The effectiveness of an early intervention program based on electronic games in developing the visual perception of children with intellectual disabilities within the age group 2-5 years

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Abstract

The current research aimed to ascertain the effectiveness of the early intervention program based on electronic games in developing the visual perception of children with intellectual disabilities within the age group of (2-5) years, using the quasi-experimental approach with one group, and the study sample consisted of (11) children with disabilities. Simple and medium intellectuals enrolled in the early intervention program at the Successful Communication Center for Day Care in Makkah Al-Mukarramah and were deliberately selected. To achieve the research objectives, the researchers prepared and applied the visual perception scale after ensuring its validity and stability. Three electronic games were also designed and applied to the sample for (17) sessions. The results showed the effectiveness of the electronic games program in developing the visual perception of children with intellectual disabilities within the age group (2-5) years and maintaining this improvement over time. Where the results showed that there were statistically significant differences at the level ($\alpha = 0.05$) between the grades of the group children in the pre and post-measurements on the visual perception skills scale for children with intellectual disabilities in the post-measurement after applying the program, in favor of the post measurement. The results also showed that there were no statistically significant differences at the level ($\alpha = 0.05$) between the grades of the group children in the two post and follow-up measurements on the visual perception skills scale for children with intellectual disabilities in the follow-up measurement which indicates the long-term impact of the program. The researchers recommend the necessity of activating educational programs based on various electronic games to develop the visual perception of children with intellectual disabilities and employ them effectively in the educational process for children with intellectual disabilities.

Keywords:
early intervention, intellectual disability, visual perception, electronic play.

1. Introduction

The importance of early intervention programs comes from the importance of early childhood, and this is due to the rapid growth in early childhood, especially cognitive development, as learning in early childhood is linked to each other, so what is presented to the child in his early years is a building for his future, in addition to that, it is based on the principle of individual differences. This in turn helps to provide the program for each child in proportion to his abilities and capabilities, and in a way that supports him to live better, therefore, the speed of growth and considering individual differences are among the most important reasons behind providing early intervention programs for children with disabilities in general, and children with intellectual disabilities in particular [4][17]. In this regard, Al-Luhaidan and Al-Abdul-Jabbar [12] indicated that the speed of growth and the development of skills in early childhood, especially cognitive growth and ease of learning compared to other stages, are among the main reasons for providing early intervention programs for children with intellectual disabilities, in addition to the passage of the first years without providing knowledge and experience for the child may lead to a developmental deterioration in one way or another, where early childhood is a critical stage for a child. Therefore, attention must be paid to it, as well as learning is linked to each other. What we are currently interested in for the child's present is primarily caring and building for his future at the same time. They also stressed the need for and importance of building internal motivation for the child's learning, discipline, and self-management from an early age for people with intellectual disabilities.

The most prominent characteristic of children with intellectual disabilities is their low cognitive ability. Visual perception is one of the most important low cognitive abilities of people with intellectual disabilities, which in turn affects the level of awareness and knowledge of a child with intellectual disabilities. Hence the importance of searching for modern methods and strategies that keep pace with the progress of our time to support the growth of visual perception of people with intellectual disabilities,

especially after the remarkable recent technological and digital development [21]. The importance of visual perception lies in its guiding consideration of human behavior, especially related to human adaptation, the way of understanding and solving problems, as well as the excitability that occurs in the central nervous system, therefore, visual perception is evidence of the full activity of the nervous system and is important in achieving the child's adaptation and compatibility with the external and internal world [9]. Kim and Suk Lee [21] point out that people with intellectual disabilities have reduced cognitive abilities of attention, memory, perception, and other cognitive processes that are essential for interaction and awareness of the environment around them, which affects them in one way or another the process of input, output, as well as processing. This requires early intervention, training, and provision of the necessary support, hence the importance of searching for modern methods and strategies that keep pace with the progress of our time to support the knowledge growth of people with intellectual disabilities, especially after the remarkable recent technological and digital development.

