Journal of Positive School Psychology http://journalppw.com
2023, Vol. 7, No. 2, 1737-1757

# Measuring The Impact Of Technological Activities On Developing Mathematical Concepts Among Kindergarten Children In The Kingdom Of Saudi Arabia

**Dr. Manal Muslim Al-Juhani**

*Assistant Professor, Department of Mathematics Curricula and Methods, Faculty of Education, Imam Abdul Rahman bin Faisal University, Kingdom of Saudi Arabia.*

**Abstract:** The paper aimed to identify the impact of the use of technological activities in the kindergarten stage, and its impact on the cognitive development of the child. Bloom's cognitive levels (remembering - understanding - application) were used to measure the cognitive development of kindergarten children. To achieve the goal of the research, the experimental approach based on the semi-experimental design was used with two groups, the control and the experimental, where the research sample consisted of 50 male and female students distributed over the two groups, the experimental group consisted of (25) male and female students, and the control group consisted of (25) male and female students. Application of the test on the experimental and control groups before and after the research experiment. The results of the research showed that there is a statistically significant difference between the mean scores of the students of the experimental and control groups in the post-application of the mathematical skills test in favor of the students of the experimental group. This confirms the effectiveness of electronic activities in the cognitive development of kindergarten children towards mathematics. The research also presented some recommendations related to the need to pay attention to mathematics teachers and encourage them to employ the strategy of electronic activities in the field of teaching and learning mathematics, and the need to include electronic activities to develop the skills of mathematics curricula in the different educational stages.

**Keywords:** Technological Activities; Bloom's Levels Of Knowledge; Remembering Level; Understanding Level; Application Level; Kindergarten Children; Mathematics and Saudi Arabia.

## Introduction

E-learning is one of the modern methods of education, which uses technology to facilitate the learning process and develop educational concepts. It is also used in the development of mathematical concepts among kindergarten children as one of the effective methods to improve the level of children's understanding and enhance their arithmetic skills. The effectiveness of using e-learning lies in providing interactive methods and educational methodology that attract children’s attention and encourage them to participate and interact (Benavides et al, 2020). E-learning also enables the provision of various educational resources suitable for all children, as students can access educational materials at any time and from anywhere. Educational games, interactive programs, videos, animations, and interactive exercises can be used in e-learning to enhance children's understanding of mathematical concepts (Muhammad, 2023). In this way, children are stimulated to think, explore and experiment, which helps them develop their mathematical skills and improve their mathematical level. In addition, e-learning can help teachers manage time and resources and improve the quality of mathematical instruction in the classroom. It also helps to improve communication between teacher and students and to enhance interaction and cooperation between them (Abdel-Baqi, 2019) (Stubbé et al, 2016).

The early childhood stage represents a fertile medium for the development of many different concepts and skills. Therefore, many

educational institutions interested in childhood tend to use many modern teaching and learning methods. To be able to achieve the comprehensive and integrated development of the child. At this stage, different concepts and skills are developed to achieve the comprehensive and integrated development of each child, taking into account individual differences in abilities, linguistic preparations, and developmental and behavioral levels. Thus, it helps him to acquire new experiences, including their interest in the various aspects of their development, such as linguistic, physical, social, psychological, cognitive, emotional, and others (Sharrod et al, 2021).

A lot of technological innovations have emerged, the aim of which was to make the kindergarten child the focus of the educational process instead of the teacher, and to focus on educational strategies such as active learning and e-learning, which is generally intended to use technology of all kinds to deliver information to the learner with the least effort and time, and with the greatest benefit. This learning may be synchronous immediate learning, and it may be asynchronous inside or outside the kindergarten activity hall (Faisal, 2023). Despite the many advantages and positives of e-learning, there are shortcomings in some aspects that he could not overcome. Hence the need for a new approach that combines the advantages of both traditional education and e-learning, so the so-called blended education emerged, which means the integration of both traditional education in its various forms and e-learning in its various forms. To increase the effectiveness of the educational situation and opportunities for social interaction (Al-Rajeeb, 2021).

Twenty-first century skills may represent a general framework for the development of education systems, and they can be integrated through school subjects such as languages and mathematics. It may also be included in early childhood programs. In order to develop these skills in the child, opportunities must be provided for him to participate in his learning process, and to build his knowledge through the application of learning in real situations. This achieves communication between children with each other, or between them and adults, and expresses their ideas, which develops different patterns of thinking in them. Therefore, twenty-first century skills are an important pillar. To build a child capable of life in a changing digital world, by developing a set of skills, including thinking, learning, work, and life skills (Syed, 2022).

On the other hand, we find that the process of teaching and learning in kindergarten faces many challenges, including the large and increasing numbers of children enrolled in kindergartens with the lack of kindergartens equipped to accommodate these numerical densities for these children, as well as the presence of halls in which children are accommodated on the lists only because there are no places available for them in official kindergartens. On the other hand, we find the flagrant deficit in the numbers of specialized kindergarten teachers, which resulted in the need to resort to using a technological strategy as one of the effective solutions to this matter. The Ministry of Education has begun to integrate technology into traditional kindergarten learning by making internet networks available in kindergartens, especially during the Corona pandemic in 2020 (Ibrahim, 2022).

This imposed the use of technological applications and benefit from them in the management and organization of the educational process and its implementation in various educational institutions. Technological electronic applications express an idea, program, or product that depends on computers, the Internet, and websites. It comes in the form of an integrated system or a sub-system that necessarily entails desired reactions and behaviors that are expected to be obtained from the beneficiary of this program, idea or product. These programs offer new and unfamiliar educational materials to the learner, and are based on the principle of individual learning (Olefirenko et al, 2019).

Given the importance of e-learning in building the cognitive formation of kindergarten children, many researchers have contributed to presenting studies that measure the impact of this strategy on the development of educational skills among children in general and kindergarten children in particular. One of the most important of these studies is an article measuring the impact of an e-learning environment based on the design of educational activities on developing the skills of computer teachers in promoting digital citizenship. Where (Muhammad, 2023) implemented an educational program that uses an electronic learning environment, based on the design of educational activities, to develop teaching and learning skills in the field of computer, for a group of female teachers, and their performance was compared with a group of female teachers who did not participate in the program. The results showed that the use of an e-learning environment based on the design of educational activities had a positive impact on the skills of female teachers in promoting digital citizenship, as the teachers who participated in the program achieved an improvement in their skills in promoting digital citizenship and applying it in educational classes.

The article indicates the importance of using an e-learning environment based on the design of educational activities in developing female teachers' skills in promoting digital citizenship, and that the use of this environment can be effective in improving female teachers' performance in this field. The article recommends developing educational programs that use an e-learning environment based on designing educational activities to develop female teachers' skills in promoting digital citizenship. As for (Faisal, 2023), he applied an educational program that used electronic blogs as a tool to develop self-learning skills among a sample of secondary school students, and their performance was compared to a group of students who did not participate in the program. The results showed that the use of electronic blogs as a tool for developing self-learning skills had a positive impact on the students' performance in academic subjects, as the students who participated in the program achieved better results compared to the students who did not participate in the program. The article recommends applying educational programs that use electronic blogs as a tool to develop students' self-learning skills at the secondary level.

