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Using distance learning strategy in students' acquisition of conceptual and procedural knowledge in mathematics

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Abstract

The study investigates the effect of using Distance learning (DL) on students' acquisition of conceptual and procedural knowledge in mathematics. The study used the quasi-experimental approach, where the study was applied by two groups of ninth grade students (experimental, 25 students, and control, 26 students), the experimental group was taught by using Distance learning, and the control group was taught in the usual way, after verifying the validity coefficients. And reliability for testing conceptual and procedural knowledge. The results demonstrated statistically significant differences favoring the experimental group, suggesting that Distance learning has a beneficial impact on mathematics instruction. The study included recommendations on the necessity of promoting Distance learning usage among students and teachers additionally the function of educational technology in the process of teaching and learning mathematics.

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INTRODUCTION

Jordan stays up to date on current affairs and any new technological advancements in the realm of education. Including the COVID-19 crisis in Corona; Jordan has resorted to implementing alternative plans to be able to continue student learning. It prepared television channels and specialized platforms for educating students remotely, for exapmle the "Darsak" channel and its platform, and urged teachers to create closed groups and activate distance education methods and tools To ensure success for students can follow their lessons remotely, while ensuring that students and their parents can access these platforms for free (Jordanian Ministry of Education, 2020).

The field of education is not new to distance education; It was previously known by multiple names. Sometimes it is said: Distance learning (DL), sometimes Distance Teaching, and other times Distance Education. Researchers dispute on how to define distant learning, but they all agree that the elements listed above lead to the goal. It has to do with the student and teacher's separation from one another. The term "distant education" refers to the method of instruction that uses a variety of media to transmit and acquire information and skills. While the idea of distance education also implies that the teacher teaches from a distance, the term "process" refers to the student's description of their learning process and how they interpret the course content. Sherry (2001), Educational literature uses many words when referring to the concept of DL, such as DL, distributed learning, learning centered on electronic resources, flexible learning, and other concepts that abound in such

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studies. Meanings and definitions vary for the concept based to the view of it and comprehension of its elements (Alrantisi, 2020).

Research and studies have agreed on two types of DL (Georgiou, 2018), First: Synchronous learning: It is education in which the teachers and students meet simultaneously in a real educational environment, through a direct electronic meeting, and this is Through chat rooms or e-learning classes. The second: Asynchronous learning: which is education that frees the student from time. The teacher provides complete learning tools on a specific platform, for the students to use whenever they want, without simultaneous communication with the teachers.

M. Ghunaimat (2020) indicates that teaching using this type DL supports the principles of constructivist education, on basis that learning occurs when the student is more active and able to build his cognitive structure on his own, and accordingly, meaning is built for students through purposeful viewing and reaction with the presentations. And texts and sounds, and freely browsing and searching for knowledge within the educational program. Teaching with software also achieves the principles that underpin constructivism in teaching mathematics, such as moving from teaching to construction.

Because of its a high level of flexibility, DL is an excellent exercise for individual learning. Students can have additional possibilities for review, reflection, and feedback when they learn remotely. To be able to achieve their learning objectives, students can design unique methods of learning, choose their learning materials, and carry out activities. They also have more opportunities to receive feedback from a variety of sources, which is crucial because high levels of learning independence will lead to greater success than low levels. A survey carried out in the midst of the epidemic's major blockade at the Faculty of Engineering, National University of Surabaya, Indonesia, by the Department of Electrical Engineering revealed that 80.1% of students were content with the way that distance learning helped them become more independent learners. This is a finding of the fact which distance education online is more individualized to match the requirements of each student. Additionally, because younger generations spend more time on social media and the internet, they are more accustomed to engaging in online activities, which makes that sort of influence more noticeable with younger students (Xianyang, 2024).

