

Questionnaire of Using Humanoid Robot for Teaching and Learning Kids

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Abstract—the advances in Artificial Intelligence and robotic technology are poised to be one of the most disruptive technologies in the coming decade. Teachers and students can access the technology at different entry points, depending on their skills and experience. NAO is humanoid robots, which used successfully to help to teach children. NAO is an ideal platform for teaching kids Math, Science and any other concepts. NAO can be incorporated into almost any type of lesson to provide novelty and engagement. The aim of this paper is to measure the satisfaction percent of using Robots in teaching kids. More than 297 participants participated in the questionnaire. 71% of the participants strongly agreed or agree to the use of artificial robots in education will increase the learning rate. 87% of participants were believed that the use of modern methods of education based on artificial intelligence applications would have a positive impact on learning, 50% of participants supported the idea of the advantages of using the artificial robot in education were higher than it disadvantages. 69% of the participants strongly agreed or agree that the use of robots has become an urgent necessity in education because it can provide advanced means of clarification and learning methods.

Index Terms—Artificial Intelligence, Robotics, Humanoid Robots, Teaching and Learning methods, Data Analysis.

I. INTRODUCTION

The new developments in Artificial Intelligence and robotic technology are considered as promising technologies in the coming decade. The robotics uses increasingly growing for its multiple and useful applications in the educational process. Artificial robots have attracted the interest of everyone, including teachers and researchers, as a valuable tool for teaching students at all levels, including pre-school in various fields of science, entertainment and personal development [1]. Today people still believe that the robot as a machine to mimic humans, but a lot of robotics get our imagination. And so far man was unable to give the robot "common sense" enough to interact well with the world. Robot is a system that has sensors and control systems and some energy and software supplies and camera all these components work together to accomplish the task of certain (build, design, test programming) [2]. NAO is a humanoid robot which is an ideal platform for teaching kids at all levels. The use of robots helps to increase the student's engagement, self-directed and deep learning [3]. Besides, increases the

collaboration, communication and computational thinking [4,5].

NAO robot has pre-programmed responses to a range of questions and commands but students can also program it to do specific things such as dance moves, and sync them in time to music. The programmable software ranges in complexity from simple drag and drop actions, to manual coding in Python. The humanoid NAO robot can help children with Autism; the researchers found that the clear and predictable nature of the technology often motivated children on the autistic spectrum, improving their learning and attainment [6].

Teaching children is not an easy task. Therefore, find a suitable method for teaching kids and makes them accept and apply commands is not trivial matter. However, there are children with special needs which make the task of teaching them harder [7]. Also, the communication media is important to explain the element of class. Therefore, this paper aims to design and deploy a questionnaire to measure the satisfaction of using NAO robot in teaching kids as shown in Figure 1. Study and analysis of previous existing systems is needed to use the results as a key for this work.



Figure 1: NAO Humanoid Robots

II. PROBLEM STATEMENT

Teaching children is not an easy task. Therefore, finding a suitable way to teach children is not a trivial matter. As well as, teaching children with special needs is difficult matter. The use of robots as an educational tool helps attract students to the classroom and make them interested and eager to learn lessons in all areas and make fun presentations. Besides, the robot can welcome the students and talk about the components

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of the lesson with movement, sound and shape recognition, which generates a useful interactive environment between the student and the robot. Therefore, this work develops and implements a questionnaire for measuring the stratification rate of using the robot as a teaching tool in the schools to increase communication and learning skills of students.

III. RELATED WORK

Many researchers have presented the use of the artificial robot in many fields including design, construction, operation, and education [8]. NAO robots have been used for research, design, construction and education purposes in Universities and schools. Over 5,000 robots have been used in more than 50 countries. NAO is humanoid robots which used successfully to help to teach children. NAO is an ideal platform for teaching and learning concepts with students at all levels [9, 10]. Benitti in ref 10 reviews the recent scientific literature publication on the use of robotics in schools. So, it can incorporate into any lesson to provide classes in various languages like Arabic, English, French, German, etc. Robots are used extensively in the field of health, for example in the conduct of some difficult surgeries, nursing and treatment of children with special needs [11, 12]. Ismail, et al. in ref 7 discussed the using of Humanoid Robot NAO in getting the initial response of stereotyped behavior of children Autism in Human-Robot Interaction environment.