While (ElShafie, 2023) presented a proposed educational program that uses blended learning to develop written language skills and readiness for writing among children in early childhood, in the light of twenty-first century skills. The proposed program was designed using a blended learning approach that combines active learning and e-learning, and was applied in a rural school in early childhood to evaluate its effectiveness. The results showed that the use of the proposed program had a positive impact on the development of written language skills and readiness for writing among children, as the children improved their skills in reading, writing, oral expression and creativity, and their ability to use modern technology improved. The article recommends that the proposed program should be used as an effective means for teaching written language and developing children's writing readiness skills in early childhood, and encourages improving the quality of active learning and e-learning to achieve the best results in children's education in the twenty-first century.

To use interactive electronic activities to teach geometry in developing some levels of engineering thinking among first grade preparatory students, (Sayed, 2022) studied the effectiveness of using interactive electronic activities in teaching geometry, and to determine the extent of their impact on developing levels of engineering thinking. The results showed that the use of interactive electronic activities in teaching engineering can improve the levels of engineering thinking among first-grade middle school students. These improvements were represented in the students' use of electronic activities in engineering reasoning and problem solving,

and in improving their ability to conclude and think critically in engineering topics.

While (Ibrahim, 2022) studied the effectiveness of using the educational scaffolding strategy supported by electronic activities in teaching mathematics, and determining its impact on the development of some algebraic thinking skills among middle school students. The results showed that the use of educational scaffolding strategy supported by electronic activities in teaching mathematics can improve some skills of algebraic thinking among middle school students. These improvements were represented in improving their ability to reason and think critically about algebraic topics, and improving their performance in solving algebraic problems and performing arithmetic operations related to algebra.

As for (Murtagh, 2022), he studied the effect of play-based learning on the academic performance of children in Palestinian primary schools. Where the effect of play-based learning on children's performance in mathematics was tested, through the application of an educational program that uses play as the main method of learning in a group of primary schools in Palestine. The performance of students who participated in the program was compared with the performance of students who did not participate in the programme. The results showed that play-based learning had a positive effect on students' performance in mathematics. Students who participated in the program were able to achieve better results in tests compared to students who did not participate in the program.

To analyze the effectiveness of digital interventions in helping children with mathematical learning difficulties, (Benavides-Varela.2020) identified the most effective digital interventions in helping children with mathematical learning difficulties, and improving the quality of teaching and learning in this field. It was concluded that digital interventions positively affect the improvement of mathematics skills in children with mathematical learning difficulties. This information was used to determine which digital interventions are most effective in helping children with mathematical learning difficulties. It was found that the effective use of digital interventions can have a positive impact on children's ability to learn mathematics and improve their skills in this area. Educators, educators and sports learning professionals can use this information and digital interventions to be more effective to improve the quality of teaching and learning in the field.

(Al-Rajeeb, 2021) also studied the effectiveness of designing an educational program based on a Montessori approach in developing different concepts and skills for students, in light of the impact of the variables of digital transformation and active learning. The educational program was designed and applied to a sample of students, and the results were analyzed and compared with a group of students who did not participate in the program. The results showed that the design of the educational program based on the Montessori approach was effective in developing the different concepts and skills of the students, and their performance improved in the tests compared to the students who did not participate in the program.

And to study the effectiveness of using the electronic learning environment in language development for kindergarten children, in light of the digital transformation witnessed by society. (Sharoud, 2021) implemented an educational program that uses the electronic learning environment as a tool for language development in a sample of kindergarten children, and their performance was compared with a group of children who did not participate in the program. The results showed that the use of the electronic learning environment as a tool for language development had a positive effect on the children's performance in the language, as the children who participated in the program achieved better results compared to the children who did not participate in the program. The digital transformation had a role in enhancing

the positive effectiveness of the e-learning environment.

As for (Olevirenko, 2019), he provided effective electronic educational resources for teaching mathematics to achieve teaching success in primary schools. A group of electronic educational resources available for teaching mathematics in primary schools was analyzed, and their effectiveness in achieving educational goals was evaluated. The results showed that electronic educational resources are widely used in teaching mathematics in primary schools, and they are able to improve students' skills in this field. Some factors affecting the effectiveness of electronic educational resources were also found, such as design quality, interactivity, availability, and adaptation to the needs of teachers and students.

The article recommends the need to continuously develop electronic educational resources, improve their quality and make them better available to teachers and students, and encourages the integration of electronic educational resources into the educational process more to achieve success in mathematics education in primary schools. (Yahya, 2019) also studied the impact of technological applications on the cognitive development of kindergarten children, and determined the extent of their impact on enhancing the cognitive abilities of children at this age.

A study was conducted on a sample of children in kindergarten, where a blended educational program was applied that uses technological applications to enhance the children's cognitive abilities. The results were evaluated using standardized tests to measure the children's cognitive abilities, and comparing the results of the children who participated in the educational program with the results of the group that did not participate in the program. The results showed a significant improvement in the cognitive abilities of children who participated in the educational program, especially in the areas of memory, attention, focus, analysis and creative thinking, compared to the control group that did not participate in the program. The article recommends the need to use technological applications as an effective tool to enhance the cognitive abilities of children in kindergarten, and encourages the development of blended educational programs that use technological applications in an appropriate educational environment to support children's cognitive development.

To study the role of e-learning in promoting some different aspects of children's growth, from the point of view of the students of the kindergarten department. (Abdul-Baqi.2019) conducted a survey on various aspects of children's development, such as intellectual growth, social development, linguistic development, and motor development. The results showed that kindergarten students see that e-learning plays an important role in promoting the different growth of children, as e-learning can help promote intellectual growth by developing higher thinking skills and creativity, and promote social growth by enhancing communication and social interaction. It helps to promote linguistic development by developing language and communication skills, and to promote motor growth by developing movement and physical activity. The article recommends the inclusion of e-learning as a tool in the educational process at the kindergarten stage, and encourages the development of specialized e-learning programs aimed at enhancing some of the different aspects of children's development and improving the quality of education at this vital stage of human development.

Some studies have also tended to measure the effectiveness of applying e-learning in teaching mathematics. Where (Amer, 2017) evaluated the impact of the electronic application in teaching mathematical subjects on secondary school students in Malaysia. The results showed that e-learning can be effective in teaching mathematics. In addition, the students who participated in the experiment showed high satisfaction with the use of e-learning as a means of learning mathematical subjects. Accordingly, e-learning can be an effective alternative to traditional

education in teaching mathematics, especially in light of the current circumstances of the Covid-19 pandemic, which forced many students to learn remotely.

While (Stubbé, 2017) aimed to study the effectiveness of the e-learning system in Sudan in providing formal education to children who were unable to attend traditional schools. The results showed that the e-learning system in Sudan can be effective in providing education to out-of-school children, and this effectiveness was represented in improving the level of education and knowledge of children. The results were positive in the areas of reading, writing, arithmetic and social studies. The children participating in the study reported that the e-learning system can be helpful for them in learning basic skills and knowledge necessary for future success. The online system could also be useful for remote communities that are having difficulties providing formal education to children.

