

جامعة المنصورة كلية التربية



# "A Digital Developed Unit to Develop Students` Problem Solving Skill and Science Achievement of Primary Stage In Language Schools"

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# The general framework of the research

#### • The introduction:

Today's world is witnessing many rapid changes in the fields of knowledge and the environment, and its effects have been reflected in various systems, primarily the education system. Education is the key pillar that contributes to the development of individual skills and the appropriate knowledge that enables them to cope with these changes. The invasion of the Corona pandemic forced all educational institutions to change their strategies and seek alternative ways to continue their work (Alfaisal, 2020).

The COVID-19 pandemic has caused the biggest disruption to education in history, having already had a near-universal impact on students and teachers around the world, from pre-primary to secondary schools, technical and vocational education and training institutions and universities, and in mid-April 2020, 94% of the world's 1 billion young people and children were affected by the pandemic, according to the UNESCO report. The CORONA pandemic has claimed the lives of millions of people, as the spread of the virus does not limit geographical boundaries, nationalities or religions, or doctrines of communities at the global level, or at the level of one state. This has forced the teaching community to consider new ways and alternative strategies to engage students in the education process, and in many higher education institutes it has turned to online education to ensure continuity of teaching and learning processes (UNECO, 2020-A).

The Corona-19 pandemic also closed schools during the influenza pandemic to stop its spread, which prompted institutions to adopt distance education. During the pandemic, many solutions were offered to continue the education process worldwide by re -arranging the classroom, limiting the movement of teamwork for students in the classroom and creating opportunities for distance education, and accordingly the educational content scheduled for the Internet, television broadcast, and principles were presented Guidance, resources, and online channels in (96) countries to increase the coverage of school lessons for the population (UNECO, 2020-B).

(Asaad, 2021) pointed out that the spread of many emerging health problems; It has caused the spread of infectious diseases, the most prominent of which is the pandemic of the new Corona virus, and black mushrooms. The Corona virus spread has stopped many human activities, as it stopped studying in schools and universities, and as a result of that, the education systems called for traditional patterns with their classic components, where the school, teacher, student, blackboard and paper test, goodbye to an irreversible bouquet.

At the global level of education systems have witnessed radical transformations resulting from the outbreak of the corona, and the consequent closure of education institutions, and turned into direct teaching strategies into distance teaching strategies, some of which followed the Blended Learning strategies in which the direct methods of teaching are mixed with Electronic methods remotely, and this has contributed to the increasing need to harmonize the usual paper curricula to formulas from the electronic digital curricula that are implemented via the Internet online.

(khalifa & Mutawa, 2015) explained that the electronic curriculum is a way to achieve the goals of E-learning, which was described as a new method of education using computer, networks and various applications in the educational process, as it is a method of education using modern communication mechanisms from computer, networks, and multiple media; From sound, image, graphics, research mechanisms, electronic library, and Internet gates, with the least effort and most beneficial. E -learning is also defined as: the use of electronic and computer media in the process of transferring and communicating information to the learner through the optimal use of these media in building virtual classes through the Internet, and designing the curriculum in an automated, digital and electronic way, to put it on the web.

The concept of electronic education and learning expanded to transcend the traditional classes to a technical environment rich in multiple sources of interactive educational technologies, which provide opportunities to provide electronic curricula, in an effort to achieve the following (Mutawa & khalifa, 2018):

- Providing the opportunity for learners to retrieve and study the study courses on the various sites of the web and review them.
- Reducing the use of traditional teaching methods using teaching strategies that increase learning attractiveness.

- Facilitating the dissemination of information culture between teachers and learners.
- Providing activities accompanying the curriculum, questions and situations that help develop understanding through links to enrich learning.
- Increasing the elasticity of temporal and spatial learning with various methods of presenting the curricula.

Arab and international companies have competed in providing electronic content for the digital curriculum; This led to the multiplicity of methods, methods and tools for its presentation, including Miley (Ismail, 2010):

- 1- The virtual laboratory: It is an interactive program that contains tools for the chemistry, biology and physics laboratory, to conduct chemical reactions and physics experiences in electricity, magnetism, mechanics and other basic scientific concepts, and also provides viewing of enlarged microscopic segments in the electronic microscope.
- 2- HTML files: They are the Internet pages that can be reviewed using various browsing programs such as: Microsoft, Sinbad, Neoline and others. These pages are easily linked to their association, and the ability to include interactive programs in them.
- 3- PDF files: These are files for e -books that contain various scientific topics and concepts, and are characterized by ease of use, and create closed copies that other users (student or teacher) cannot make adjustments to them.
- 4- Java accessories: They are small online programs used to achieve one specific goal, and they have small sizes, which can be included in the curriculum.