With the goal of enhancing mathematics teaching in DL, video is increasingly being used in classrooms as a resource for teachers to reflect on their practice. Where videos excerpts from mathematics teachers are selected, presented and discussed (Raewyn, 2023). The foundation of DL is a collection of abilities that include: sharing files, copying data and information, using e-mail, using virtual discussion boards with students, conducting electronic tests and surveys, exchanging information and files, organizing electronic enrichment sources, and linking education applications and activities to systems information (Williamson, 2007).

According to Juwaida (2019) most of goals of DL are to: encourage students to learning; provide an assortment of learning resources; offer contemporary teaching techniques based on educational technology; allow students to manage their time and determine when is the best time to study; and provide privacy among students and teachers.

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The National Council of Teachers of Mathematics in the United States of America (National Council of Teachers of Mathematics, 2005) included the principles of teaching school mathematics (the principle of technology) in the document because of the important role that mathematics plays in education the subject, additionally its influence on enhancing and supporting student learning. For instance, it enables students to study variables, patterns, connections, and curves using computer software and other technological tools that teachers activate through e-learning strategies. following. Internet-integrated learning technology is significant because students may make advantage of the websites anywhere and whenever in their everyday life (Hwang, 2008). The responsibilities of instructors, supervisors, and students have evolved due to remote learning (Karatepe, 2020).

M. , & M. E. Ghunaimat (2022) mentioned the positives of DL in mathematics education of, which are: It enhances individual learning, develops research and investigation skills, helps students take responsibility for their learning, reduces time and effort in controlling student learning management, increases the student's skills in social communication, It enhances students' 21 century skills such as critical thinking, creativity, problem solving, linguistic proficiency, etc. Hamadenah (2017) indicated a positive impact of DL in teaching mathematics, and that it helps discover common mathematical errors, makes mathematics an enjoyable and easy subject, and takes into account learning styles.

Educating students to comprehend mathematical concepts, cultivate mathematical reasoning abilities, recognize connections between mathematical definitions and symbols, and apply mathematics to problem solving and modeling are the main objectives of mathematics education. Raising students who value and are knowledgeable in mathematics is the major conclusion that these objectives lead to. Because of The features of mathematics. It could be exceedingly challenging to raise people who exhibit this trait. For example, kids may view mathematics as a challenging subject to study, have unfavorable attitudes toward the subject or the teacher, or misinterpret concepts (Celen, 2023).

In the current environment, DL is becoming increasingly popular among those seeking higher education; most working people find that DL is more beneficial than usual classroom settings. The world is turning more toward technology, which is necessary for the ways in which education is delivered. Previously, students had to invest more time and money to enroll in standard degree programs at different universities; nevertheless, the demand for higher education exceeded the supply of seats in these institutions. This has opened up an immense number of options for students across all disciplines in e-learning and distance education. Moreover, the government's objective to increase access to higher education now includes distant learning. Certain private and deemed-to-be institutions do better in distant learning than state universities (Radhakrishnan, 2024).

"Knowledge of mathematical structures, concepts, theories, and procedures, additionally to understanding The association between those elements" is how Ben-Motreb (2010) mathematical knowledge. Procedural and conceptual knowledge are the two categories of mathematical competence.

Relationships that emerge internally and are connected to previously held notions make up conceptual knowledge. Knowing fundamental arithmetic facts and

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comprehending mathematical concepts and procedures are examples of conceptual knowledge. According to Khashan (2012) students possess conceptual knowledge when they can identify and apply principles, additionally recognize and apply facts and words. They can also establish similarities and contrasts between various ideas. Hiebert (1986) defined conceptual knowledge as: "Comprehension of the fundamental links and linkages between concepts that clarify and provide context for mathematical operations".

As for procedural knowledge, it expresses the skill in implementing procedures in a flexible, accurate, effective, and appropriate manner, and includes knowledge of the procedures and steps that enable reaching specific goals by following a group of specific and sequential steps, which express the language of symbols, conditions, and processes that can be applied to complete the process. A mathematical task (Shepherd, 2006). Procedural knowledge was characterized by Hiebert (1986) as "the proficiency with computing, understanding of methods to identify structures and algorithms, ability to formulate an issue in its broadest sense, and ability to solve it appropriately".