Malik, N.A, et al. in ref 6, they deployed the humanoid robot NAO as intrusion tool for Physical therapy of children with Cerebral Palsy. Direct medical and surgical robots used to perform clinical surgery, external structures and prostheses (replacement of missing limbs) [13, 14]. Vitiello, et al. in ref 13 presented a comprehensive survey of robotic surgical systems and introduced current advancements in the integration of synergistic controls such as virtual fixtures, dynamic-active constraints, and perceptual docking. Robots are used mostly in entertainment and games, so they can play with children and carry out orders [15, 16]. Brooks, et al. in ref 15, they reviewed the modern attempts like powerful, autonomous humanoid robot and how to teach the robot via playful communication using natural social movement and voice. They focused on two classes: teaching as play and teaching with. Laue, et al. in ref 16 proposed minimum requirements for making the robot play interactive ball games with human players. He can play, dance, introduce entertaining passages and read stories to children at bedtime [17]. Kory, in ref 17 designed a robot as a social character to involve children as a peer using the dialogic context and relational. The robot will communicate through a storytelling game to teach the kids new wordlists.

IV. TEACHING METHODS

The teaching process is one of the most critical and difficult tasks because it is interested in sending information to understand the learner with a suitable method. Teaching methods should be renewable for all time. For example, you can use games, color cards, role plays, and play-by-play. The teacher must use all means to communicate the

information to the child in a fun and high degree of excellence [18].

The method of teaching is defined as a series of steps followed by the teacher to achieve specific goals [19]. The existence of many standard methods of teaching is not only a result of the teachers' ideas about human nature and the nature of knowledge throughout the ages. It is worth mentioning that there is no possibility of differentiating between different teaching methods.

Therefore, the choice of modern teaching methods appropriate to the age of the student it is a crucial matter. This will have a powerful effect in enhancing the quality of teaching and learning. However, the traditional methods have become unable to meet the needs of education in the current time. The modern teaching methods have enabled the student to access the information and understand and apply it more quickly and accurately as shown in Figure 2.

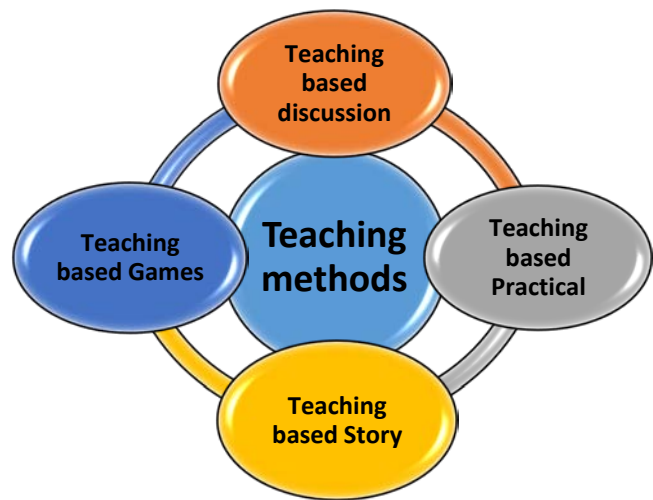


Figure 2: Teaching Methods

The latest teaching methods are learning bags which is a set of written activities and some of their applications [20]. The study programs in the form of written exercises that include subjects related to the facts and theories performed by the teacher and the students. Teaching methods include :

i. The teaching based discussion.

The teacher enters the student in the discussion on the subject of study in a systematic and arrange. So the students will give solutions and ideas related to the subject of conversation. Also, the teacher discuss students what they talked about, and the use of constructive analysis. This will enhance the student's self-confidence, and get the information solidly.

ii. The teaching based story :

The teacher can do this method to deliver the information to the students in the form of a story. This will draw the minds of students to the subject, and make the possibility of linking information to each other more.

iii. The teaching based practical projects

The teacher gives students the opportunity to apply the theoretical part in form of the project. The teacher divides students into groups and asked them to carry out the implementation of a specific project. This method established

the cooperation between the students and increased their love and their ability to the educational material given

iv. The teaching based Games

Educational research confirmed that children often tell us what they think and what they feel through their free acting toys and their use of dolls, cubes, colors, clay, etc. The play is considered an educational medium that works to a great extent in shaping the personality of the child with different dimensions. Thus educational games, when well planned, organized and supervised, play an active role in organizing learning. Current studies have proved the great value in acquiring knowledge and skills to reach it if it is best exploited and organized. The play is defined as a guiding activity by children to develop their mental, physical and emotional behavior and abilities. Also, it is achieving pleasure and amusement. The method of learning by playing is to exploit game activities in acquiring knowledge, bringing the principles of science to children and expanding their cognitive horizons