Digital-Curriculum, or E-Curriculum, has been accompanied by the appearance of new terms, including Digital Content, E-LearninE-School, E-School, Smart Classroom smart classes, virtual class (Computerized) E-Tests, Smart Boards, Smart Board, and others, the literature also dealt with the educational theories of the digital curriculum, the reasons for its use, the theories of it, its pillars, the requirements of its planning, goals, systems of its system, requirements for its implementation, methods of displaying its content, tools, accessories, and its presentation systems, including the BlackBoard system to manage the curriculum education and electronic decisions and teach them, Moodel and its implementation strategy, including webquest, the roles of both the teacher and learner in learning the electronic curriculum, and applications of some electronic curriculum activities in virtual learning societies (Mutawa & khalifa, 2018).

The E-Curriculum Electronic Curriculum is a new form of communication between the knowledge of the expert and the learner, and it is an alternative to the traditional approach, which the learner often gets through communication with the book and the teacher, after what this communication has become digital through the information network or through another digital broker like CDs. Three major elements are integrated in the electronic curriculum; It is: the increasing demand for developing the new work skills necessary for the information age, the enormous capabilities offered by information and communication technology, and change in understanding how the learning process (the khalifa & Mutawa, 2015).

The Curriculum Digitalization is intended to convert its contents into electronic formulas, according to computer action systems, to become automatic treatment, in various multimedia, in order to facilitate the flow of its flow in the visual and audio means of communication systems through channels, sites and electronic communication means. (Mutawa & khalifa, 2018).

The spread of electronic learning systems has led to the emergence of digital curricula, in which information is provided, data storage, and summoning all practical requirements for educational curricula and programs in technical methods, according to its follow -up steps in the learning process, based on the basis of behavioral and police learning theories. The digital formulas of the curriculum include all its elements (goals, content, teaching methods, and evaluation methods) to facilitate his education and learn in all modern methods, devices and technical tools (Ismail, 2010).

The electronic approach is a formula for the curriculum that facilitates its learning with e -learning methods, which is done through communication via the information network or through a digital technical medium, in order to provide educational experiences of the learner through the forms of communication between the knowledge of the expert and the learner, by adapting the tremendous capabilities of information and communications technology in supporting the system The curriculum of all its elements. The electronic curriculum is also defined as providing educational content in the form of pages through an interactive environment that depends on the technologies of the web, through a group of multimedia and represented in: Text, Audio, Streaming video, Graphics, Animation, Illustration (Mutawa & Hosan, 2014).

The challenges imposed by the corona's pandemic resulted in the challenges of conducting multiple studies to contribute to finding a solution to this crisis, including the study of (Amir, 2020), which dealt with the role of educational technology in facing academic problems resulting from the spread of the Corona virus's pandemic among high school students. And the study of (Al –Hazmi, 2020), which aimed to conduct a strategic analysis of the possibility of guaranteeing integrated education in public education in the Kingdom of Saudi Arabia for the post -Corona stage. And the study of (Khamisi, 2020), which dealt with the gap in education between the home and the school time.

And the study of( Saleh, 2020), which dealt with COVID-19 and distance education between the conditions of turmoil and the requirements for the rise. And the study of( Al –Otaibi, 2020) that dealt with the challenges that faced Saudi families in teaching their children under the corona Festival (COVID 19).( Abhim, 2020) explained what the educational systems witnessed in the era of 'Corona' from the transformation of educational platforms for smart applications.