According to Szulc (2020), the National Center for Supporting Vocational and Continuing Education released a report in 2013 that included findings about the state of DL in Poland, particularly with regard to vocational and continuing education. According to the report: 1) In Poland, the percentage of DL in continuing and vocational education (also known as lifetime learning) is negligible. 2) The main cause of the restricted usage of this type of educational organization is that educators and administrators of vocational and lifelong learning institutions do not see the advantages of DL .3) Numbers of teachers prepared for DL is insufficient for its development in vocational and continuing education. 4) The vocational and continuing education system's application of DL is incredibly inefficient.5) Polish laws pertaining to digital rights are out of step with developments in Europe.6) No widely accepted standards, associated evaluation and quality control procedures, or establishments that grant accreditation for DL .7) There is little usage and sharing of free didactic materials for DL. 8) The kinds of distance education that are most frequently employed in professional and lifetime learning settings are unsuitable for use in educational field.

Abri et al. (2023)used two variables—the number of years of service and the quantity of technical training courses and programs—to identify the practices and difficulties experienced by female primary school teachers while adopting the distant learning technique in teaching mathematics. There were forty-seven female elementary school instructors in the research sample. The findings indicated that there are a few difficulties that teachers face while putting the distance learning approach into practice, including an increase in workload and tasks, spotty or nonexistent internet access, and a higher effort need than with usual teaching techniques.. The findings also demonstrated that, in comparison to recently appointed teachers that have not completed a sufficient number of specialized training courses, instructors who have completed more technical training programs and have less years of service experience less difficulties.

Through the previous literature review, a few research exist. that focused on DL in mathematics, including: Al-Halaibi. H (2022) study`s aimed to reveal the function of using distance teaching in mathematics in first grade of primary school.

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The study used the quasi-experimental approach, its sample consisted of 69 students, then the study sample was divided into two groups, a control group consisting of 34 students, and an experimental group consisting of 35 students, the findings of the study indicated the following: There are statistically significant differences at the significance level (a = 0.05) between the mean scores of the control and experimental group students according to the teaching method variable (distance teaching, the usual teaching method), Differences that are statistically significant exist. The accomplishment test's (knowing, remembering, and application) mean scores for students in both the control and experimental groups were compared at the statistically significant level (a = 0.05).

Volodymyr (2024) presented a tutor training alternative wherein university teachers can access expert-created general-purpose distant learning courses. Teachers enroll in the "Practice of the Tutor" remote course, where they learn the theories and technology of online education and obtain useful abilities while teaching students enrolled in the aforementioned courses. On behalf of 74 teachers, the "Practice of the Tutors" course was offered. Eleven educators have effectively finished the training course; of these, seven have engaged 132 students in professionally designed online courses. The study proved how beneficial it is to teach tutors using professionally designed remote courses that include the developers' input while also conducting educational activities with students. Teachers enrolled in the semester-long course "Practicing of Blended Learning" benefit from the experience gained via practical instruction. The issues raised in the questionnaire drew the attention of instructors who create and oversee distant learning programs, and strategies for enhancing the Institute's online learning tools were devised.

Chimmalee. B (2023) investigated students' mathematics critical thinking in a review of mathematics course using flipped cloud learning, that includes a curriculum for developing mathematical thinking. A pretest-posttest design was employed in a quantitative manner with a group of fifty-six undergraduate mathematics students. An examination of mathematics critical thinking skills served as the research tool. The n-test, t-test, and descriptive analysis were used to examine quantitative data. According to the findings, at the 0.05 level, the students' mathematical critical thinking scored higher than 60% of the total, indicating statistically significant thinking. Students' critical thinking skills in mathematics improved, with a mean gain of 0.64—a moderate rise. The findings also demonstrate that, at the 0.05 level, this strategy considerably improved the students' mathematical critical thinking. In summary, students' critically mathematical thinking was positively impacted by the incorporation of the mathematical thinking improvement technique into flipped cloud learning. The findings also imply that the modified learning strategy might be helpful in the new typical setting in a teaching capacity model.