As for (Somiya, 2014), she presented a computer-based program to correct the misunderstanding of some mathematical concepts among kindergarten children. The program is designed to address some of the misunderstandings related to mathematics concepts, using active and interactive learning techniques in a computer environment. The program was applied in a kindergarten school to evaluate its effectiveness, and the children's understanding of the mathematical concepts treated in the program was measured. The results showed a significant improvement in the children's understanding of the mathematical concepts treated in the program, and an improvement in their performance in solving mathematical problems. The results also showed that the program was able to correct the children's misunderstanding and improve their level in mathematics.

The article recommends the need to use the proposed program as an effective tool in correcting the misunderstanding of some mathematics concepts among kindergarten children, and encourages the development of educational programs based on interactive and active learning in a computer environment to improve the quality of education in the field of mathematics for children. As for (Castro, 2014), it aimed to examine the effect of a virtual environment on the development of mathematical skills in children with difficulties in mathematical learning (dyskalexia). An educational program was applied using a virtual environment as a tool to develop mathematical skills in a sample of children with dyslexia, and their performance was compared to a group of children who do not suffer from these difficulties. The results showed that the use of a virtual environment as a tool for developing mathematical skills had a positive effect on the performance of children with dyslexia, as they achieved an improvement in their mathematical levels after participating in the program.

In the same direction, (Weiss, 2006) studied the impact of multimedia environments on children's achievements in mathematics and their learning style in kindergarten. The results showed that the use of multimedia environments in teaching mathematics can improve children's achievement in this area, and influence their learning style. These improvements were represented in improving their ability to understand mathematical concepts, improving their performance in solving mathematical problems, and improving their learning style in general. Moreover, the results showed that the use of multimedia environments can help stimulate children's love for learning mathematics, and can increase their engagement in learning and improve their overall level.

After reviewing the previous studies, it was found that they tended to the importance of the e-learning strategy for kindergarten children, and that despite the difference in the field of application, they agreed that there was a significant impact of learning through electronic applications in developing the cognitive aspects of children. However, there is a paucity of studies that dealt with the phenomenon in Saudi society, as well as studies that dealt with mathematical concepts and skills. Where the teaching technology of

mathematics is an important medium that helps children understand ideas in a more clear way, not only machines and individuals, but an integrated and complex system of people, machines, ideas, procedures and operation.

Information technology through computers has succeeded in rebuilding human thinking, which in turn can improve the mental development of the learner. As a result, the use of computers in the educational process quickly, as no school or kindergarten is devoid of a computer, yet the computer has not been optimally exploited, especially In kindergartens, where its role was limited to being an entertainment tool, which prompted the researcher to present this article, which aims to examine the effectiveness of e-learning, by relying on electronic applications in developing mathematical skills among kindergarten children. And measuring the effectiveness of the program based on education based on websites, by identifying the impact of using technological applications and electronic educational websites in the kindergarten stage in developing the cognitive growth of children's mathematical skills. And diagnosing the obstacles facing technological learning environments in kindergarten and achieving the cognitive growth of children's mathematical skills. And presenting some proposals to develop the level of learning in kindergarten in the light of the use of technological applications and their impact on the cognitive development of children's mathematical skills.

In addition to studying and analyzing the effectiveness of e-learning in developing mathematical skills among kindergarten children. And assessing the effect of using e-learning on improving mathematical concepts and numeracy skills for children of this age. And to study the performance of children who learned using e-learning compared to those who learned using traditional methods, such as printed papers and traditional curricula. The results are analyzed to determine the extent to which the level of mathematical concepts and numeracy skills improves among children who learned using e-learning and the use of technological applications compared to children who learned using traditional methods.

The importance of the study is due to the accurate information it provides about the effectiveness of e-learning and the use of technological applications in developing mathematical skills among kindergarten children, by studying the impact of these educational methods on the level of mathematical concepts and arithmetic skills of children at this age. And providing the necessary information for teachers and teachers to make the right decisions regarding the use of e-learning in the development of mathematical comprehension skills among kindergarten children. Providing useful information to parents and educators on how to improve the level of mathematical skills and understanding of their children, through the use of e-learning as an effective educational tool.

In addition to providing useful data and information for researchers and those interested in the field of e-learning and its impact on the level of mathematical concepts and mathematical skills of children, in order to deepen knowledge and research in this field. In order to achieve the objectives of the study, a set of tools was prepared, and its psychometric properties were verified, which included a list of mathematical concepts suitable for kindergarten children proposed to be included in the program. A questionnaire to limit the concepts of mathematics understood by kindergarten children. And educational sites based on the use of technological applications. A test of mathematics concepts for kindergarten children, and a teacher's guide.

The study relied on Bloom's levels of knowledge to measure the level of mathematical knowledge of kindergarten children, and it represents a classification system for educational goals and the different mental skills that students can develop. This system was developed by Benjamin Bloom in 1956, and was later updated by a number of researchers. Bloom's cognitive levels consist of a set of objectives. Remembering, which refers to remembering information and facts without

analyzing or understanding them in depth. And understanding, which refers to the understanding and interpretation of information and facts. and application by using understood information to solve different problems. Analysis of information and facts and dividing them into different parts. Evaluate information, facts, validity, and accuracy. and finally creativity by creating something new using understandable information and facts (Demirbaş, 2023).

These levels form a gradual ladder through which students can gradually develop in order to achieve the required educational goals. The study was applied in the eastern region of the Kingdom of Saudi Arabia, and by relying on the semi-experimental approach, which includes a comparison between each of the control sample, which reflects kindergarten children who learn mathematics based on traditional methods, and the experimental sample that relies on the e-learning strategy through Technological applications, and examining the significance of the proposed strategy in developing mathematical concepts among kindergarten children. The rest of the article will be organized as follows. The second section includes the theoretical framework, and it reflects some of the concepts and theories that dealt with the use of the e-learning strategy in developing children's cognitive skills. As for the third section, it includes the results of the statistical analysis of the applied study, and discussion and analysis of the most important results of the analysis. The last section includes the important conclusions of the study.

## Theoretical framework

The childhood stage is one of the most important stages in which the child’s initial concepts are formed, as these concepts are the first building blocks in defining the features of his personality, his attitudes, inclinations, and thinking. Where the new concept acquired depends on the previous concepts he has. Kindergarten children are surrounded by technology in their homes, schools and the community around them. They are exposed to the use of computers and its technological applications in many areas in the field of discovery, the employment of models, shapes and graphics, the representation of abstract concepts and the selection of an appropriate education style, and meeting the needs, tendencies and abilities of children, so we find the importance of proper and accurate planning for the process of employing this technology to help children discover new opportunities for learning . From this point of view, different concepts are presented in kindergartens, and this confirms Piaget's idea, as he sees the mental development of a preschool child corresponding to the second stage of mental development at Piaget, which is the pre-operational stage (Muhammad, 2023) (Syed, 2022).

This stage starts from the end of the second year until about the seventh, and this stage is characterized by the transformation of the quality of thinking from direct sensory experience to the ability of memory to retain the mental image and the ability to devise elementary rules. Therefore, he must acquire these concepts correctly. Baddeley asserts that the development of mathematical concepts takes a long time from the learner, if it is not directed properly. The current era is the era of information technology, in which the computer language has become the language of this era, and in order for society to keep pace with this progress, it must benefit from technology in all aspects of life, especially in the field of education, as it is the main pillar for building youth (Abdel-Baqi, 2019).