Al -Hawari study (2021) targeted an assessment of the impact of distance education in light of Corona on the motivation of students towards education from the point of view of teachers and parents in Jordan. And the study of **Al -Zahrani (2021)**, which dealt with the impact of the use of e - learning under the corona (COVID-9) in the development of some concepts. **Problem of the study:** 

Hamid's study (2019) dealt with the impact of digital education on knowledge growth and the capabilities of learners, and this digital pattern of education and learning has been popular since the outbreak of the negative corona and its negative repercussions on educated students in school Their interruption from studying and stopping direct education in schools since the outbreak of the pandemic began in March 2020, this challenge has sparked the thinking of many researchers, to study the ideal ways to overcome the problems of closing schools, and the regular study in it stopped due to the pandemic, and there were many solutions to confront this challenge, most of which were to change the direct education system to the distance education system, or integrated education.

There is a question that still arises, which is the extent of the occasion of distance teaching systems and integrated learning in teaching traditional paper curricula; Prepared in a previous period for the outbreak of

Corona's pandemic? How much is the need to develop science curricula to be more functional in developing students' achievement and skills in solving health and environmental problems? Then the research problem was formulated in a major question: What is the effectiveness of a unit based on digital education to develop achievement and the skills of solving health and environmental problems emerging among primary school students in language schools?

## Aims of the study:

## The study aimed at achieving each of the following:

- 1- Preparing a proposed developed digital unit for the development of achievement and the skills of solving health and environmental problems among primary school students in language schools.
- 2- Evaluating the effectiveness of the developed digital unit proposed in the development of science achievement among primary school students in language schools.
- 3- Evaluating the effectiveness of the developed digital unit proposed in developing the skills of solving health and environmental problems among primary school students in language schools.

# Importance of the study:

#### The study can contribute to:

- 1- The benefit of primary school students for languages through the digital development of a unit in the science curriculum that can develop their achievement and skills in solving the emerging health and environmental problems, especially after the transformation of direct education systems to distance education and integrated learning after the spread of new health and environmental diseases.
- 2- The benefit of primary school students to use what they learned in the developed unit using remote learning methods in solving health problems and the emerging environment in a employment manner of problem solving skills, which helps to grow their thinking capabilities, and increases the positive participation in solving problems threatened with them and their community. Directing specialists from science teachers in language schools, mentors, and curriculum planners to the positive aspects of digital development of science curricula units, and their development impact on the achievement of students, increasing their skills in solving the health and environmental problems, and linking them to what they learned with their lives, especially during the period of preventing them from direct attendance To school.

- 4- Teaching teachers benefit the units developed in attractive and exciting methods, which are more enjoyable and develop for students 'capabilities in language schools.
- 5- Providing controlled scientific tools and a set of recommendations and proposals related to the results of the research that benefit researchers, and opens new horizons to conduct more studies related to the current field of research.

## The study hypotheses:

- 1- There are statistically indicative teams between the average degrees of students of the experimental and control groups in the post-application of the academic achievement test in the interest of the experimental group.
- 2- There is a statistical difference between the average degrees of students of the experimental and controlled groups in the post-application of the measure of health and environmental problems in the interest of the experimental group.
- 3- There is a statistically significant correlation between achievement and the skills of solving health and environmental problems of the experimental group students. Fourth: The importance of the study.

## Search materials its tools:

## The research material includes the following:

- 1- The unit proposed to be developed in the science curriculum for the fifth grade of the primary stage in language schools (preparation of the researcher).
- 2- Teacher Guide (Researcher Preparation).
- 3- Student activity brochure (researcher preparation).

#### The research tools also include:

- 1- A script test (researcher preparation).
- 2- The scale of solid health and environmental problems skills (researcher preparation).

Search limits:

# The study limits will be limited to:

- 1- The study sample is from primary school students in Al-safwa Language Schools.
- 2- Measuring the level of skills to solve some of the emerging health and environmental problems, which are functional related to the concepts of the unit proposed to be developed.

#### **Research Methodology:**

The research will follow the descriptive approach and the experimental approach:

- 1- The descriptive analytical approach in collecting the data needed to prepare research materials and its tools.
- 2- The experimental approach; In the semi -experimental design of the effectiveness of the effectiveness of developing a unit in the science curriculum in the development of achievement and the skills of solving health and environmental problems that are set up for primary school pupils for languages. The semi -experimental design of two independent groups (experimental and controlled).

# can be clarified in the following figure:



#### An illustration form of the semi -experimental design of two independent groups (experimental and controlled). Search variables:

# Search variables:

The research variables were the independent variable and the dependent variable as follows:

1- The independent variable: digital learning

2- The dependent variable: science achievement, problem-solving skills.