Due to the technological and digital progress and development, and the recent expansion of technologies, the use of computers and their programs in the field of education, literature, and studies have proven the effectiveness of electronic games in teaching and improving skills for people with intellectual disabilities as it has become necessary to expand, deepen and benefit from this development, and electronic games in particular in the education of children with intellectual disabilities [15]. Hence, the current research seeks to verify the effectiveness of electronic games in developing the visual perception of children with intellectual disabilities.

By reviewing the theoretical literature and previous studies as the study [14][21] The researchers chose the topic of the current research, as cognitive development is affected by people with intellectual disabilities, especially visual perception. and noticeable, which in turn affects the growth of the rest of the fields and this requires both support and the provision of appropriate educational opportunities for its proper development [12].

Based on the importance of the early age stages of children's development, and the impact of the experiences that a child obtains in early childhood and the environment around him on his development and learning, the significance of this stage is clear for children with intellectual disabilities who have developmental delays as there is a requirement for the provision of early intervention programs for each case to invest this important period of the child's life to develop his various skills in daily life, perceptual, motor, social and linguistic [3]. Whereas cognitive development is clearly and noticeably affected by people with intellectual disabilities, which in turn affects the growth of other fields and this requires support and the provision of appropriate educational opportunities for its proper development and development.

Also, early intervention and appropriate support for the development of children with intellectual disabilities and the development of their skills, especially in the early years of a child's life goes for the benefit of the child, and his family as well, therefore, early intervention cares for the child and the family alike, especially since the family, and in particular the parents, is one of the most important influences for the child [12].

Given what the literature and studies have proven, as Mustafa and others study [14] the effectiveness of electronic games in teaching and improving the skills of children with intellectual disabilities [15]. From the reality of field experience in the field of early intervention, the researchers noted the weakness of the application and activation of programming and technology, especially electronic play in teaching children with intellectual disabilities, and the lack of studies - to their knowledge - that dealt with electronic play in developing visual perception for people with intellectual disabilities, the researchers found that the current research topic needs further study and in-depth study. Hence the research problem, which is represented in the following question:

1. *"What is the effectiveness of an early intervention program based on electronic toys to develop visual perception for children with intellectual disabilities, in the age group (2-5) years? "*

and the following hypotheses:
2. *"Are there statistically significant differences at the significance level (α = 0.05) for the application of the early intervention program based on electronic play to develop visual perception for children with intellectual*

disabilities within the age group 2-5 years in the post-measurement?"

3. *"Are there any statistically significant differences at the significance level (α = 0.05) for the application of the early intervention program based on electronic play to develop visual perception for children with intellectual disabilities within the age group 2-5 years in the follow-up?"*

2. Literature review

By reviewing the theoretical literature and previous studies, the two researchers noted the importance of electronic play in the education and training of children with intellectual disabilities. Parameters of early intervention for electronic toys to develop the visual perception of children with intellectual disabilities.

There are multiple procedural definitions used, first is electronic games which are defined as games that are prepared electronically using specialized programs and multimedia to develop a set of concepts for the recipient, or the learner through the computer, and smart devices [15] or the computer to display a set of concepts and information to support visual perception intentionally through the play, and suspense. Electronic gaming is one of the forms of play, which is a group of directed activities prepared using multimedia within an interesting and enjoyable framework for specific purposes and goals according to the rules and instructions of the game and to introduce some concepts to the child by blending learning and entertainment [10]. Tsikinas & Xinogalos [24] note that they are digital games that primarily run-on computers for additional purposes, not for entertainment. Subti and others [7] show that electronic games are not limited to video games, as some believe that it is a broader term that includes many other genres, of which video games are a part. The importance of electronic play lies in enhancing the learning process and continuing it flexibly as they can stop whenever they want, go back, pick up where they left off, and be able to learn anytime, anywhere which makes the learning process and its continuity easier and in return, increases the child's confidence, in addition to improving communication and self-control [2]. Electronic gaming also gains significance for children with intellectual disabilities in providing an educational environment that takes into account the characteristics of children with intellectual disabilities and removing the obstacles that children with intellectual disabilities faced in traditional education in terms of the need for more time and repetition that may not be available to the teacher, while the electronic game provides the educational material in an interesting, attractive, and interesting way that calls for the child's focus, and stimulates his continuity within the scope and limits of his abilities [13]. Despite the recent great interest in technology, and its innovations, especially in the field of general education as well as in special education, and with children with intellectual disabilities, we find, on the other hand, the limited studies that dealt with this issue in our Arab world, and Saudi Arabia in particular, and Arab studies will be reviewed in addition to the foreign ones that dealt with electronic games in the education of children with intellectual disabilities, from the most recent to the oldest. Ahn [19] conducted a study aimed at knowing the effects of using virtual reality (VR), and cognitive therapy based on computer games on the development of visual-motor coordination in children with intellectual disabilities, who are between (7-13) years old, and the study used the curriculum semi-experimental one-group, which numbered 13 children.