That children have great difficulty in understanding and realizing mathematical concepts, in the kindergarten stage in particular, where the child's thinking at this stage is in one direction, as it is difficult for him to realize the relationships between things. And given that mathematical concepts are abstract in nature, and it is difficult for children to understand them, therefore the possibility of misunderstanding of these concepts increases among children, excluding other concepts. As the children lack a correct understanding of

some of these concepts, and this is due to the fact that the child comes to the kindergarten, and he has previous ideas and information about concepts that he did not learn that may conflict with the correct understanding of them, or examples of the concept are presented to him by the teacher that carry a meaning contrary to him; Therefore, the misunderstanding of the concept arises among kindergarten children (Murtagh et al, 2022).

## Kindergarten child's cognitive development

The cognitive development of the kindergarten child refers to the changes that occur to him in sensation, perception, perception, retention, recall, problem-solving, reasoning, language, and thinking. The characteristic characteristics of the contribution do not change depending on the developmental context, young children use the application to coordinate their external actions, they learn to prefer, process means and direct experience, and older children use action images to coordinate their generalizations to the experience. Language also plays a central role in the context of learning, so that the child becomes able to use the experience of others (Al-Rajeeb, 2021).

## The role of websites in developing mathematical concepts

Website-based education depends on a set of educational activities and processes, which are applied using a computer, with the aim of developing mathematical skills in kindergarten children in the light of specific educational goals based on specific foundations that include procedural goals, educational activities, various teaching and learning strategies, and appropriate evaluation methods. One of the mechanisms used in this strategy is educational technological applications, which represent educational materials that are designed and prepared by a specialized team, and are produced and taught by computers. In such a case, the educational laboratory has a tool to present and display the educational material in an interactive manner with the learner (Ibrahim ,2022).

Thus, it represents an idea, program or product that comes in the form of an integrated system or in the form of a sub-system of another integrated system that necessarily entails unfamiliar and uncommon behaviors from the beneficiaries of this idea, product or program. Thus, it can be said that the educational software produced by computer for the purpose of education and education can be used by kindergarten teachers to help them achieve the cognitive growth of children, by teaching etiquette, communication skills, and the rules of reading and writing, in a better and faster way compared to using traditional means of teaching and learning. for children (Stubbé et al, 2016).

## The nature of technological applications for kindergarten children

Technological applications aim to increase the educational and cognitive achievement of kindergarten children, by removing physical barriers and obstacles in front of them, and the teacher in order to know their value and impact on the educational environment for kindergarten children. It is a broad and comprehensive concept for a number of multiple technological means, as it expresses an idea, a program, or a product that comes in the form of an integrated system, or in the form of a sub-system of another integrated system that necessarily entails unfamiliar and uncommon behaviors from the beneficiaries of this idea or educational software produced by Computer, for educational purposes (Murtagh et al, 2022). These applications are used by kindergarten teachers to help them achieve cognitive growth

for children by teaching etiquette, communication skills, and the rules of reading and writing, in a better and faster way compared to using traditional methods of teaching and learning for children. The computer is one of the best means of modern technological applications in the field of the educational and educational process for children, as it is the main nerve on which the use of technology in

education depends (Al-Rajeeb, 2021) (Syed, 2022).

Positive and effective participation in obtaining experience is one of the most important features of technological applications, through the enjoyment of gaining experience and controlling the child's feelings and feelings. Which leads to increased attention and focus on activity, and the child exercises many mental processes during play such as understanding and analysis, and acquiring different intellectual habits, such as problem solving, flexibility, initiative, and imagination. The use of technological applications and their utilization in managing and organizing the educational process and its implementation in any educational institution is also called technology in education. Which depends on employing hardware and software in educational situations to enrich its activities and achieve educational goals (Benavides et al, 2020).

## The impact of technological applications on the cognitive development of kindergarten children

The first features of mental and cognitive life are represented in the development of the sensory and motor aspects of the child in kindergarten, where the speed of mental and motor development in late childhood (from 6 to 12 years) is slower than it was in the early childhood stage at the age of five years, although it continues in Its path to maturity in terms of thinking, remembering and paying attention, and the child at this age matures his ability to think and innovate, and his ability to remember grows through understanding and finding relationships. The lack of awareness of the importance of using technological applications is the most important challenge facing kindergarten children when using technological applications, as well as the difficulty of allocating the necessary funding to provide and maintain modern technological devices (Olefirenko et al, 2019). Failure to keep up with the rapid technological developments. And the lack of provision of human competencies. Lack of interest in training kindergarten teachers. And the revolution in the field of knowledge and communication. And the emergence of sources of education and modern information. These contemporary challenges facing kindergarten institutions require all those in charge of the educational process to play their role efficiently and effectively and develop their performance and methods of dealing with contemporary challenges with organized and purposeful planning in order to benefit from technological applications of this era in developing, modernizing and improving the educational process, in accordance with the hopes and aspirations of society. (Abdel-Baqi, 2019).

## The effect of technological applications on the cognitive development of kindergarten children

The child benefits from these technological applications as he grows up and advances in age, so he begins to employ the computer and its technological applications with the help of adults, whether teachers or parents, then gradually the roles shift to monitoring and guidance, in order to give children opportunities to carry out learning tasks independently so that children acquire methods of discovery and experimentation, Which later develops the independent self-learning that modern education aspires to. The most important applications of information technology in childhood are drawing programs, listening to stories and re-recording them, and electronic games (Sharrod et al, 2021). The importance of the technological activities that are provided to the child through the computer stems from the fact that it brings great benefit to him, as it works on synergy between the eyes and the hand of the child when practicing it, and gives him the opportunity to choose, discover and try alternative strategies, and dare to use the computer without fear, and achieve interaction between the computer and the child, With this, the computer and its activities have become helpful tools in the child's learning and development effectively (Al-Rajeeb, 2021). As

the consolidation of the relationship between children and technological devices has a positive impact on the quality of the educational process, which prompted the Ministry of Education to develop the educational structure, especially the kindergarten stage. Educational experiences and technological activities that challenge the child's thinking, stimulate his imagination, and develop his creative and innovative abilities (Stubbé et al, 2016).

## E-learning and learning theories

The behavioral theory is one of the most important theories that dealt with e-learning procedures by defining the scientific material, presenting it, and using the various programs and programs designated for that. An example of this is the so-called programmed education. The idea of programmed education is to put the children of the classroom in front of equal opportunities and move them from known topics to other unknown ones, as it was found that the means to achieve this goal is the education system by feeding it with a program that contains old and new lessons (Yehia et al, 2019). Behavioral learning theories suggest that learning takes place through experience and participation in everyday activities, and that individuals learn through their interactions with the environment in which they live. This learning style indicates that individuals learn through their interactions with others, the environment in which they live, and that participation in daily activities lends itself to learning. As for the cognitive theory, it relies heavily on the cognitive aspect, and believes that the process of communication and e-learning depends on the culture of the audience, so it takes into account the human aspect. It also takes into account these needs, desires, and concerns when designing technological educational programs, and the extent of familiarity between them and the technological means and communication channels used in activating this type of education by defining the desired goals of e-learning (Weiss, 2006) (Faisal, 2023).