Jelena (2021) examined the function of online education and the usage of Moodle LMS in educational applications considering the results of this type of instruction on student learning outcomes and instructor effectiveness in Serbia. The findings indicate that the students' past knowledge has the greatest impact on their performance. When past knowledge is integrated with instructional software in

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primary school mathematics lectures, it is more successful. In secondary education, past knowledge works better when paired with a desire to learn mathematics.

In the United Arab Emirates (UAE), Snoussi (2020) investigated the DL experiences for communication student throughout the coronavirus crisis and assessed the suitability of online technologies for communication and media courses. The information uncovered a number of benefits, the principal ones being the utilization of technology, the improvement of students' communication abilities, and the preservation of education during emergencies. The limitations mostly have to do with computer expertise and technological problems. The findings of this study were crucial in helping to create open-access, globally accessible communication courses that would benefit students at the University of Sharjah.

Through the researcher's review of previous literature, he found few studies investigating the impact of DL in teaching mathematics, especially in assessing students' possession of conceptual and procedural mathematical knowledge. Therefore, this study aimed to determine the effect of using DL on ninth grade students' acquisition of conceptual and procedural mathematical knowledge.

Study Statement And Questıons

Given the status of Jordan's educational system as of 2020–2021, Thus, we can say that it was closely impacted by all of the events and advancements that took place. It influences as well as being influenced by the events occurring, and Jordan's education system places a strong emphasis on using distant learning as a cutting-edge, contemporary teaching method.. The significance of mathematics as a subject that is based on thinking and understanding, additionally an enthusiasm in mathematical knowledge in addition to its function in education the subject, made the search for a comprehensive strategy that offers the potential for conceptual awareness and deep understanding through a variety of sources urgent. As a result, the DL approach was selected and used in the teaching of mathematics.. As a result, a technique that makes use of instructional technology and gives students the flexibility to study one moment at a time and location that works for them was developed based on the researcher's expertise teaching mathematics. confirming that all resources required to carry out the study properly and efficiently are available. Research by Hamadenah (2017) and M. , & M. E. Ghunaimat (2022) also showed that DL has a beneficial effect on teaching mathematics.

In light of the aforementioned, The research sought to investigate ascertain how using the DL method affected the acquisition of conceptual and procedural knowledge in mathematics in the ninth grade. The research makes an effort to respond to the following queries: What effect does teaching mathematics through remote learning have on the conceptual and procedural knowledge that ninth grade students acquire?

Study hypotheses

In terms of students' acquisition of conceptual and procedural knowledge in mathematics, there are no statistically significant differences between the arithmetic averages of the test scores for the experimental group students who studied by using the DL strategy and the control group students who studied using the usual strategy.

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Procedural definitions:

Distance education: The researcher adopted the UNESCO definition of distance education (UNESCO, 2020), which is: any educational process in which there is no direct contact between students and teachers, so that they are far apart in a timely manner and places, and the communication between them is through electronic educational media or publications.

1) Conceptual knowledge:
   The Mathematics and Science Project Development Team (MSPDT) Affiliated to Arab Education Bureau for the Gulf States (2012) defined it as: "understanding basic mathematical ideas into terms, generalizations, relationships, operations, and procedures." As stated by the researcher's methodical definition, it is the students' understanding of the connections and functions ideas included in the ninth-grade mathematics curriculum.
2) Procedural knowledge:
   MSPDT defined it as: carrying out procedural operations, including algorithms and mathematical skills, in an efficient, accurate, flexible and appropriate manner to the situation.
   The researcher defines it procedurally: applying the concepts and laws of functions, interpreting representative data for relationships, quadratic function, and geometric transformations of the quadratic function in an accurate way to reach the correct solution.