The significance of playing in learning includes the following:

- 1) Playing is an educational tool that helps in the interaction of the individual with the elements of the environment for learning and development of personality and behavior.
- 2) Playing is an educational tool that brings concepts closer and helps in understanding the meaning of things.
- 3) A useful tool for the separation of learning and organization to meet the individual differences and education of children according to their potential and abilities.
- 4) Play is a method of treatment addressed to educators to help them solve some of the problems and disorders experienced by some children.
- 5) Playing is an instrument of expression and communication between children and promotes their belonging to the group.
- 6) The games activate mental abilities and improve the creative talents of children. Technique

V. RESEARCH METHODOLOGY

There are two types of research methods in science or education which can be used to develop this work. These research methods are divided into qualitative and quantitative methods. In this work, priority is given to the quantitative approach because it is useful and helpful in interpret the collecting data related to the teaching methods based Robots. The Quantitative methods are highlighted objective measurements of the statistical and numerical analysis of data collected through polls, questionnaires, and surveys. Quantitative research focuses on obtaining digital data and concluding it over groups of people to describe a specific phenomenon. Therefore, this work includes two phases. First phase is implementing a questionnaire to collect required data about the using of new technologies like robots in teaching purposes. The second phase is to discuss the result and write recommendations for using or not using the robots in teaching.

VI. QUESTIONNAIRE

Getting answers to some questions are not limited to see videos or odious, but it needs to survey of some procedures and regulations for diagnosing the current reality. Also, it may needs to discover a future development based scientific methods. Therefore, there is a need to use some scientific research tools, including the questionnaire, interview, observation, tests.

The Questionnaire is a set of written questions that the respondent answers, which are either restricted or free. The scientific rules were taken into account when writing this questionnaire, including the fact that the questions are simple and unique that can be understood clearly with only one meaning. Questions were categorized into several categories, each class discussing a specific aspect. There are two main methods were used to create the questionnaire which is usually based on closed or open questions. The closed questions determine their answers in advance, and they do not give the user opportunity to present his opinion. However, the questionnaire based open questions provides more space to show the opinion of users. But, there is a difficulty in interpreting and analyzing the user views. Therefore, a mixed questionnaire was chosen, combining closed and open questions.

The purpose of this questionnaire is to measure the views of participants in supporting or not supporting the hypothesis of artificial robot use in children's education. The Figure 3 shows the number of participators in the questionnaire which is recorded more than 295 participants.

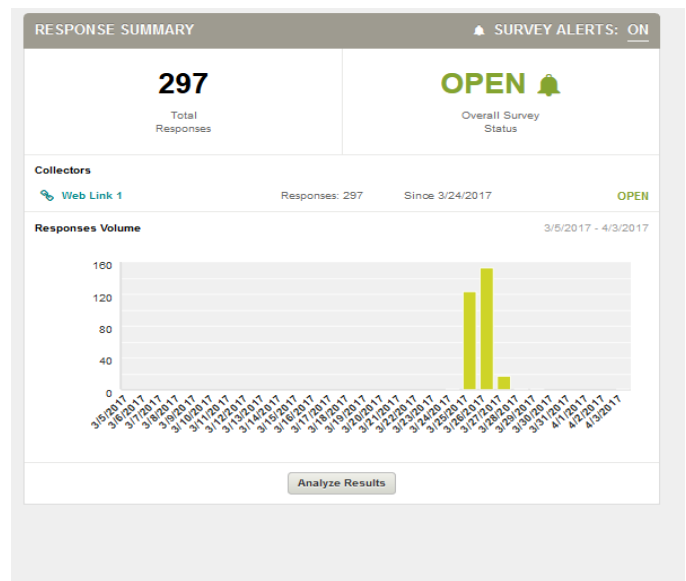


Figure 3: Number of participators

The number of respondents was divided by gender into two categories: male and female. The number of females participating in the questionnaire was 70 % while the male is 30% as shown in Figure 4.