# Search terms:

# Search terms are determined in the following:

1- Curriculum Digitalization: It is intended to convert its contents into electronic formulas, according to computer action systems, to become automatic processing, in various multimedia, in a way that facilitates the flow of its flow in the visual and audio means of communication systems via channels, websites and electronic communication means (Mutawa & khalifa, 2018).

#### The researcher defines digital learning as:

- Digital learning in virtual classes is like learning within traditional classes in terms of teacher and learner presence.
- Digital learning is a modern educational tool and the learner is in a different place from the source of information.
- The basic idea of digital learning is to provide information and deliver it to the learner and enhance current skills, experiences and knowledge.

#### 2- Problem Solving Skills:

The skills of solving problems means the ability to find effective solutions to the various problems facing us in practical or private life, and at the appropriate time to ensure that losses or reduce them as possible.

#### The researcher defines problem solving skills as:

problem solving is a systematic search method consisting of a set of actions that are worked to reach a particular goal, and one of the teaching methods, which helps students to think and scrutinize, so that the student is put in front of a particular problem, and asked to deal with it in the appropriate way, by collecting sufficient information about the problem, identifying its factors, finding appropriate solutions to it based on these reasons, and then reaching the desired results.

From the foregoing, it is clear to us the importance of developing science units using digital learning in developing achievement and problem-solving among primary school students in science schools

The development of problem-solving skills for students in different subjects, especially science, is of essential importance in learning through the use of modern non-traditional teaching strategies and methods. It encourages students to think and acquire problem-solving skills that qualify them to solve any problem they face in the society in which they live and raise motives that they have to learn and eliminate their boredom.

In light of the previous studies and their role in developing problem-solving skills, the researcher believes that developing problemsolving skills for primary school students in science will bring them many benefits, including:

- 1- Broadening the horizon and developing higher mental abilities.
- 2- Curiosity and a constant desire for education.
- 3- Self-confidence and perseverance.
- 4- Develop students' teamwork skills.
- 5- Intellectual honesty and objectivity and not to rush to reach solutions.
- 6- Finding the real causes of the problem.

Among the benefits of e-learning is the ability to meet the needs of individual learners so that individuals learn at their own pace, improve retention of information, access information in a timely manner, quickly update information in the network, unify content and information for all users, improve cooperation and interaction between students, and reduce student feelings, embarrassed in front of his colleagues when he made a mistake (Codone, 2001)

(Yalia, 2020) investigated the ways in which the Corona pandemic affected the reshaping of education in Indonesia, where the types and learning strategies used by teachers in the world were explained via the Internet due to the closure of educational institutions to limit the spread of the epidemic Corona virus. The results of the study showed that there is a high speed of the impact of the Corona epidemic on the education system, as the traditional method of education has declined, to spread instead of education through the Internet, and the study has proven the importance of using various strategies to increase the smoothness and improvement of education through the Internet.

And (Warrier, 2011) confirms that e-learning differs from traditional education in that it makes the student live the academic life outside the classroom using various e-learning methods, which liberates the student from the traditional classroom environment. It is a means of communication that enables teachers to communicate with their students and experts anywhere in the world, and this is beneficial to the educational process as a whole the educational process in general.

#### **Procedures of the study:**

- 1- See the previous literature related to research variables that include (science curricula for primary schools in language schools, and the skills of solving healthy and environmental problems) to establish the theoretical framework, as well as to prepare research materials and tools.
- 2- Developing a unit in the science curriculum digitally in the light of the foundations that were identified for the development of achievement and the development of the skills of solving health and environmental problems that are prepared for primary school students for languages.
- 3- Preparing the teacher's guide, and the brochure of activity in the unit, and its presentation to a group of arbitrators to ensure its sincerity, and the extent of its suitability, as well as the extent of its suitability for primary school students for languages, and amending the teacher's

guide and the brochure of activity in the light of the opinions and suggestions of the arbitrators.

4- Preparing the research tools, which are:

A- Calculation test in science.

B- A scale of solid health and environmental problems.

The research tools were subjected to a group of arbitrators, to confirm its sincerity, the extent of its suitability to measure what was put for it, its suitability for primary school students for languages, and the amendment of the research tools in light of the opinions and directives of the arbitrators.

