

# Effectiveness of Use PEAK Program in Developing Language Skills with Autism Spectrum Disorder Children in Oman

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## Abstract

The study aimed to reveal the effectiveness of the promoting emergence of advanced knowledge programs in developing language skills among a sample of children with an autism spectrum disorder in Oman. The study adopted the pre-experimental approach of the single experimental group with two pre- and post-measurements. 10 children with autism spectrum disorder (speakers) from (5-8) years and good mental ability were used and selected to achieve the objectives of the study. PEAK program was used and a scale for language skills was developed that consisted of (34) items distributed over two dimensions (receptive and expressive language). The validity and stability of the study tool was verified. The results of the current study showed that there were significant differences at ( $\alpha = 0.05$ ) level in favor of the post and follow-up application in the average performance of autism spectrum disorder children on the scale of language skills (receptive and expressive) attributable to the promoting emergence of advanced knowledge. The study recommended the preparation of periodic meetings and workshops for workers in the field of special education and autism spectrum disorder children in the Sultanate of Oman to learn how to employ the PEAK program in dealing with this group of children in Oman.

**Keywords:** promoting emergence of advanced knowledge, language skills, autism spectrum disorder

## 1. Introduction

The early childhood stage is one of the most sensitive stages, and the most susceptible to the growth of many disorders and difficulties that have a tangible impact on the various aspects of growth in children, this causes them to have many problems that affect their interaction with the individuals around them, and one of these disorders is: autism spectrum disorder.

Autism spectrum disorder is one of the most widespread developmental disorders nowadays, as this type of disorder appears in children from birth, it results from a neurological defect that affects brain functions, which leads to impaired language skills and affects their ability to communicate with other people, and also affects them socially and psychologically. It is imperative to work on finding mechanisms and criteria for diagnosing this disorder in children and detecting it early, to understand the characteristics of this group and work to design and develop appropriate therapeutic educational programs that contribute to the development of their various skills and reduce the distance between them and ordinary children (Abbas, 2018).

The Diagnostic Statistical Manual of Mental Disorders (DSM-V) states that autism spectrum disorder is characterized by persistent deficits in social interaction and communication across multiple contexts, in addition to specific and repetitive patterns of activities or behavior that appear in early childhood, especially before the age of three. Autistic children show significant functional impairment, an inability to interact emotionally or socially, repetitive and stereotyped use of language, and constant preoccupation with unusual things. It includes three main characteristics: the presence of fixed and repetitive behavioral patterns, deficiencies in linguistic communication of conversation and language, and deficiencies in social communication.

Yoder et al. (2015) confirm that developing expressive language skills requires developing receptive language skills, through which children with autism spectrum disorder can use spoken words to express their thoughts. Therefore, they can communicate with other individuals and adapt to them by using specific and clear messages

that work to achieve the desired goals, as the expressive language of children with autism spectrum disorder is characterized by repetitiveness and the inability to communicate with those around them. Hence it can be said that working on developing receptive and expressive language skills helps improve social interaction among children with autism spectrum disorder.

Through the importance of the program, the current study seeks to verify the effectiveness of the PEAK program in developing language skills and to know its impact on children with autism spectrum disorder.

### *1.1 Introduce the Problem*

Many training programs have emerged that guide children with autism spectrum disorder to develop weaknesses and deficiencies in their performance in various fields. These programs lead to improvements in their performance, communication, and social relationships. Many studies have indicated the importance of developing language skills, such as the studies by (Reinhartsen, 2019; Eduardo et al., 2018).

One of these programs is the promoting emergence of advanced knowledge skills program, which is based on the best practices of Applied Behavior Analysis, and on an accurate and reliable evaluation to identify existing skills and deficits in the learner's outcome, and on clear directions on how to collect, summarize, and present data to teachers of children with autism spectrum disorder. Many studies have proven the effectiveness of these programs in the educational process such as studies by (Tee et al., 2010; Yoder et al., 2015; Tsiouri et al., 2012)

Therefore, the present study sought to reveal the efficacy of using the PEAK program in developing language skills among a sample of autism spectrum disorder children in Oman.

### *1.2 Introduce the Study Questions*

This study's problem is determined by the next main question:

Q1: What is the effectiveness of using the PEAK program in developing language skills among a sample of autism spectrum disorder children in the Sultanate of Oman?

The sub-questions branch out from the main question as:

Q1.1: Is there a statistically significant difference ( $\alpha= 0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the dimension of receptive language skills attributable to the effect of the training program?

Q1.2: Is there a statistically significant difference ( $\alpha= 0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the expressive language dimension attributable to the effect of the training program?

### *1.3 Theoretical Framework*

This section dealt with an overview of the theoretical literature and previous relevant studies, which were reached by reviewing many studies published in scientific journals, databases, and the Internet, and reviewing the abstracts of doctoral theses related to the subject of study.