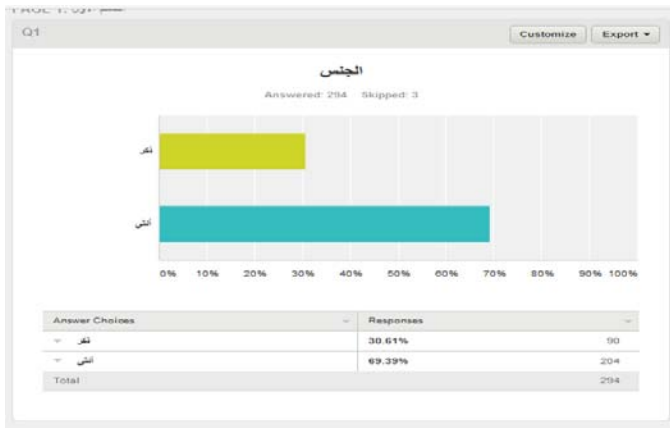


Figure 4: Number of participants based Gender

The Figure 5 presents that about 47 % of respondents were between the ages of 24 and 28 and the lowest rate of participants based age group is above 38 equal to 17 %.

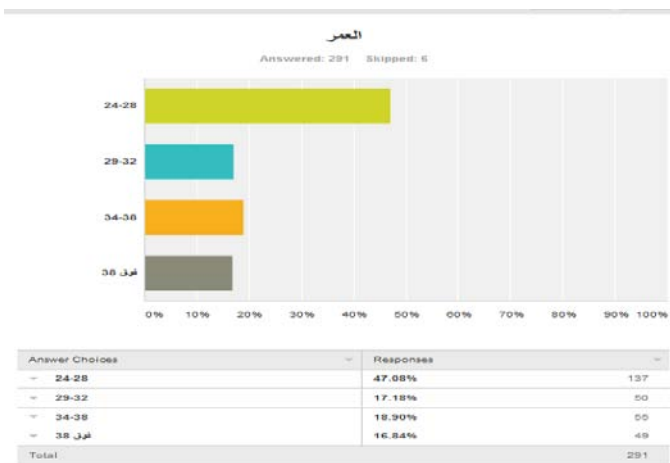


Figure 5: Number of participants based Age

The Figure 6 illustrates that the number of participants in the questionnaire has a university scientific qualification is 75%, which gives the impression that the survey will reflect the actual orientation of the professional group, which will be answered on the science they learned, not hearing or viewing. 25% of participants are with no scientific qualification.

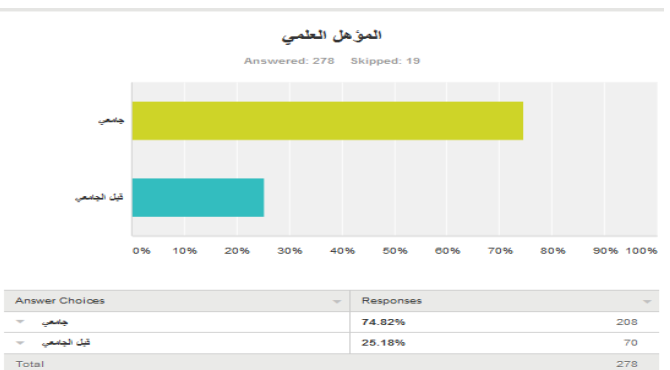


Figure 6: Number of participants based scientific qualification

Figure 7 depicts that 94% of participants strongly agree or agree with the use of modern technology, including robots, which helps to accomplish business quickly and easily.

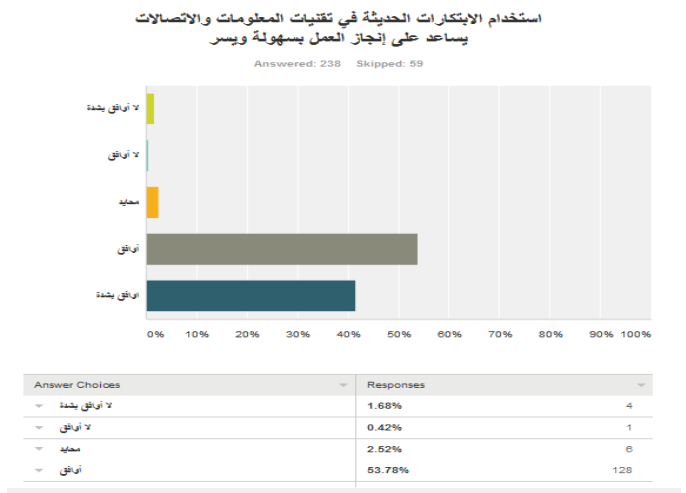


Figure 7: Number of participants agrees of using modern technology

Figure 8 shows that 71% of the participants strongly agree or agree to the use of artificial robots in education and that it will increase the learning rate.