The Importance

The following factors indicate why this research is important: applying DL to math instruction based on current practices in the Jordanian Ministry of Education. For instructors in particular, the use of DL is crucial since it offers a contemporary approach to education. Teachers who get this guidance will gain a greater grasp of how to apply DL in the classroom. The study's findings offer educators and educational supervisors constructive criticism and a clear picture of how to apply DL in the teaching and learning process. They also highlight the significance of integrating DL into mathematical curricula and the classroom activities that support them.

Study Delimitations

The study's findings are determined by a set of determinants, namely: ninth grade students in schools affiliated with the Directorate of Education, Bani Ubaid District, Irbid Governorate - Jordan, for the academic year 2023/2024 AD. The research was limited to a conceptual and procedural knowledge test, consisting of (14) multiple choice items, which the researcher prepared through the Relations and Functions unit in the mathematics curriculum for the ninth grade. The study used a group of educational videos selected from YouTube to teach the experimental group using asynchronous DL.

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RESEARCH METHOD

Study Approach

The study adopted the semi-experimental approach, pre-post, for two groups, one experimental and the other control, and applying a test to answer the study questions:

G1: O1 X O1
G2: O1 O1
Where: G1 : the experimental group
G2 : the control group
X : processing (using the DL)
O1 : acquisition of conceptual and procedural knowledge in mathematics.

Participants

To accurately represent the study population, two groups (control and experimental) were purposefully chosen from the population. The following steps were followed in the process of choosing the individuals: We selected the participants from Musab Bin Omair Basic School. There were two classes available for ninth-grade pupils. For an experimental group, one randomly selected class had its students assessed using DL. There were 25 students enrolled. The second group was designated as the control group, and the usual teaching methodology was applied to its students. There were 26 pupils in all.

Equivalence of groups:

The overall pre-test score of the students in addition to the arithmetic means and standard deviations of the dimensions were retrieved depending on the group variable (experimental, control) to verify the equality of the groups. Using the "t" test, Table (1) presents the statistical differences between the arithmetic means.

Table 1. Arithmetic means, standard deviations, and the “t” test according to the group variable on the dimensions and the total score of the students’ scores on the conceptual and procedural knowledge test.

	Group	Number	Arithmetic Means	Standard Deviation	T-Value	Degrees Of Freedom	Sig
conceptual knowledge	Experimental	25	2.32	.98	.94	49	.94
	Control	26	2.57	.94			
procedural knowledge	Experimental	25	2.76	1.33	.76	49	.17
	Control	26	2.50	1.10			
Total	Experimental	25	5.08	1.7	.007	49	.63
	Control	26	5.07	1.44			

It is clear from table (-) that there are no statistically significant differences (α= 0.05) attributed to the group in all dimensions and in the total score of the pre-test of conceptual and procedural knowledge, and this result indicates the equality of the groups.

Study Instruments

The second unit of the ninth-grade mathematics curriculum, "Relationships and Functions," was utilized to carry out this investigation, as stated by the

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Jordanian Ministry of Education. The unit has 49 pages and covers four major topics: quadratic function, geometric transformations of the quadratic function, functions, and interpretation of representative data for relationships.

The purpose of the study is to evaluate students' conceptual and procedural knowledge in mathematics on the topic of "Relationships and Functions." It contains tools for measuring conceptual and procedural knowledge. This unit's test includes (14) a multiple-choice paragraph that assesses how employing DL affects students. The cognitive component of the test is predominant since it relates to the algebraic subject. The ideas and methods in the unit served as the foundation for the test's creation. The learning results (outputs) for the unit reached 14, therefore the test was constructed in accordance with the requirements table. The researcher then classified mathematical knowledge into two categories: procedural knowledge (7 questions) and conceptual knowledge (7 questions).