Cognitive learning theories suggest that learning is based on existing knowledge, and that individuals learn by analyzing the information they acquire (Yehia et al, 2019). This learning style indicates that individuals learn by analyzing the information they get which helps them to develop their existing knowledge. Cognitive learning theories are studied using psychological research and other scientific research to identify the factors that influence learning and memory. While constructivist learning theories indicate that learning is based on building on existing knowledge, and that individuals learn by constructing correct and understandable answers. This learning style indicates that individuals learn by constructing correct and understandable answers on existing knowledge they possess. Constructivist learning theories are studied using psychological research and other scientific research to identify the factors that influence learning and memory (Muhammad, 2023).

## Types of electronic activities for kindergarten children

Electronic activities for kindergarten children are represented in the various methods and methods designed by the teacher according to specific objectives to communicate the scientific material and to achieve the objectives of the lessons, provided that these activities are dealt with as a group of related activities, each activity containing learning resources or learning methods. It called the activities that are conducted, which represent the necessary frameworks for active and interactive learning, through the Internet and that are characterized as asynchronous, can be performed at any time, motivating, attractive and purposeful (Syed, 2022).

The electronic activities depend on the use of electronic methods, which are carried out by the mathematics teacher, as well as the learner using the applications of technological innovations on the Internet, e-mail, conversation and the computer on the interactive whiteboard. Electronic activities can

be divided according to the types of e-learning into synchronous electronic activities that learners implement directly with the presence of their peers and the teacher, and these activities depend on synchronous learning tools, which are provided by the electronic learning environment such as direct dialogue tools. And asynchronous electronic activities, and these activities rely on asynchronous learning tools, which are provided by the electronic learning environment, such as e-mail tools and discussion forums (Amer, 2017).

## Developing mathematical skills using electronic activities

The process of developing mathematical concepts and skills for kindergarten children represents an important and crucial stage in the development of a child's early life, and electronic activities can be used as an effective tool to achieve this goal. Specially designed electronic games for young children can be used to teach basic math skills such as counting, addition, subtraction, multiplication, geometry, proportion and measurement. These online activities can help motivate and motivate kids to learn and enjoy math. Electronic activities can include smartphone apps, educational games, and websites that provide educational games and learning resources for young children. These electronic activities can be fun and encourage children to learn and improve their mathematical skills. It is important for kindergarten teachers to monitor the use of electronic activities and ensure that they are used appropriately and in the appropriate amount (Castro et al, 2014).

Children should also be encouraged to play outside and interact with physical objects to promote the development of other motor and cognitive skills. There are many theories that have been developed to deal with the development of mathematical skills for kindergarten children using electronic activities, and the most prominent of these theories is Jean Piaget's theory, where Piaget believes that learning is the process of building knowledge, concepts and skills through the child's interaction with his environment. Thus, electronic activities can be used to enhance children's interaction with their surroundings and motivate them to develop their mathematical skills. And Vogotsky's theory of social learning, and this theory tends that the interaction between children and the social environment surrounding them leads to the development of their mathematical skills.

Electronic activities encourage social interaction between children, and this can help develop their mathematical and social skills (Faisal, 2023).

As well as Bronfenbrenner's theory of active learning, which focuses on this theory that learning should be active and through children's interaction with the educational material. Electronic activities can be used to encourage children to interact with the educational material and develop their mathematical skills. As for Garner's theory of multiple intelligences, it tends to indicate that individuals possess different types of intelligences, and electronic activities can be used to develop mathematical skills in children

who prefer mathematical intelligence (Muhammad, 2023).

There are many methods and applications that can be used to develop the mathematical skills of kindergarten children using electronic activities. One of the most important of these methods and applications is the applications of smart phones and tablets, which provide many applications aimed at developing mathematics skills in young children. These apps can include educational games that encourage children to develop counting, addition, subtraction, multiplication, geometry, proportion and measurement skills. These apps can be fun and encourage children to learn and improve their mathematical skills. As well as electronic educational games, which include instructions dedicated to teaching young children math skills (Amer, 2017).

These games can be interactive and motivate children to learn and enjoy mathematics. As for websites, some websites provide free educational resources to develop

young children's math skills. These resources include educational games, interactive activities, and educational materials (Olefirenko et al, 2019). As well as interactive electronic activities, where interactive electronic activities can be used to encourage children to interact with the educational material and develop their mathematical skills. These electronic activities can include children interacting with the materials displayed on the screen in an interactive and fun way. There are also many educational videos available on the Internet that aim to teach math skills to young children. These videos can be fun and encourage children to learn and improve their mathematical skills (Ibrahim, 2022).

Children interact with new technology at an increasingly early age, and while there were earlier concerns that computers were too abstract and difficult for young children to use, many educators now believe that computers can enhance learning and development in early childhood education. , if they are used appropriately. Children need to engage with the uses of computers in order to meet the challenges posed by the current and future technological society. Multimedia is a computer-based interactive environment that provides active interaction (Abdel-Baqi, 2019).

Students learn more deeply from well-designed multimedia presentations than from traditional learning, including improved performance on problem-solving transfer tests. According to standards in mathematics education, the use of technology is an integral part of promoting mathematics from an early age in kindergarten. It is at this age that children develop many mathematical concepts, at least in their intuitive beginnings, even before they reach school age. Children automatically recognize and distinguish between objects, and many preschoolers have a great deal of informal mathematical knowledge. Engaging in multimedia embedded with mathematics from an early age can provide opportunities for reflection and exploration. Teaching mathematics is one of the biggest challenges in education. By focusing on the basics of mathematics, teachers can provide a stronger foundation in math skills for the future (Yehia et al, 2019).

The first years of children's life are very important for determining the effectiveness of learning and subsequent education. Before coming to school children have a great knowledge of mathematics in an informal way and these informal experiences form a strong foundation for later formal understanding. Many parents complain about the level of their children in mathematics. It is a common mistake to think that a student's difficulty in mathematics is due to the child's inability to understand mathematics. One of the main goals of e-learning is to focus on the personal needs of students in mathematics (Syed, 2022). In personalized e-learning, the focus should be on each student's math learning style, the goal of education, and the e-learning mechanism should be adaptable according to these factors. Electronic interaction with the student in mathematics and providing assistance to him, according to his learning style, improves the student's ability to learn. Intelligent teaching systems in mathematics assess a child's ability to learn in an interactive environment, developing a model of knowledge, skills, and experience (Benavides et al, 2020).

Internet access in households in developing countries is increasing day by day, and because children in those countries have less access to quality educational institutions, e-learning is also becoming more important and can play a pivotal role in supporting educational needs. As computer technology provided a positive impact on children's mathematics learning. Computer technology can also be used successfully to improve basic numerical competencies in children with math learning disabilities. Serious computer-based games can enhance cognitive learning of difficult mathematical concepts and can provide different levels of learning difficulty (Soumya, 2014).