The results showed a significant difference and improvement in both, visual-motor coordination, and motor function. Mustafa and others [14] conducted a study aimed at identifying the difficulties and obstacles for children with intellectual disabilities aged (6-11) years in learning cognitive skills and working on developing educational software to develop cognitive skills, focusing on some cognitive skills, such as measuring, matching sizes, lengths, basic colors, basic arithmetic operations using the quasi-experimental method. The study sample consisted of (14) children in the city of Khartoum, and the results of the study indicated the effectiveness of the software used in improving the level of cognitive skills among the sample children, with correct responses ranging between 85-90% in favor of the experimental group. Kim et al. [22] also conducted a study to know the effectiveness of electronic games in improving the cognitive skills of children with intellectual disabilities. The quasi-experimental approach was used with a single case design. The research sample consisted of five children from Korea, whose ages ranged from (10-12) years, and the results of the study indicated a remarkable development for

the study sample in cognitive skills such as auditory perception, visual perception, processing speed, and working memory, and that visual recall was the most effective among all children of the study sample. On the other hand, recalling sequential information had the lowest improvement in all children in the study sample, and their ability to explore significantly improved. Because the foregoing does not include all cognitive skills. One of the most prominent recommendations of the study was to work on more studies and to delve into the subject in detail by taking more topics and increasing the period. Pashapoor and others [23] also conducted a study aimed at finding out the effectiveness of cognitive computer games in the attention of students with intellectual disabilities in Iran. The quasi-experimental approach was used, and the sample consisted of (20) students with intellectual disabilities, and the results indicated the effectiveness of cognitive games to increase attention for the experimental group of students with intellectual disabilities. Also conducted by Ekina and others [20] a study aimed at knowing the effectiveness of smart game applications in teaching students with intellectual disabilities in Turkey, and used the quasi-experimental approach with a single case design which included three participants whose ages ranged from (11-16) years, and the results of the research indicated the effectiveness of electronic games, and their positive impact on teaching students with intellectual disabilities as a new form of play activities for students, preserving what was learned and using it in other activities and situations.

Second is an early intervention which is defined as providing a range of diverse services such as medical, social, educational, and psychological services for children under the age of six who have a disability, a developmental delay, or who tend to be delayed or disabled [3]. It is defined procedurally as a set of programs, activities, and services to develop the visual perception of children with intellectual disabilities within the age group (2-5) years. Al-Khatib and Al-Hadidi [3] define early intervention as providing a variety of services such as medical, social, educational, and psychological services for children under six years of age who have a handicap or a developmental delay, or who tend to delay or disability. The importance of early childhood is increasing for people with disabilities, including children with intellectual disabilities. Hence the importance of early intervention programs and

services, in addition to improving the child's performance, developing his abilities at an early age, and providing the necessary support according to his needs and requirements. This will help improve the child's skills and support his development in several areas, and this is reflected in psychological and social adjustment, the improvement of personal skills, as well as the health aspect of children with intellectual disabilities [17]. The main and primary objective of early intervention programs and services, whether for children with disabilities in general, or children with intellectual disabilities, lies in receiving appropriate services and programs for them, which support their development on the one hand, and at an early age on the other and this ultimately leads to the inclusion of children with intellectual disabilities in their society [6].