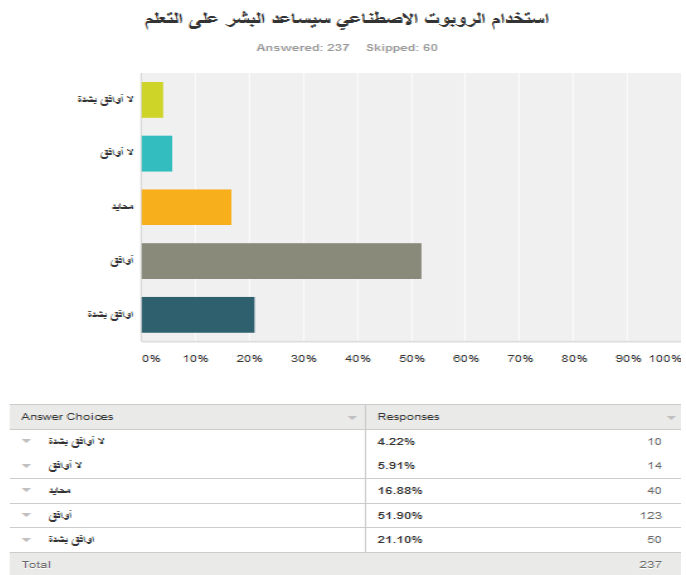


Figure 8: Number of participants agrees that using Robot will help Kids

Figure 9 shows that 87% of participants strongly agree or agree that the use of modern methods of education based on artificial intelligence applications will have a positive impact on learning. Figure 10 shows that 70% of the participants strongly agree or agree that the use of the artificial robot in education will increase the speed of learning and the child will accept the subjects in a faster pace compared with the use of the traditional route.

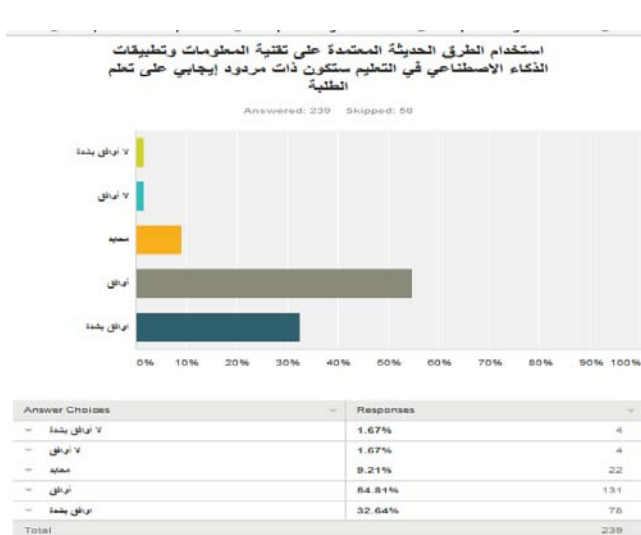


Figure 9: Number of participators agrees that using Modern methods in education will help Kids

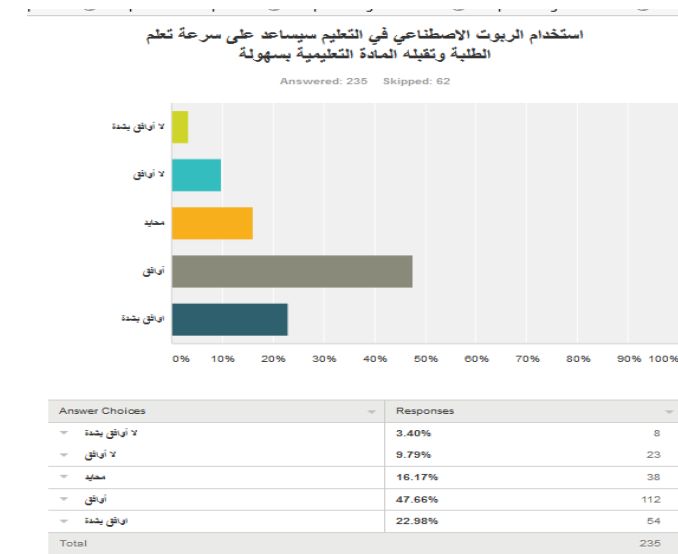


Figure 10: Number of participators agrees that using Robots will help Kids to be a fast learner