## Bloom's taxonomy of cognitive goals

In measuring the effect of relying on technological activities in developing mathematical concepts among kindergarten children, the researcher relies on Bloom's classification of cognitive goals, and according to Bloom's division of educational goals, it is divided into three main components, namely, the cognitive domain, and includes goals that emphasize intellectual learning outcomes, such as knowledge, understanding and skills. Thinking, and the emotional domain, which reflects goals that affirm feelings and emotions such as inclinations, attitudes, and taste or appreciation (Demirbaş, 2023). As for the psychomotor domain, it includes goals that emphasize motor skills such as writing, swimming, typing and operating machines in general. As for the cognitive levels, they include, in the first level, knowledge, which reflects the recollection of previously learned material. This section includes remembering a wide range of material ranging from specific facts to complete theories, but all that is required is for the learner to retrieve the appropriate information, and remembering information represents the least levels of learning outcomes in the cognitive field. It includes knowledge of terminology, special facts, and knowledge of customs. basics and generalizations, skills and methods (Olefirenko et al, 2019).

The second level refers to comprehension, and comprehension is defined as the ability to comprehend the meaning of the material being studied by the learner. Which includes (translation - interpretation - prediction). While the third level reflects the application, and refers to the learner's ability to use what he learned in new situations. This may include the use of rules, laws, methods, concepts, theories, and learning outcomes at this level that require a level of understanding greater than what was previously mentioned in relation to the level of understanding (Al-Rajeeb, 2021).

As for the fourth level of Bloom's levels, it reflects the analysis, which refers to the learner's ability to analyze the learning material into its partial components, which helps to understand its structural organization. The fifth level represents the installation, and it refers to the learner's ability to put the parts together to form a new whole, and the learning outcomes of this level confirm innovative behavior with an emphasis on the formation of new forms or patterns. While the sixth level reflects evaluation, which refers to the learner's ability to judge the value of an article or thing, whether a phrase, story, poetry, art, report, or research (Sharrod et al, 2021). The last three levels are called the level of higher abilities, and there are usually some difficulties in deciding whether a mathematical problem refers to the level of application or the level of higher capabilities. The main difference is that in the first case the student is able to re-deal with the basics and well-understood steps to solve unfamiliar problems, while in the second case the student is able to produce something that is new to him by discovering the existing relationships between the previously unrelated principles, and that When the familiar method of solution is not available to reach the solution. Another difficulty is that solving an issue can be reached in two different ways, the first of which represents thinking from the level of higher capabilities, while the second represents thinking from the lower level, which is the level of application (Yehia et al, 2019) (Demirbaş, 2023).

## Method

The participants were 50 students (31 girls and 19 boys) who attended two kindergartens: the first kindergarten reflects the experimental group (average age 5.5, n = 25), and the second kindergarten reflects the control group (average age 5.8, n = 25). Kindergartens were randomly selected from middle to high socio-economic kindergartens that learn according to the curriculum developed by the Ministry of Education in the Kingdom of Saudi Arabia. It was ensured that all of them have computers at home, which are used for various purposes such as playing games, exercising, writing, and watching videos.

## Treatments

The multimedia technology environment was designed by the researcher according to the kindergarten curriculum adopted in the Kingdom of Saudi Arabia. The main purpose of multimedia is to enhance the mathematical concepts and skills of kindergartners. Multimedia includes three different levels of Bloom's cognitive levels, which are remembering, understanding, and applying. A test containing thirty questions measuring the three cognitive levels was prepared. The three levels measure each of the mathematical skills as follows:-

1. Remembering skills: it includes a total of (14) questions, (3) measures the concept of numbers and operations, (5) measures measurement and comparison skills for children, (3) measures geometry skills and spatial sense among children, (3) measures children's ability to analyze data and possibilities.

2. Comprehension skill: it includes a total of (16) questions, (5) measuring the concept of numbers and operations, (4) measuring children's familiarity with the concept of patterns, functions and algebra, (3) measuring children's geometry skills and spatial sense, (4) measuring children's ability to analyze and understand the nature of the different possibilities.

3. Application skill: it includes a total of (16) questions, (2) to measure the concept of numbers and operations, (4) to measure children's familiarity with the concept of patterns, functions and algebra, (2) to measure children's measurement and comparison skills, (1) to measure geometry and spatial sense skills of Children, (7) measures children's ability to probabilities and analyze data.

## Measures

Mathematical achievement tests before/after training were used in the current study to assess the mathematical skills of kindergarten children. The test included 30 items representing three different Bloom's levels, reflecting five mathematical skills, which are the concept of numbers and mathematical operations, the concept of patterns, functions and algebra, measurement and comparison, geometry and spatial sense, data analysis and probability. Taking the test of 50 children about three months, the Cronbach α for the entire test was 0.872.

## Procedure

The study was conducted for three months on 60 boys and girls in two kindergartens, after obtaining permission from the Ministry of Education and parents. A mathematical concepts test was conducted before and after applying the e-learning strategy. The students were divided so that the first kindergarten children represented the experimental group, while the second kindergarten children represented the control group. A placement test was conducted for each of the two groups. Table (1) shows that there is no significant difference for the level of students in both the experimental and control groups (P>0.01).

**Table 1. Homogeneity test**

| **Dimensions** | | **Remembering skills** | **Comprehension skill** | **Application skill** |
|---|---|---|---|---|
| **Number Of Questions** | | **14** | **16** | **16** |
| **Experimental Group** | **Mean** | 9.084 | 10.338 | 9.061 |
| | **standard deviation** | 0.847 | 0.452 | 0.567 |
| **Control Group** | **Mean** | 9.361 | 10.489 | 9.084 |

| | | | | |
|---|---|---|---|---|
| | **standard deviation** | 0.817 | 0.359 | 0.611 |
| **t** | | -0.883 | -1.053 | -0.108 |
| **Sig** | | 0.193 | 0.151 | 0.457 |

**Results**

The purpose of this paper is to investigate the effects of technological activities on the mathematical achievement of kindergarten students through the electronic learning method based on computers and the Internet.