The third is visual perception which is defined as the mental process by which things are observed, and individuals are transferred to the stimuli of the outside world which begins with the neural receptors in the eye network receiving the light reflected from things, interpreting them, and then responding to those stimuli, by converting them into images that are recognized by linking the visual objects with similar images stored in the visual memory [9]. It is defined procedurally as the visual perception skill set.

Fourth is intellectual disability which is defined as a clear decline in mental performance below average with an IQ score of (70-75) and less, accompanied by a deficiency in two or more adaptive behavior skills that are represented in a set of conceptual skills, such as language, reading, writing, and counting concepts such as time, numbers, and social skills such as interaction with others, sense of social responsibility, ability to follow rules and laws, ability to solve problems, and practical skills such as activities of daily living, self-care, personal care, health, professional skills, use of money and telephone, and this disability appear before the age of twenty-two. [18].

It is defined procedurally as children who have been officially diagnosed with mild or moderate intellectual disability, whose ages range from (2-5) years, and who are enrolled in the early intervention program. The American Association on Intellectual and Developmental Disabilities [18] defined intellectual disability as a clear decline in mental performance below average, with an IQ score of (70 to 75) and less, accompanied by a deficiency in two or

more adaptive behavior skills that are represented in a set of conceptual skills, such as language, reading, writing, and counting concepts such as time, numbers, and social skills such as interaction with others, sense of social responsibility, ability to follow rules and laws, ability to solve problems, and practical skills such as activities of daily living, self-care, personal care, health care, professional skills, use of money and telephone, and this disability appear before the age of twenty-two. When talking about the characteristics of children with intellectual disabilities, we find that they vary according to the severity of the disability from one child to another, but the low mental abilities remain the prominent feature, which can be observed, and its impact can be observed as well, such as problems of memory and poor attention [1][11][5] points out the need to focus primarily on the attention of the child with intellectual disabilities as it is a prerequisite for learning, the child cannot learn without giving sufficient attention first, which in turn affects other cognitive skills such as visual and auditory perception, and information retrieval. In this regard, Al-Otaibi and Al-Harthy [9] point out that the importance of visual perception lies in its guiding consideration of human behavior, especially related to human adaptation, the way of understanding and solving problems, as well as the arousal that occurs in the central nervous system. Therefore, visual perception is evidence of the full activity of the nervous system and is important in achieving the child's adaptation and compatibility with the external and internal world, and the shortcomings in visual perception have consequences that affect the child's academic comprehension and understanding of symbols and mathematical language if intervention and support are given in a timely and appropriate manner. It the importance of working on the development of visual perception among children with intellectual disabilities, as poor visual perception affects the perception of the surroundings and the characteristics of things around them, such as sizes, colors, as well as shapes, in addition to the poor ability to understand and perceive events and situations around them and this is due to their poor attention and memory, which in turn affects their education and academic achievement. As the learning process requires in the first place the ability of the educated child to understand, perceive, and receive stimuli around him. Visual perception has an important role, especially in the early years of the child's learning and

concept formation which helps the child later in the thinking process and this requires increased attention and efforts to support the development of visual perception of children with intellectual disabilities, through educational programs, and modern teaching methods and methods [8][16].

3. Method

The current research aims to ascertain the effectiveness of the early intervention program based on electronic play in developing the visual perception of children with intellectual disabilities within the age group (2-5) years and to reveal the presence of statistically significant differences in the application of the program in the post-measurement and follow-up.

The importance of the current research comes from the importance of early intervention programs, and the importance of providing the necessary support for children with intellectual disabilities in a timely and appropriate manner that ensures the development of skills, including visual perception where the deficiency they have in these skills leads to a deficiency in the interaction and integration of children with intellectual disabilities with the environment around them.

Given the technological and digital development, and what studies and literature have proven the effectiveness of electronic games and their success in teaching children with intellectual disabilities the skills of visual perception as it has become necessary to pay more attention to this field of education, in more depth, and more detail. The current research also contributes to providing early intervention workers with modern and effective ways to support the development of visual perception among children with intellectual disabilities through electronic games and electronic gaming.