Figure 11 shows that 50% of participants strongly agree or agree that the advantages of using the artificial robot in education are higher than their disadvantages. 36% were neutral while 14% rejected or strongly rejected the idea.

Figure 12 shows that 69% of the participants strongly agree or agree that the use of robots has become an urgent necessity in education because it can provide advanced means of clarification and learning methods.

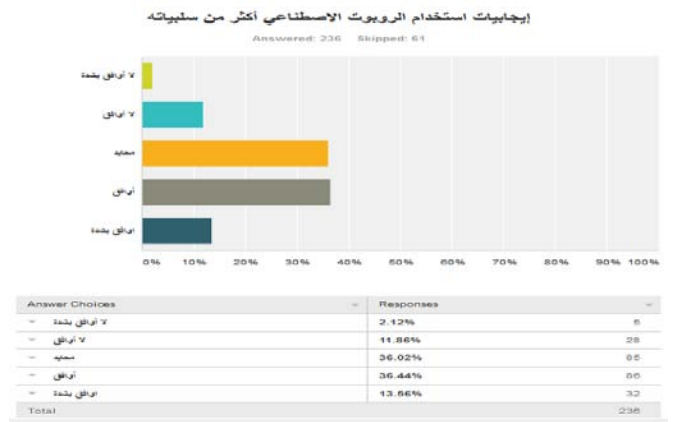


Figure 11: Number of participators agrees that the advantages of using Robots in education are higher than its disadvantages.

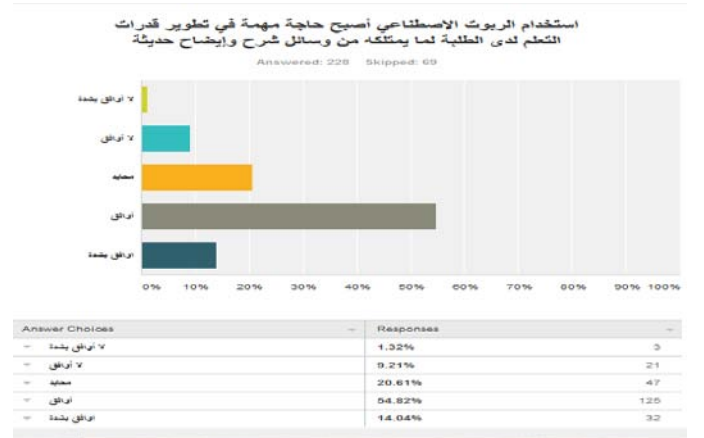


Figure 12: Number of participators agrees that the using Robots in education is important tool.

VII. CONCLUSION

This paper presented the satisfaction percent of using the artificial robots in teaching and learning kids' materials of science, math, regulations, etc. Knowing that educating children is not easy, so finding the best way to make kids accept instructions and apply the desired goal is one of the important tasks.

The number of participators in the questionnaire which is recorded more than 295 participants. 71% of the participants strongly agree or agree that the use of artificial robots in education will increase the learning rate. The rate of 87% of participants were strongly agree or agree that the use of modern methods of education based on artificial intelligence applications will have a positive impact on learning. 50% of participants were strongly agreed or agree that the advantages of using the artificial robot in education are higher than their disadvantages. 36% were neutral while 14% rejected or strongly rejected the idea. 69% of the participants were strongly agree or agree that the use of robots has become an urgent necessity in education because it can provide advanced means of clarification and learning methods.

Research Recommendations The results of the questionnaire demonstrate that the use of modern techniques,

including robots, helps increase communication between children and the use of modern technologies. As well as being a tool to help improve the speed of understanding and learning in children through the provision of different means of clarification.

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