**Table 2. The means, standard deviations, and means adjusted for mathematical achievement by treatment and time.**

| **skill** | **Dimensions** | **number of questions** | **Pretest** | | | | | | | **Post-test** | | | | | | | **Sig** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Experimental Group)25( | | | Control Group.)25( | | | Sig | Experimental Group)25( | | | Control Group.)25( | | | Sig | |
| | | | Mean | SD | Adjusted mean | Mean | SD | Adjusted mean | | Mean | SD | Adjusted mean | Mean | SD | Adjusted mean | | |
| **Remembering** | Concept of numbers and mathematical operations | 3 | 1.751 | 0.847 | 2.094 | 1.584 | 0.817 | 2.026 | 0.092 | 2.754 | 0.939 | 3.403 | 2.584 | 0.724 | 2.896 | 0.000 | 0.348 |
| | Measurement and comparison | 5 | 2.654 | 0.567 | | 2.769 | 0.611 | | | 4.537 | 0.973 | | 4.108 | 0.583 | | | |
| | Geometry and spatial sense | 3 | 1.648 | 0.768 | | 1.429 | 0.759 | | | 2.876 | 0.514 | | 1.925 | 0.903 | | | |
| | Data analysis and probabilities | 3 | 1.950 | 0.705 | | 1.825 | 0.615 | | | 2.687 | 0.903 | | 2.157 | 0.863 | | | |
| **Comprehension** | Concept of numbers and mathematical operations | 5 | 2.054 | 0.586 | 1.838 | 2.287 | 0.732 | 1.873 | 0.164 | 4.391 | 0.549 | 3.763 | 4.187 | 0.793 | 3.583 | 0.000 | 0.587 |
| | The concept of patterns, functions and algebra | 4 | 1.850 | 0.810 | | 1.724 | 0.542 | | | 3.809 | 0.733 | | 3.590 | 0.650 | | | |
| | Geometry and spatial sense | 3 | 1.184 | 0.519 | | 1.269 | 0.661 | | | 2.849 | 0.532 | | 2.798 | 0.759 | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Data analysis and probabilities | 4 | 2.047 | 0.690 | | 1.957 | 0.556 | | | 3.618 | 0.554 | | 3.411 | 0.529 | | |
| Application | Concept of numbers and mathematical operations | 2 | 0.714 | 0.542 | 2.214 | 0.805 | 0.674 | 2.387 | 0.291 | 1.867 | 0.580 | 4.436 | 1.597 | 0.942 | 3.826 | 0.000 0.476 |
| | The concept of patterns, functions and algebra | 4 | 1.294 | 0.540 | | 1.518 | 0.677 | | | 3.684 | 0.701 | | 3.239 | 0.955 | | |
| | Measurement and comparison | 2 | 0.819 | 0.617 | | 1.024 | 0.640 | | | 1.837 | 0.795 | | 1.601 | 0.847 | | |
| | Geometry and spatial sense | 1 | 0.246 | 0.872 | | 0.318 | 0.566 | | | 0.867 | 0.795 | | 0.769 | 0.931 | | |
| | Data analysis and probabilities | 7 | 3.847 | 0.557 | | 4.021 | 0.576 | | | 6.851 | 0.543 | | 5.871 | 0.946 | | |

There are no significant differences between the control and experimental groups in the pre-test, and the values of the mathematical skills scales are close between the two groups. While we find significant differences between each of the two groups in the post-test ($P<0.01$). Where we find that technological activities in teaching mathematics have led to an increase in kindergarten children's understanding of the concept of numbers and mathematical operations, and an increase in their ability to understand the concept of patterns, functions and algebra, and the application of technological means has led to children's rapid absorption of measurement and comparison methods, which represent one of the most difficult concepts on kindergarten children. By examining the values of the averages, we find that there is an improvement in the children's knowledge of the concepts of geometry and spatial sense, when adopting the technological methods in teaching compared to the traditional methods, and finally, there is an increase in the children's awareness of the concepts of data analysis and probabilities. Referring to the means of measuring children's cognitive skills using technological activities, we find that the weighted average of memory skills increased from 2.094 to 3.403, compared to 2.896 for teaching in traditional ways. The weighted average of understanding skills for kindergarten children increased from 1.838 to 3.763, compared to 3.583 for teaching by traditional methods. As for application skills, we find that it increased from 2.214 to 4.436 for teaching based on technological activities, compared to 3.826 for teaching using traditional methods. This explains the moral impact of teaching using technological activities at the level of kindergarten children in the development of mathematical skills.

**Table 3. F values of two-way MANCOVA with repeated measures on mathematical achievements by treatment and time**

| Source | DF | Total score | Remembering skills | Comprehension skill | Application skill |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Treatment** | 1 | 36.158 | 7.489 | 17.316 | 21.504 |
| **Time** | 1 | 1.015 | 2.095 | 6.155 | 1.899 |
| **treatment × Time** | 1 | 19.098 | 9.869 | 9.976 | 4.036 |
| **Age (covariant)** | 1 | 28.925 | 7.206 | 17.484 | 6.492 |
| **Error** | 47 | | | | |

Table 3 presents the F values from a repeated measures MANCOVA analysis. Two-way analyzes of covariance (treatment method (2) × time (2), with repeated measures on the second factor) were performed on the total score and on each of Bloom's cognitive skill levels separately, with age as a covariate. The scores on the total score indicate that there was a significant main effect of time ($F= 36.158$, $P < 0.01$) and that the interaction between time and treatment was significant ($F= 19.98$, $P < 0.01$). These results indicate that all groups made significant progress in their mathematical skill achievement over time. Subsequent pairwise comparisons indicated that at the end of the study, the experimental group outperformed the control group when relying on technological activities in teaching kindergarten children. Repeated measurements at each level of cognitive skills (remembering - understanding - applying) indicated similar results for the main effects and interactions. It was found that at the end of the study, the experimental method was superior to the control group in every level of cognitive skills of mathematics. When analyzing the results based on mathematical concepts, we find that the experimental group excelled in understanding the concept of numbers and mathematical operations, the concept of patterns, functions and algebra, and data analysis and probabilities. While we find an average superiority in realizing each of the measurement and comparison tools, geometry and spatial sense. It was found that the students who followed the learning style through

technological activities significantly outperformed the students who followed the traditional learning style, effect size (ES) = 0.42. The effect size was calculated as the difference between the mean of the two groups divided by the standard deviation of the traditional learning group.

## Discussion

The current study indicates that teaching using technological activities in kindergarten affects the development of mathematical skills of kindergarten children. These results are found for all three cognitive levels of memory, comprehension and application.

Cognitive research has shown that learning is most effective when four basic characteristics are present: active participation; participate in groups; frequent interaction and feedback; Connections with real-world contexts (Haugland, 2000). Engaging in the environment of technological activities seems to have provided kindergarten students with the opportunity to participate in real-world contexts through multiple presentations, which in turn affected their mathematical skills.

These results are consistent with what was reported by (Muhammad, 2023) that the use of an e-learning environment based on the design of educational activities had a positive impact on female teachers' skills in promoting digital citizenship. It also agrees with the findings of (Faisal, 2023) that the use of electronic blogs as a tool for developing self-learning skills had a positive impact on the performance of female students in academic subjects. (ElShafie, 2023) also reached similar results, that the use of the electronic program had a positive effect on the development of written language skills and readiness for writing among children, and their abilities to use modern technology improved. (Sayed, 2022) also interacted with this trend, as he concluded that the improvements in students' use of electronic activities led to an improvement in their level of engineering reasoning and problem solving, and an

improvement in their ability to conclude and think critically about engineering topics. The results of (Ibrahim, 2022) also showed similar results in improving children's ability to deduce and think critically about algebraic topics, and improve their performance in solving algebraic problems and performing mathematical operations related to algebra, when relying on technological activities in teaching.