The results of the current research are objectively limited to the tool used to identify the effectiveness of an early intervention program based on electronic games to develop the visual perception of children with intellectual disabilities enrolled in the early intervention program. Results in human limits are also limited to children with intellectual disabilities enrolled in early intervention programs between the ages of two and five years. The results are limited to spatial limits on the early intervention program for people with intellectual disabilities in the

successful communication center for daycare in the city of Makkah. As for the time limits, results are limited to the second semester of the academic year (1443)/ (2022).

The current research followed the quasi-experimental one-group approach with a measurement (pre-post-sequential) to answer the research questions and due to its relevance to the research topic, which is used to estimate the causal effect of the intervention on the target population without random assignment to treatment or control of variables. The following table shows the experimental design:

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The research community consisted of all children with mild and moderate intellectual disabilities who were enrolled in early intervention programs within the age group (2-5) years at the Successful Communication Center for Day Care in the city of Makkah Al-Mukarramah in the second semester of the academic year 1443 AH.

The research sample consisted of (11) children with mild and moderate intellectual disabilities who were chosen by the intentional method as shown in the following table.

Table (1): Distribution of children in the research sample according to their demographic characteristics

% Percentage	Frequency	Category	Variant
%9.09	1	2 years	
%27.27	3	3 years	
%27.27	3	4 years	Age
%36.36	4	5 years	
%100	11	Total	
%36.36	4	Simple	
%63.64	7	Moderate	Disability degree
%100	11	Total	

The data in Table 1 indicate the following results:
- The highest percentage of the distribution of children in the research sample according to the age variable was (36.36%) for the age group (5) years, while the lowest percentage was (9.09%) for the age group (2) years.
- The highest percentage of the distribution of children in the research sample according to the degree of disability variable was (63.64%) for the degree of moderate disability, while the lowest percentage was (36.36%) for the simple degree of disability.

To achieve the research objectives, the following tools were prepared: First: The Visual Perceptual Skills Scale, prepared by the two researchers Second: The electronic games program for developing the visual perception of children with intellectual disabilities within the age group of (2-5) years, prepared by the two researchers. The process of building the tools goes through the following stages: The stage of data collection to prepare the scale. At this stage, all data and information were collected by reference to the growth and development tables for children's visual cognitive development and several sources, Such as [3][5].

At the stage of data collection for program preparations, all data and information were collected by reference and review of the previous literature that dealt with the subject of the research, or that used the experimental method, Such as [15][14].

The research and analysis stage, in which the characteristics of the research sample and the visual perception of children aged (2-5) years are determined, in addition to the educational needs necessary to develop the visual perceptual skills of children with intellectual disabilities.

The design stage includes working on designing a scale to measure visual perception, then designing a program based on electronic games to develop them for children aged (2-5) years with intellectual disabilities. The production and creation stage, in which the scale and electronic games program were produced to develop visual perception according to the design stage by using the software, and websites appropriate to the design to achieve the purpose of the current research.

In the evaluation stage, in which the scale and program were presented to a group of specialized arbitrators, and the necessary adjustments were made according to their observations and opinions. In the application stage, the scale and program were applied to the children of the research sample.

To verify the scale's validity, the Face Validity method was adopted. The training program, which was presented in its initial form to (5) arbitrators who hold a doctorate in special education from faculty members in Saudi universities, To ensure the suitability and ability of the two tools to achieve the objectives of the research, their observations, and opinions on the validity of the paragraphs, their relevance, the suitability of the program, and its

suitability were taken into account, taking into account the modifications, notes, and additions where the wording has been modified on the paragraphs of the scale based on the directions, and without deleting or adding any paragraph where the scale in its final form consists of (23) items.

To verify the validity of the tool's construction, it was applied to an exploratory sample consisting of (10) children with moderate and simple intellectual disabilities from the study community, and from outside the target research sample as well as to calculate the values of the Pearson correlation coefficients for the relationship of the paragraphs to the dimension to which they belong which is shown in Table (2).

