the strengths, weaknesses, and required revisions: Through the application of the research experience, the strengths in the type of activities (related-unrelated), as well as the difficulties encountered in the application process, become clear, in order to reach the recommendations and proposals for the current research that will be completed later.

- Decision making regarding use and review: This step was done through arbitration on the various sessions of the learning environment with its various types of activities (related - not related) by presenting it to the arbitrators from the educational technology and the survey sample, as well as the measurement tools that were reviewed and arbitrated to reach the final image to be usable in the basic experiment.

- Registration of property rights: property rights were registered by activating the educational sessions on the environment, while preserving the address of a site dedicated to the research experiment, and thus the researcher has the powers to control the environment.

Dissemination, use and follow-up stage:

- Publication: The researcher communicated with the female students of the first prep class and introduced them to the learning environment and the Gimp program, which is the experimental treatment material and the type of activities that will be practiced

for the groups, during the preliminary meeting before doing the basic experiment, and making sure of their desire to learn.

- **Adoption:** This was done by experimenting with the e-learning environment with the type of activities (related - unrelated), ensuring ease of use, and accessing the content of the environment.

- **Implementation:** It is done by following the movement of the students in the learning environment and their use of communication tools, which is evident through the questions and comments made on the environment, as well as the dialogue between the researcher and the students, and the students and each other during the application of the experiment.

-Fixation and integration: The researcher aspires to fix the use of the appropriate type of activities, whether (related or unrelated) to the e-learning environment.

- **Follow-up, continuity, and self-renewal:** The follow-up process of the e-learning environment is carried out based on the type of activities used by the students, and an attempt to develop the future nature of the content, as well as the modification of the elements of the teaching subjects themselves, according to recent research results.

Second: the exploratory experience:

The survey experiment was applied to a random sample of (30) female students in the first preparatory year at Al-Azhar Al-Sharif, enrolled in the academic year 2022-2023 AD. Until Thursday 10/11/2022 pm.

Third: the basic experience of research:

The research experiment was applied during the period from Saturday 11/19/2022 AD until Tuesday 12/6/2022 AD, as the application period took about two and a half weeks, according to the general procedures that apply to experimental groups.

Research results in the light of research questions and hypotheses:

Answering the first question, what are the image processing skills that prep school students need to acquire?

This question was answered by preparing a list of image processing skills in the Gimp program for the first grade of prep school, in light of the curriculum distribution list granted by the Al-Azhar institutes sector. The list was prepared in its initial form and then on a group of arbitrators in the field of educational technology. And then reach the final picture of the Gimp image processing skills.

The answer to the second question, what is the appropriate instructional design for an e-learning environment to develop image processing skills among prep school students?

This question was answered by envisioning an e-learning environment based on the type of activities (related-unrelated), according to Atteya Khamis's (2003, pp. 93-104) educational design model. With some modifications to the model, the development of the e-learning environment according to this model went through five main stages: analysis, design, development, final evaluation, and publication.

The rest of the questions were answered by reviewing the results of the research hypotheses:

- There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the pre and post applications to test the cognitive aspect of the image processing skills of the prep school students, in favor of the post application.

To verify the validity of the first hypothesis regarding the comparison between the pre and post applications, a T-test was used to identify the significance of the difference between the

application, and the following is the presentation of the results of the cognitive test.

Table (1) of means, standard deviations, and significance (T) for students in the cognitive test

Deg	group	number	average	Standard deviation	"T" value	Degree of Freedom	Sig value	Sig level	ETA Square	Imp size
44	Before	120	28.16	1.44	8.49	62	0.00	sig	0.75	Big
	After	120	23.97	2.39						

By extrapolating the results in the previous table, it is clear that the value of t reached (8.49), which is a function at the level of (0.01), meaning that there is a statistically significant difference at the level of $\alpha \leq 0.01$ between the female students in the test of the cognitive aspect of image processing skills among female prep school students in favor of the post application group. . Then the hypothesis is accepted.

- There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the pre and post applications of the preparatory stage students' image processing skills observation card, in favor of the post application.

To verify the validity of the second hypothesis regarding the comparison between the two applications, the pre and post, a T-test was used to identify the significance of the difference between the two applications. The following is the presentation of the results of the observation card.

Table (2) of averages, standard deviations, and significance (T) for students in the post application of the observation card

Deg	Group	number	average	Standard deviation	"T" value	Degree of Freedom	Sig value	Sig level	ETA Square	Imp size
252	Before	120	19.06	0.88	10.91	62	0.00	sig	0.83	Big
	After	120	15.53	1.61						

By extrapolating the results in the previous table, it is clear that the value of t amounted to (10.91), which is a function at the level of (0.01), and there is a statistically significant difference at the level of $\alpha \leq 0.01$ between the female students in the observation card of the image processing skills of primary school female students in favor of the post application. Then the hypothesis is accepted.