Validity and reliability of the study tools

To verify the validity of the conceptual and procedural knowledge test, it was presented to a group of arbitrators who hold doctorates in mathematics curricula and teaching methods. They were asked to judge the test items in terms of knowledge classification, learning outcomes, linguistic integrity, and output. In light of the arbitrators' observations and suggestions, the necessary amendments were made. To ensure the reliability of the study tool, it was verified using the test-retest method by applying the test, and re-applying it after two weeks to a group of (20) individuals outside the study, and then the Pearson correlation coefficient was calculated between their estimates the two times, as it was (0.85). The reliability coefficient was also calculated using the internal consistency method according to the Kuder Richardson-20 equation, reaching (0.79), and these values were considered appropriate for the purposes of this study.

Difficulty and discrimination coefficients (test)

Using the SPSS program, the responses of a group from outside the study population, consisting of (25) students, were analyzed to calculate the difficulty and discrimination coefficients for the test items. The percentage of students who answered the paragraph incorrectly was taken as the difficulty factor for each test item. The difficulty coefficients for the items ranged Between (0.20-0.68), and discrimination coefficients ranged between (0.40-0.70). Based on what Odeh (2010) indicated for the acceptable range of paragraph difficulty, which ranges between (0.20-0.80), paragraphs are considered good if their discrimination coefficient is higher than (0.39), and acceptable and it is recommended to improve them if their discrimination coefficient ranges between (0.20-0.39), It is weak and it is recommended to delete it if its discrimination coefficient ranges between (0-0.19), and negative discrimination should be deleted. Accordingly, none of the paragraphs were deleted based on difficulty coefficients or discrimination coefficients.

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Study procedures:

The study subjects were identified, and two classes were selected from Musab bin Omair School, taught by one teacher. The classes were randomly distributed into an experimental group and a control group.

1) The equality of the groups was verified before conducting the study by relying on the pre-test scores.
   The teacher for the two groups—the experimental and control—received training on the use of DL and how to apply it while instructing the experimental group. The control group was taught the standard curriculum, while the experimental group was taught all the material covered in the "Relationships and Functions" unit through carefully chosen instructional videos from the YouTube website. The instructor also provided feedback and brief assessments.
2) The application period took two weeks, which is equivalent to (10) class sessions.
3) Following the completion of the research's implementation, the study participants were given a post-test on their conceptual and procedural understanding of mathematics from the unit. The test was then rectified, and the findings extracted to be able to evaluate the data and give answers to the research question.

Study variables:

This study includes the following variables:
1- Independent variable: teaching method.
2- Dependent variables: Conceptual and procedural knowledge, measured by the student's grade according to the study tool linked in the "Relationships and Functions" unit, which was prepared for the purposes of the study.

RESULTS AND DISCUSSION

The question: Are there statistically significant differences at the significance level ($\alpha = 0.05$) between the average scores of the experimental and control groups in the conceptual and procedural knowledge test? To extract the answer. calculating the arithmetic means, standard deviations, and adjusted arithmetic mean of the students' scores in the conceptual and procedural knowledge test in the pre- and post-measurements according to the group (experimental, control), as shown in Table (2).

Table 2. Arithmetic means, standard deviations, and adjusted arithmetic mean of students' scores in the conceptual and procedural knowledge test as a whole for the pre- and post-measurements according to the group (experimental, control)

Group	Numbers	Pre-measurements		Post-measurements		Standard error
		Arithmetic Means	Standard Deviation	Arithmetic Means	Standard Deviation	
Experimental	25	5.08	1.70	12.04	1.71	.34
Control	26	5.07	1.44	9.46	1.44	.28

It is clear from Table (2) that there are apparent differences between the arithmetic means and the adjusted arithmetic mean of the students' scores in the conceptual and procedural knowledge test in the pre- and post-measurements

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according to the group (experimental, control). To determine whether these apparent differences are statistically significant, the accompanying one-way analysis of variance was used. (One way ANCOVA) for the post-measurement of the conceptual and procedural knowledge test as a whole according to the group (experimental, control), and the following is a presentation of these results as shown in table (3).

Table3. Results of the one way ANCOVA for the post-measurement of students' scores on the conceptual and procedural knowledge test as a whole according to the group (experimental, control).