Table (2): It shows the Pearson correlation coefficients for the paragraphs of the visual perception skills axis

Correlation coefficient	No.	Correlation coefficient	No.
**662.	13	**604.	1
**494.	14	**10 7.	2
**775.	15	**849.	3
**628.	16	**775.	4
**602.	17	**637.	5
**725.	18	**628.	6
**599.	19	**611.	7
**699.	20	**615.	8
**851.	21	**690.	9
**630.	22	**876.	10
**700.	23	**715.	11
		**842.	12

The data in Table (2) indicate that the correlation coefficients for the dimension of visual perception skills ranged between (.876**-.494**)

The study tool's stability means the results' stability, reliability, and predictability. That is, the extent of concordance or consistency in the results of the questionnaire, as it was applied more than once in similar circumstances. The internal consistency test Cronbach Alpha was used, as it measures the extent of consistency in the respondents' answers to all the questions on the scale, as Alpha can be interpreted. It is the internal stability coefficient between the answers and indicates its high value on the degree of stability and ranges between (0-1) and its value is acceptable at (60%) and above, and in other studies, it is acceptable at (70%) and above, according to the following table. To verify the stability of the tool, Cronbach's alpha

coefficient was calculated, as an indicator of internal homogeneity, where the total reliability coefficient Cronbach's alpha was (0.836), which is a very high percentage and indicates the stability of the tool.

Table (3): Internal consistency coefficient according to Cronbach's alpha equation for visual perception skills as a whole

No.	Dimension	No.	Cronbach's alpha coefficient
1	Visual perception skills	23	0.805

note. ** Statistically significant at the significance level (0.01). The data in Table (3) indicate that the internal consistency coefficients according to Cronbach's alpha equation for visual perception skills amounted to (0.805).

The research includes the following variables: First is the independent variable which is the early intervention program based on electronic toys. Second is the dependent variable which is in the visual perception

Based on the nature of the research, and the goals that it sought to achieve, the data were analyzed using the Statistical Package for Social Sciences (SPSS), and the results were extracted according to the following **Statistical methods:** Starting with the Pearson correlation coefficient, then the Cronbach's alpha coefficient which is used to calculate the stability of the study tool, then the frequencies and percentages of the personal variables, in addition to the t-test for the impact of the program's effectiveness, and lastly, the Wilcoxon test for two correlated samples.

4. Study Results and discussion

The first question: *"What is the effectiveness of the early intervention program based on electronic games in developing the visual perception skills of children with intellectual disabilities? "*To answer it, a t-test was used to find out the differences between the pre- and post-measurements of the cognitive skills scale, and the visual perception of children with

intellectual disabilities, and the following table shows the results:

Table 4: The results of the T-test to find out the differences between the pre- and post-measurements of the visual perception skills scale for children with intellectual disabilities.

It was found in Table (4) that there were statistically significant differences at the (α = 0.05) level between the grades of the group members in the pre- and post-measurements on the post-measurement of visual perception skills for children with intellectual disabilities after applying the program and in favor of the post-measurement, where the arithmetic mean of the pre-measurement was (2.55) and for the post measurement (5.9). The effect size was (65.1%), which indicates the existence of the program's effectiveness.

The first hypothesis: *"Are there statistically significant differences at the significance level (α = 0.05) for the application of the early intervention program based on electronic games to develop visual perception skills for children with intellectual disabilities in the post-measurement?"* To answer the first research hypothesis and to measure the validity of this hypothesis, the arithmetic averages and standard deviations of the responses of the research sample members were calculated in the pre and post-measurements on the visual perception skills scale for children with intellectual disabilities and Table (5) shows that: Arithmetic averages and standard deviations of the responses of the research sample members on the visual perception skills of children with intellectual disabilities in the pre and post measurement

Standard deviation	Arithmetic mean	Sample	Category
2.42	2.55	11	Pre measurement
3.56	5.91	11	Post measurement

We note from Table (5) an increase in the average responses of the group members in the post-measurement on the visual perception skills scale for children with intellectual disabilities that the arithmetic mean of the pre-measurement was (2.55), and the arithmetic mean of the post-measurement was (5.91), and to determine the significance of the differences, the Wilcoxon test was used (Wilcoxon-Test) for two correlated samples to indicate the

differences between the mean ranks of the sample members' scores in the pre and post measurement on the visual perception skills scale for children with intellectual disabilities