The previous results can be explained by the fact that the use of technological activities in the education of kindergarten children is considered one of the modern technological methods that can contribute positively to the development of the experiences and growth of the child, and it keeps pace with the developments in this era, as the technological activities include a lot of different images and shapes, and fixed and moving images. , and cartoon clips, which provide direct interaction between the child and the educational program and other components, and this is accompanied by sound through audio means received by the kindergarten child to explain the picture in front of him, and to clarify the concepts presented to him in a more practical and comprehensive manner. By reading these results, this result can be explained by the fact that kindergarten teachers in the Kingdom of Saudi Arabia have an awareness of the importance of the role of technological activities, as when kindergarten children learn computer skills, they use these skills to build visual objects from their ideas. Thus, the computer provides them with something exciting and an outlet from which they can create things from their drawings that they may not be able to draw on paper. The interaction between the child and the computer helps to achieve all aspects of effective learning if the program activities are well available.

Technological activities by means of the computer grow and develop with the child’s chronological progression, meaning that the child benefits from this technology as he grows and advances in age, so he begins to employ the computer and its applications with the help of teachers and parents, and gradually the roles turn into monitoring and guidance, in order to give the child opportunities to carry out tasks Learning independently so that children acquire methods of discovery and experimentation, and this led to children responding to the scale after being exposed to these technological applications prescribed for them. In addition, the child's use of the computer gives him a sense of control over the sequence of the program level, in the next step that he wants to follow, and thus feels self-confident.

Also, the skills of technological activities were new to kindergarten children, and this reflected positively on their performance, their continued enthusiasm for learning and attention, and increased their motivation towards learning, as they interacted with technological activities on the one hand, and pairing on the other hand. The reliance on technological activities came to meet children's tendencies and desire for technological interaction, and their participation in the activities that were provided to them during the application of technological activities.

## Conclusion

The paper aimed to investigate the effect of teaching using technological activities on the development of mathematics skills among kindergarten children. Two experimental and control groups were relied upon to examine this effect. The effect was measured by relying on Bloom's three cognitive levels: recall, comprehension, and application. Mathematics was taught to kindergarten children in the experimental group through technological activities, and a pre- and post-test was conducted for each of the two groups. By analyzing the results, it was concluded that the technological activities have contributed to the development of the knowledge levels of kindergarten students with regard to mathematics. This is due to the fact that technological activities have contributed to enhancing memory and rapid retrieval of mathematical concepts, through the use of educational games and digital applications that rely on repetition and memory, which reflects the first level of memory bloom. As for the

second level of understanding, the use of educational games and digital applications helped explain concepts in a clear and appropriate manner for kindergarten children. While the technological activities in the third level of application contributed to the development of practical application skills of mathematical concepts, through the use of educational games and digital applications that allow kindergarten children to conduct experiments, calculations and measurements in an interactive and fun way. Given the paper's finding of a significant impact of technological activities on the cognitive level of kindergarten children in relation to the mathematics course, we recommend that this strategy should be applied gradually to kindergarten children, taking into account the continuous evaluation of this experience. Technological activities should be part of comprehensive kindergarten education programs and should not be the main method of education. Care must be taken to use it in a balanced manner with other means of education, such as play, conversation and manual activities. Directing technological activities in a supervised and directive manner, in order to ensure that children benefit from them effectively and learn mathematical concepts in a correct manner. Technological activities must be chosen for the target age group, which are compatible with the level of their mathematical skills.

## References


1. Abdel-Baqi, B., & Batool. (2019). E-learning and its role in promoting some different aspects of children's growth from the point of view of the students of the Kindergarten Department - College of Education - Boys. The Arab Journal of Child Information and Culture, 2 (9), 47-78.

2. Al-Rajeeb, Dr. P., & Dalal Abdullah. (2021). The Effectiveness of Designing a Montessori-Based-Program to Develop Different Concepts and Skills in Light of the Influence of Variables of Digital Transformation and Active learning. Scientific Journal of the Faculty of Early Childhood Education - Mansoura University, 2021(1), 780-829.

3. Amer, M. A. G. D. I., & Alnaja, F. A. (2017). E-learning application to teaching mathematics. International Journal of Management and Applied Science, 9, 81-90.

4. Benavides-Varela, S., Callegher, C. Z., Fagiolini, B., Leo, I., Altoè, G., & Lucangeli, D. (2020). Effectiveness of digital-based interventions for children with mathematical learning difficulties: A meta-analysis. Computers & Education, 157, 103953.

5. Castro, M. V. D., Bissaco, M. A. S., Panccioni, B. M., Rodrigues, S. C. M., & Domingues, A. M. (2014). Effect of a virtual environment on the development of mathematical skills in children with dyscalculia. PloS one, 9(7), e103354.

6. DEMİRBAŞ, İ., & DEMİR, F. B. (2023). Evaluation of Primary School Teachers' Questioning Skills Regarding Teaching Geography Subjects According to Revised Bloom's Taxonomy. Kastamonu Eğitim Dergisi, 31(1), 87-96.

7. Faisal Muhammad Al-Osaimi, H., & Al-Qahtani, A. (2023). The role of using electronic blogs on developing self-learning skills among secondary school students. Journal of the College of Education (Assiut), 39(1.2), 166-205.

8. Ibrahim Syed, A., & Ahmed. (2022). The use of educational scaffolding strategy supported by electronic activities to teach mathematics in developing some algebraic thinking skills among middle school students. Educational Journal of Adult Education, 4(2), 19-51.

9. Muhammad bin Thawab Al-Otaibi, Z., & Flowers. (2023). The impact of an e-

learning environment based on the design of educational activities in developing the skills of computer teachers in promoting digital citizenship. Journal of the Faculty of Education (Assiut), 39(1.2), 108-132.

10. Murtagh, E. M., Sawalma, J., & Martin, R. (2022). Playful maths! The influence of play-based learning on academic performance of Palestinian primary school children. Educational Research for Policy and Practice, 21(3), 407-426.

11. Olefirenko, N., Kostikova, I., Ponomarova, N., Bilousova, L., & Pikilniak, A. (2019). E-learning resources for successful math teaching to pupils of primary school.

12. Sharrod, d. a. M., & Dina Ahmed Mostafa. (2021). The effectiveness of the electronic learning environment in language development for kindergarten children in the light of digital transformation. Scientific Journal of the Faculty of Early Childhood Education - Mansoura University, 2021(1), 830-857.

13. Soumya Mohamed Ahmed Ali. (2014). A Computer Based Program for Correcting Misunderstanding of some Mathematics Concepts among Kindergarten Child. Studies in Higher Education, 7(7), 246-266.

14. Stubbé, H., Badri, A., Telford, R., van der Hulst, A., & van Joolingen, W. (2016). E-Learning Sudan, Formal Learning for Out-of-School Children. Electronic Journal of e-Learning, 14(2), 136-149.

15. Syed Jaber Ahmed, p. A., & Abdul Hamid. (2022). The use of interactive electronic activities to teach geometry in developing some levels of engineering thinking among first-grade middle school students. Educational Journal of Adult Education, 4(1), 263-209.

16. Weiss, I., Kramarski, B., & Talis, S. (2006). Effects of multimedia environments on kindergarten children's mathematical achievements and style of learning. Educational Media International, 43(1), 3-17.

17. Yehia El-Sayed, H., Saad Mohamedy, E., Ehab, & Khalaf Al-Enezi. (2019). The impact of technological applications on the cognitive development of kindergarten children. Scientific Journal of Educational and Qualitative Studies and Research, 9(1), 1-30.