-There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the test of the cognitive aspect of the image processing skills of the prep school students, due to the main effect of the type of activities (related - unrelated).

The results of the pre-test achievement were analyzed, with the aim of identifying the extent of the equivalence of these groups in the pre-experiment of the research, in addition to the significance of the differences between the groups with regard to the scores of the pre-test, in order to determine the appropriate statistical analysis method.

A one-way analysis of variance was used to identify the significance of the differences between the groups in the pre-test scores, with respect to the means and standard deviations. The following table shows the results of this analysis.

Table (3) Statistical description table (arithmetic mean and standard deviation) of the groups' pre-measurements in cognitive achievement

Standard deviation	Arithmetic Mean	Number	Groups	Variables
3.96	8.10	60	Related	Cognitive test
2.17	7.43	60	Unrelated	
2.70	7.50	120	Total	

Table (4) A one-way analysis of variance table between groups' pre-measurements of cognitive achievement of image processing skills

Sig level	Sig value	F	Mean of squares	Freedom deg	Sum of squares	Sources of contrast	Variables
Non Sig	0.64	0.45	3.40	2	6.796	Between groups	Cognitive test
			7.56	29	219.204	Within groups "False"	
				31	226.000	Total	

The value of (q) in the previous table indicates that there are no statistically significant differences between the experimental groups, which indicates that the cognitive levels of the female students are similar before conducting the basic research experiment, and therefore the groups can be considered equal before conducting the experiment, and that any differences that appear after the experiment are due to the independent variable , and not to pre-existing differences between groups, so a one-way analysis of variance will be used for each dependent variable separately.

The results of the post-test achievement were analyzed, in order to identify the significance of the differences between the groups in relation to the scores of the post-test, and one-way analysis of variance was used to identify the significance of the differences between the groups in the scores of the post-test, in relation to the averages, and standard deviations.

Table (5) Statistical description table (arithmetic mean and standard deviation) of the groups' post-measurements in cognitive achievement

Standard deviation	Arithmetic Mean	Number	Groups	Variables
3.37	41.40	60	Related	Cognitive test
5.28	36.67	60	Unrelated	
5.01	39.03	120	Total	

The previous table shows that there is a clear difference between the mean scores of the students of the research group with respect to the first independent variable, the type of activities (related - unrelated) in favor of the related type of activities, as the average score of students in the related type of activities was (41.40), while the mean scores of students in the non-related type of activities related (36.67).

-There is a statistically significant difference at the level of ≤ (0.05) between the mean scores of the experimental group students in the performance aspect test of the image processing skills of the prep school students, due to the main effect of the type of activities (related - not related).

The results of the pre-observation card were analyzed, with the aim of identifying the equivalence of these groups prior to the basic experiment of the research, in addition to the significance of the differences between the groups with regard to the scores of the observation card, in order to determine the appropriate statistical analysis method.

One Way Analysis of Variance was used to identify the significance of the differences between the groups in the scores of the observation card, in relation to the means and the standard deviations.

Table (6) Statistical description table (the mean and standard deviation) of the pre-measurements of the groups in the observation card

Standard deviation	Arithmetic Mean	Number	Groups	Variables
0.51	2.43	60	Related	Observation card
1.05	3.00	60	Unrelated	
0.79	2.62	120	Total	

Table (7) One-way analysis of variance table between groups' pre-measurements in the image processing skills observation card

Sig level	Sig value	F	Mean of squares	Freedom deg	Sum of squares	Sources of contrast	Variables
			1.04	2.00	2.07	Between groups	
Non Sig	0.20	1.72	0.60	29.00	17.43	Within groups "False"	Observation card
				31.00	19.50	Total	

The value of (q) in the previous table indicates that there are no statistically significant differences between the experimental groups, which indicates that the skill levels of the female students are similar before conducting the basic research experiment, and therefore the groups can be considered equivalent before conducting the experiment, and that any differences that appear after the experiment are due to the independent variable The current research topic, and not to differences that already existed before the experiment was conducted between groups, and therefore one-way analysis of variance will be used for each dependent variable separately.

One way analysis of variance was used to identify the significance of the differences between the groups in the pretest scores, in relation to the means and the standard deviations.

Table (8) Statistical description table (the mean and standard deviation) of the dimensional measurements of the groups in the observation card

Standard deviation	Arithmetic Mean	Number	Groups	Variables
7.43	243.23	60	related	**Observation card**
12.58	237.93	60	Unrelated	
10.59	240.58	120	Total	

The table shows that there is a clear difference between the mean scores of the students of the research group regarding the type of activities (related-unrelated) in favor of the related type of activities, as the mean scores of the students in the related

activities were (243.23), while the average scores of students in the unrelated activities were (237.93).