Table (6): The results of the Wilcoxon-Test for two correlated samples to indicate the differences

Effect size	Statistical significance	T value	degrees of freedom	Standard deviation	arithmetic mean	Sample	Category
0.651	0.000	7.783	10	2.42	2.55	11	Pre measurement
				3.56	5.91	11	Post measurement

between the mean scores of the sample members in the pre- and post-measurement on the visual perception skills scale for children with intellectual disabilities

Statistical significance	Z	Ranks total	Rank average	Sample	Ranks
0.003	-2.947	0	0	0	Negative ranks
		66.00	6.00	11	Positive ranks
				11	Total

Table (6) shows that there are statistically significant differences at the (α = 0.05) level between the grades of the group members in the pre and post-measurements on the visual perception skills scale for children with intellectual disabilities in the post-measurement after applying the program, and the value of (z) is (-2.943), and its significance level is (0.003), and this result confirms the validity of this hypothesis and in favor of the dimensional measurement, as the arithmetic mean for the pre-measurement was (2.55), and the arithmetic mean for the post-measurement was (5.91).

The second hypothesis: *"Are there statistically significant differences at the significance level (A = 0.05) for the application of the early intervention program based on electronic games to develop visual*

perception skills for children with intellectual disabilities in follow-up?" To answer it and to measure the validity of this hypothesis, the arithmetic averages, and standard deviations of the responses of the research sample members were calculated in the post and follow-up measurements on the visual perception skills scale for children with intellectual disabilities.

Table (7): Arithmetic averages and standard deviations of the responses of the research sample members on the scale of visual perception skills for children with intellectual disabilities in the post and follow-up measurement

We note from Table (7) that the arithmetic means of the post-measurement was (5.91), and the arithmetic mean of the follow-up measurement was (5.45).

To determine the significance of these differences, the Wilcoxon-Test was used for two correlated samples to indicate the differences between the mean scores of the experimental sample members in the post and follow-up measurement on the visual perception skills scale for children with intellectual disabilities in the follow-up measurement as in Table (8): The results of the Wilcoxon-Test for two correlated samples to indicate the differences between the mean ranks of the experimental sample members in the post- and follow-up measurement on the visual perception skills scale for children with intellectual disabilities

Statistical significance	Z	Rank total	Rank average	Sample	Ranks
		8.00	2.67	3	Negative ranks
		2.00	2.00	1	Positive ranks
0.257	1.134-			7	Equality whose grades remain the same
				11	Total

It is noticed from Table (8) that there are no statistically significant differences at the level of $\alpha = 0.05$ between the ranks of the group members' scores in the post and follow-up measurements on the visual

perception skills scale for children with intellectual disabilities in the follow-up measurement, and the value of (z) was (-1.134), and the level of Its significance is (0.257), a decrease in (3) degrees and a rise in (1) one degree is noted, as for those whose bikes remained the same (7). This result indicates that the long-term impact of the early intervention program based on electronic games on developing visual perception skills for children with intellectual disabilities is continuing

Discussing the results related to the first question: *"What is the effectiveness of the early intervention program based on electronic games in*

Standard deviation	Arithmetic mean	Sample	Category
3.56	5.91	11	Post measurement
3.47	5.64	11	Follow-up measurement

developing the visual perception of children with intellectual disabilities within the age group (2-5) years?" The results related to the first sub-question indicated that the early intervention program based on the electronic play was effective in developing the visual perception of children with intellectual disabilities within the age group (2-5 years). This can be explained by the fact that the electronic games designed for the program, in addition to the ease of their design commensurate with the characteristics of children with intellectual disabilities, which made it easier for the child to deal with them, playing it with ease and without complication, distinguished by its accuracy and quality, both in terms of accuracy and quality of colors, or the accuracy and clarity of the images selected within electronic games, in addition to providing the game with some visual hints for the answer, as well as providing immediate feedback, which contributed to giving the child with intellectual disability more ability to focus, pay attention, and work on trying to find and implement the required, in addition to enhancing the game for the child with intellectual disability after achieving success, winning, and the required achievement, and the diversity of games that were presented in the training program direct guidance that enables them to win improves their level of concentration, which is reflected positively on improving their visual perception. These results agree with those of Kim et al [21]. The results of which indicated a remarkable development of children with intellectual disabilities in cognitive

skills, including visual perceptual skills, for whom the electronic games program designed to develop cognitive skills was applied. Whereas visual recall was the highest effective among all children with intellectual disabilities to whom the program was applied, and it also agreed with the results of the study of Mustafa and others [14] whose results confirmed the effectiveness of the software used in improving the level of visual perceptual skills among children with intellectual disabilities.