- 5- The application of the search tools on an exploratory sample other than the search sample, to calculate the stability and determine the time of each test, and to put the search tools in its final form.
- 6- Determining the basic sample of research from primary school students from one of the language schools in Dakahlia Governorate, and dividing it into two experimental groups and the other controlled.
- 7- Applying the tools of research before the students of the experimental and control groups.
- 8- Study the research sample of the proposed digital unit developed in the science curriculum to develop achievement and the skills of solving health and environmental problems of the experimental group, and the control group also studies the unit in its paper form and in the usual ways.
- 9- Applying the research tools far away to the students of the experimental and controlled groups.
- 10- The data is monitored and processed statistically using the appropriate statistical methods to calculate the effectiveness of the proposed unit developed digitally in the science curriculum in the development of achievement and the skills of solving health and environmental problems emerging at the research sample from the primary school students for languages.
- 11-Discuss and interpret the results.
- 12-Submit recommendations and proposals in light of the results that will result in the results.

#### **Research results:**

#### **\*** Results for academic achievement:

The first question stipulates on:

What is the effectiveness of a digital learning- based unit to develop problem-solving skills primary students in language schools?"

To test the first hypothesis of the study assignments, which stipulated that: There are statistically significant differences at the level of significance ( $\alpha$  0.05) between the average ranks of the degrees of the experimental and control groups in the post -examination application in favor of the experimental group

The "Mann Whitney "test for independent groups was used to determine the significance of the differences between the average levels of the experimental group and the control in the levels of achievement and the total degree eliminating, and the following table shows this:

The value of 'U' and its statistical significance of the difference between the two ranks of the experimental group ranks and the control group in the achievement test dimension: Table(11)

Statistical significance	Z	U	Total Ranks	Average Rank	N	Group	Levels	
Indication to 0.01	3.429	57	438	24.33	18	Experimental	Khowledge	
			228	12.67	18	Control	_	
Indication to 0.01	3.108	65	430	23.89	18	Experimental	Comprehenison	
			236	13.11	18	Control	_	
Indication to 0.01	2.969	71	424	23.56	18	Experimental	Application	
			242	13.44	18	Control		
Indication to 0.01	3.980	37	458	25.44	18	Experimental	Total score	
			208	11.56	18	Control		

It is clear from the previous schedule that all the values of 'U' came statistically at the level (=  $0.01\alpha$ ), as the differences came in favor of the experimental group, which indicates the growth of the collection with its three equals compared to their peers in the control group dimensional. Then the first hypothesis was accepted.

## These results can be represented in the following form:

Averages arranged the degrees of the two groups of research at the levels of achievement and the total degree eliminating:

The results indicated that the experimental group excelled over the group control group in the achievement of science and these results were agreed with the results of a study of (Draissi & Yong, 2020), a study of (Chayim & Offir, 2019) and a study of (Durak, 2017) Which demonstrated the effectiveness of the unit based on digital learning in the development of academic achievement, which indicated that the use of the unit based on digital learning in the teaching process of primary

school students has achieved better results than the usual method used with the control group. This has returned to the following reasons:

- Dividing the students into heterogeneous groups gave the student the opportunity to benefit from the experiences of his fellow students with him, which helps to improve his academic achievement.
- The use of a new method or technique in teaching attracts the student to the learning process to discover what this new method is and what this digital unit is.
- Increasing the student's attention to the learning process, so he follows the explanation with interest, performs educational activities with his group members, solves questions, and improves his achievement.
- The digital learning unit included static and animated images that better illustrate the information, and simplified educational activities supported by reinforcement.

# The effectiveness of the unit based on digital learning in developing achievement:

To test the second hypothesis of the research, which states that:

The unit based on digital learning is acceptable to the extent of effectiveness in developing the achievement of sixth grade students.

The effectiveness of the unit based on digital learning in developing achievement was determined by using the equation " $\eta^2$ " in nonparametric statistics to determine the size of the effect based on "Z" values, as shown in the following table: Table (13)

The value of " $\eta^2$ " and the size of the impact of the unit based on digital learning in developing achievement.