Commenting on the results of the research and interpreting them in light of the literature, previous studies and educational theories

-Regarding knowledge acquisition:

The results indicated that the use of the type of activities (related) to an e-learning environment led to the growth of cognitive achievement among first year prep schoolgirls. These results can be attributed to the following:

Providing educational activities related to the content in the intervals between the session inputs in the pattern of extended intervals for the students helped in enhancing learning and repeating the content in more than one way, knowing the extent of its progress, stimulating their motivation, directing their energy towards learning, and reducing cognitive requirements, which reduces the cognitive burden on their memory, and thus helped In increasing their comprehension of the multimedia educational content offered in the light of the educational design, it also helped in fixing and consolidating information, and this is what these studies agreed upon (Imad Abdel-Haq and Ahmed Bani Atta, 2006; Opitz, et al., 2011; Chang, 2011; Scheeler, et al., 2011; Metcalfe, et al., 2009; Scheeler, et al., 2006; Dihoff, 2003).

The content-related activities took into account the characteristics of the female students represented in their love for the learning environment, their high awareness of their self-efficacy, and their focus on the subject of learning. They helped increase understanding of the content, its use, and the transfer of the impact of what they learned to other situations, which increased their achievement of the learning content. This is what the Encoding Variability Theory agreed upon: Which assumes that when educational content is repeated after a period of time (interval), it should be done in different contexts, and this is what happens in breaks that depend on repetitions of the same content

in different contexts of which activities are associated with the content; Which helped to strengthen memory and recall information in general.

Planning all educational sessions so that they contain a review of what was studied within the educational session, which helped to retain the information in a large way inside the memory, because recall has a strong effect on the survival of the learning effect, and this agreed with the study of each of (Tetzel-Kipper et al, 2014; Karpicke & Bauernschmidt, 2011), and with what Guest (2016) reported, the use of the extended pattern helps to retain learning better and for a longer period, and this is consistent with what was recommended by the study Tetzel-Kipper et al (2014), if the goal is to retain learning on In the long term, learning sessions should be planned to match extended strength patterns.

Regarding the observation card (performance side):

The results indicated that the type of content-related activities resulted in proficiency in image processing skills using the Gimp program, which was measured using an observation card. These results can be attributed to:

Providing content-related activities in the e-learning environment in the time intervals is an opportunity for excellence and better learning, performance and achievement, which helps them to take advantage of the elements of the environment in which they have developed image processing skills using the Gimp program, and this is consistent with the Study-Phase Retrieval theory, which assumes that in each Once information is recalled from memory in multi-interval learning it is activated; Thus, the memory is strengthened, and then the pattern of expanded breaks with activities related to the content helped to activate and strengthen the memory of the students during the process of recalling information in the breaks of the expanded learning environment, which led to the development of image processing skills and their superiority in the observation card.

The presence of formative tests that were standardized in all sessions for all groups and is the first, second entry of the session, and supported by immediate feedback of the answers, made the impact of the activities related to the content better, and this was consistent with the study (Thalheimer, 2006; Bauernsclinidt, 2011).

Active interaction with the learning content in the second and third entrances to the learning sessions led to improved retention of information, and this was consistent with what was mentioned by (Pappas, 2016, p.4), spacing naturally leads to the coding of information, in a variety of temporal, physical and mental contexts, which helps memory, and this was consistent with a study (Kornell, 2009; Thalleineer, 2006).

Search recommendations:

- Encouraging teachers to use the type of activities related to developing the knowledge and skills of students in different stages of learning.

- Training educational designers to design e-learning strategies according to the type of activities in light of the appropriate educational design.

Featured research:

- The interaction between the type of activities (related - unrelated) to electronic distanced learning and the type of activities (structural - final) and their relationship to the survival of the learning effect and the reduction of the cognitive burden.

- The interaction between the type of activities (related - unrelated) to electronic distanced learning and the two learning styles (individual - participatory), and its relationship to the survival of the impact of learning and their attitude towards it.

- Designing an educational strategy based on electronic spaced learning with mobile learning and measuring its impact on the retention of learning and ease of use.

- The interaction between the type of activities and the type of activities in an electronic distanced learning environment and its relationship to achievement and the survival of the impact of learning for people with learning disabilities.

- The interaction between the type of activities (related - unrelated) to an electronic distanced learning environment and the cognitive style (impulsive / introspective) and its relationship to skill development, learning impact retention and usability.

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