Discussing the results related to the first hypothesis: *"Are there statistically significant differences at the significance level (α = 0.05) for the application of the early intervention program based on electronic play to develop visual perception for children with intellectual disabilities in the post-measurement?"* The results related to the first hypothesis indicated that there were statistically significant differences in the application of the early intervention program based on electronic toys to develop the visual perception of children with intellectual disabilities within the age group (2-5) years in the post-measurement, and this may be due to the fact that the electronic games that were used in the program have improved the level of visual perception, due to its excellence in the advantages of electronic play in terms of suspense and excitement, taking into account individual differences in receiving information and responding, and making the child in control of speed and response in proportion to him on the one hand, and its suitability to the characteristics of children with intellectual disabilities on the other hand, which contributed to creating a stimulating environment, suitable for their abilities, and had a positive impact on significantly improving their visual perception.

The electronic games of the training program were specifically designed to suit early intervention programs for people with intellectual disabilities within the age group (2-5 years) in terms of their content on the one hand, and in terms of design, colors, and visual effects on the other hand, in addition to considering it. In order of skills based on the developmental sequence of children with intellectual disabilities, and their developmental characteristics. This result agreed with the results of the study of Mustafa [14] whose results confirmed the effectiveness of the software used in improving the level of visual perception among children with

intellectual disabilities and agreed with the results of the study of Kim and Suk Lee [21] Which indicated the effectiveness of cognitive training programs based on electronic games in improving the cognitive abilities of children with intellectual disabilities, including visual perception.

Discussing the results of the second hypothesis: *"Are there statistically significant differences at the significance level (a = 0.05) for the application of the early intervention program based on electronic play to develop a visual perception of children with intellectual disabilities in follow-up?"* The results related to the second hypothesis showed that there were no statistically significant differences between the grades of the group children's scores in the post and follow-up measurements on the visual perception scale for children with intellectual disabilities in the follow-up measurement, and this result indicates the continuation of the long-term impact of the early intervention program based on electronic play for cognitive development visual for children with intellectual disabilities within the age group (2-5 years). This is due to the positive impact that the program had on children with intellectual disabilities in the visual perceptual aspect, through what it provided of electronic games that are fun, stimulating for children, and of nature far from traditional teaching methods, which led to the provision of information in a friendly manner for the child, as well as the involvement of more than one sense of receiving information and interacting with it. Also, the games included were characterized by ease and smoothness that suits the reality of the needs of children with intellectual disabilities, in addition to the diversity of strategies used during the implementation of the program. Which contributed, in one way or another, to the long-term impact of the program's content on the child with intellectual disabilities. The positive interaction of children with intellectual disabilities with this type of program has also been observed, as it focuses on attracting the child's attention and focus, improving his level of visual perception, and presenting the educational material in an entertaining, interesting, and enjoyable way. These results agree with that of Ikeana et al. [20] on the effectiveness of electronic games in learning, the long-term survival of learning, and the use of what has been learned in other activities and situations.

5. Conclusion

In light of the findings of the current research, it recommends the following: the need to expand the adoption of educational programs based on various electronic games to develop the visual perception of children with intellectual disabilities, and work to educate workers in the field of special education and train them to use technology in education, employing various electronic games in the educational process for children with intellectual disabilities which requires the provision of financial support from the competent authorities to develop electronic games and early intervention programs based on electronic games for children with intellectual disabilities commensurate with their abilities and different needs as well as conducting more empirical research to study the impact of electronic games on developing visual perception and other areas of development for persons with intellectual disabilities.

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