The effect size	$\eta^2$	Z	Achievement dimensions
high	0.57	3.429	Knowledge
high	0.52	3.108	Comprehension
high	0.49	2.969	Application
high	0.66	3.980	Total score

It is clear from the previous table that all the values of " $\eta^2$ " came to express a large effect size; Where its values ranged in relation to the cognitive levels included in the test between (0.49-0.57), and it is clear that the size of the impact of the unit based on digital learning in the development of achievement as a whole was (0.66), which means that the contribution of the unit based on digital learning in the variation in achievement came by 66%, which is a value that expresses the size of a large effect, according to the approved gradient for the values of " $\eta^2$ ".

#### Post-measurement results for the problem-solving test:

For the third hypothesis scale of the study, which states that:

There are statistically significant differences at the level of significance ( $\alpha \le 0.05$ ) between the mean scores of the students of the experimental and control groups in the post application of the problem-solving test in favor of the experimental group.

The "Mann Whitney" test for independent groups was used to determine the significance of the differences between the mean scores of the experimental and control groups in the total score of the problem-solving test after, and the following table illustrates this: Table (14)

The value of "U" and its statistical significance for the difference between the mean scores of the experimental group and the control group in the total score of the post-problem solving test.

Statistical significance	Ζ	U	Total Ranks	Average Ranks	N	Groups
Significant at 0.01	3.898	41	454	25.22	18	Experimental
			212	11.78	18	Control

It is clear from the previous table that the value of "U" came in a statistically significant manner at the level (=  $0.01\alpha$ ), where the differences came in favor of the experimental group, which indicates the growth of the ability to solve problems compared to their peers in the control group dimensionally. And then the third hypothesis of the research was accepted.

These results can be represented graphically as shown in the following figure

Average Rank the scores of the two research groups in the total score of the Dimensional Problem Solving Test

The superiority of the experimental group over the control group in the ability to solve problems may be due to the following:

- The nature of presenting the educational material according to the digital learning unit and asking students to think about the situations (problems) presented to them and also to think about the responses and participate in the discussion with each other to reach the right and appropriate solution, which creates an atmosphere of suspense and excitement and increase their motivation to learn science.
- The nature of conducting experiments and activities help students to direct thinking and solve different problems.

- The use of fixed and moving images in the digital learning unit attracted the attention of the students and contributed to increasing their desire to solve the problem (the situation).
- Students' performance of the activities in the activity booklet helped them practice higher-order thinking skills such as problem-solving skills, including: problem identification skill, the skill of imposing hypotheses, the skill of testing the validity of hypotheses, and the skill of reaching the correct solution to the problem.

#### Search recommendations:

- 1- The use of digital learning in teaching science at the primary stage because of its significant impact on developing achievement and problem-solving skills.
- 2- The need for science teachers to pay attention to problem-solving skills for primary school students and present them in an appropriate way at the level of students' thinking.
- 3- Encouraging students' achievement by using digital learning.
- 4- The use of digital learning in teaching at different educational stages.
- 5- Providing the scientific content with experiments and activities that develop the student's problem-solving skills.
- 6- Attention to the role of the learner and his activity in the educational process.
- 7- Holding training courses for teachers to train them on the use of digital learning in teaching science.

#### Suggested research:

# In light results of this research, the following procedures and studies can be suggested of the:

- 1- A global outlook to the interruption of education due to COVID19 Pandemic: Navigating in a time of uncertainty and crisis. Asian Journal of Distance Education.
- 2- "Integrating Technology for Meaningful Learning". Houghton Mifflin Company in United States of Anderson, T. (2004a). Toward a theory of online learning. In T. Anderson & F. Elloumi (Eds.), Theory and practice of online learning . Athabasca, AB: Athabasca University.
- 3- Best practices in cyberspace: Motivating the online learner. Paper presented at the NECC. from <u>http://confreg.uoregon.edu/necc2002/</u>.
- 4- Assessing distance teaching and learning. Academic Exchange.
- 5- The effects of distance education on k-12 student outcomes: A metaanalysis. Naperville, IL: Learning Point Associates.

- 6- Teaching, learning and new technology: A review for teachers. British Journal of Educational Technology.
- 7- Distance education: Guidelines for good practice. Washington, DC: American Federation of Teachers.
- 8- A learner-centered framework for e-learning. Teachers College Record.

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