Source of variance	Sum of squares	Degrees of freedom	Mean sum of squares	f-value	sig	η2
Between group	84.73	1	84.73	33.64	0.00	.63
Within group	123.42	1	123.42			
Total	208.15	50				

It is clear from table (3) that there are statistically significant differences at the significance level (σ = 0.05) in the students' scores in the conceptual and procedural knowledge test according to the group (experimental, control). The value of (F) reached (33.64) with a statistical significance of (00.0). It is a statistically significant value, and the differences were in favor of the experimental group who studied using DL compared to members of the control group.

It is also clear from table (3) that the size of the effect of the teaching method was large. The Eta square value (η2) explained (63%) of the explained (predicted) variance in the dependent variable, which is the conceptual and procedural knowledge test. The means, standard deviations, and adjusted arithmetic mean were also calculated for the pre- and post-measurements of the dimensions of the conceptual and procedural knowledge test according to the group (experimental, control), as shown in Table (4).

Table 4.

Arithmetic means, standard deviations, and adjusted arithmetic mean for the pre- and post-measurements of the dimensions of the conceptual and procedural knowledge test according to the group

	Source of variance	Sum of squares	Degrees of freedom	Mean sum of squares	f-value	sig
Conceptual	Between group	23.25	1	23.25	24.11	0.00
Knowledge	Within group	47.25	49	.964		
	Total	70.51	50			
Procedural	Between group	19.21	1	19.21	19.06	0.00
Knowledge	Within group	49.37	49	1.00		
	Total	68.58	50			

Table (4) shows that there appear to be variations due to group differences (experimental, control) between the arithmetic means and the adjusted arithmetic mean in the pre- and post-measurements of the conceptual and procedural knowledge test dimensions. The significance of the observed differences was

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confirmed using a one-way multiple analysis of variance. manner MANCOVA). This is what table (5) illustrates.

Table 5. One way MANCOVA for the effect of group on the post-measurement of each dimension of the conceptual and procedural knowledge test.

	Source of variance	Sum of squares	Degrees of freedom	Mean sum of squares	f-value	sig
Conceptual Knowledge	Between group	23.25	1	23.25	24.11	0.00
	Within group	47.25	49	.964		
	Total	70.51	50			
Procedural Knowledge	Between group	19.21	1	19.21	19.06	0.00
	Within group	49.37	49	1.00		
	Total	68.58	50			

According to the effect of the group (experimental, control), Table (5) demonstrates that there are statistically significant differences at the significance level ($\alpha \leq 0.05$) in all dimensions. These differences were favorable to the members of the experimental group who studied using DL as compared to the members of the control group.

The study's findings demonstrated statistically significant differences between the study groups' use of instructional strategies. Moreover, the experimental group that studied using distance learning benefited from the finding that DL had a positive impact on mathematics learning when compared to regular learning. This is because, besides to the availability of numerous sources and references that support the teaching of mathematics, distance education (DL) is one of the contemporary strategies that has moved education from the physical world to the virtual one. DL also fosters the development of individual learning skills. It improves the processes of inquiry and study, places more responsibility on the student for his education, sharpens his critical thinking and problem-solving abilities, and advances his understanding of the sports industry. This suggests that both students and math teachers believe that teaching mathematics through distant education is an acceptable choice.

The study's findings demonstrated statistically significant differences in the conceptual and procedural mathematical knowledge that students acquired, with the experimental group that learned via distance learning showing the greatest gains. The fact that DL offered learning resources that included extensive concepts as well as comprehensive conceptual understanding shows that the students had the ability to comprehend mathematical concepts to the appropriate degree. This is because DL gives students the opportunity to conduct research, adhere to mathematical concepts, and apply those concepts to real-world problems, which helps to consolidate their knowledge. mathematical ideas and procedures, as well as preventing misconceptions among students.

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CONCLUSION

The study's findings led to the following conclusions:

1. The positive impact of using DL in teaching students mathematics.
2. The importance of motivating teachers and students to explore a variety of online resources and the function of technology for education in the method of learning and teaching mathematics.

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