#### *1.3.1 Definition of ASD (Autism Spectrum Disorder)*

There have been many definitions that address autism spectrum disorder due to the many scientific viewpoints of specialists that sought to explain it. Most of these definitions focused on the behavioral symptoms of this disorder, reaching an agreed definition of autism spectrum disorder in a successive historical sequence is to clarify that disorder, as there have been multiple definitions of ASD that are based on theories that explain the disorder. Some have focused on the role of genetics and neurology, others on social and emotional impact, educational issues, or relationships of family, while other theories have focused on various factors (Schmidt, 2017).

The US Federal Law defines autism spectrum as a developmental disorder that significantly impacts communication, both verbal and non-verbal, and social interaction before the age of three. Negatively affects educational performance, and the characteristics of autism spectrum disorder include communication disabilities, engaging in stereotyped movements, resistance to change in the environment, and an unfamiliar response to sensory stimuli (Haddan et al., 2018).

Many important changes and improvements have been made to the Autism Spectrum Disorder Manual (DSM-5-TR) that are of interest to clinicians practicing and researchers. The changes made to the diagnostic criteria and definitions include adding diagnostic entities, updated terminology, and modifications. These changes resulted from two processes: the iterative revision process that allows for the addition or deletion of disorders and determinants. As well as the changes in diagnostic criteria that must be made continuously, which

began shortly after the publication of DSM-5, and the process of reviewing the supplementary texts, which began in (2019). Most of the changes that have been made since the publication of DSM-5 include minor changes, and they serve to correct errors, clarify any ambiguities, or resolve discrepancies between diagnostic criteria. The major changes in (DSM-5-TR) include the diagnostic entities added to (DSM-5-TR), lengthy sadness disorder, non-specific mood disorder, and mild stimulus-induced neurocognitive disorder. The mild mental disorder caused by stimulants was added to the existing types of mild mental disorders caused by substances such as (alcohol, inhalants, sedative-hypnotics, or anxiolytics).

Recognizing the fact that symptoms of neurocognitive, such as memory, learning, and difficulties of executive function, can be correlated with the use of stimulants and adding stand-alone symptom codes to separate other conditions that may be the focus of clinical attention to indicate the presence of suicidal behavior and non-suicidal self-harm. These codes will permit the doctor to record these clinically significant behaviors independently of any particular psychiatric diagnosis (First et al., 2022).

### 1.3.2 Communication Skills for Autistic Children

Most autistic children find it very difficult to use language as a tool for social interaction, as most autistic children lack the desire to establish communication to achieve certain social purposes. Some believe that 50% of these children are mute, that is, they do not use the language at all, while children who have acquired some language vocabulary may find it difficult to use such vocabulary functionally in different situations and social interactions. This is because they are not aware of the reactions of those individuals who listen to them, and therefore they have different anomalies in the language they use. One of the aspects of this anomaly in the language of children with autism spectrum disorder is the following, as pointed out by (Denman et al., 2017).

- Use of pronouns in a reverse way: one of the common manifestations in this category of autistic children is the use of pronouns in a confused way, the autistic child may refer to others with the pronoun (I) and to himself with the pronoun (he) or (she).
- Echolalia: Many autistic children use stereotypical or repetitive linguistic behaviors. They repeat the words that come from other people, and what is strange. They may repeat the words with the same tone of voice or with the same intensity, and this is called echolalia.

### 1.3.3 Linguistic Characteristics of Autism Spectrum Disorder Children

Autistic children develop an effective method of social interaction, known as using hand leading, where the child uses the hands of others as a means to fulfill his needs. For example, a child with autism spectrum disorder pulls the hand of the other toward the thing he wants, but without looking at it, and without any social interaction occurring between them. The method of signaling used by these children requires that others understand and realize that his signals refer to a specific thing that the child wants, and when the autistic child gets what he wants, he goes back and ignores others again (Radley, 2018).

Ozyurt and Dinsever (2018) indicate that about half of children with ASD (autism spectrum disorder) do not develop speaking language, while the remaining part of children grow and develop language in the form of independent words and separate phrases, but their ability to communicate remains weak.

Based on the above, it is noted that children with ASD suffer from linguistic difficulties that seem obvious in their inability to communicate at various levels and forms. Even if communication methods differ from one case to another and across different age stages, their communication differs from that of ordinary children, especially in the second year of their life. They also find it difficult to understand indirect communication methods; this is because they find it difficult to understand non-verbal messages.

### 1.3.4 Promoting Emergence of Advanced Knowledge Program (PEAK)

Early intervention programs are one of the most important types of therapeutic interventions for autism spectrum disorder, which has received increased attention and focus in recent periods due to its benefits and positives in the short and long term.

Belisle et al. (2016) state that to achieve the best development for individuals with autism spectrum disorder, it is necessary to provide appropriate support services in early childhood. Due to the effects of this stage on various aspects of the child's growth and development and helps him in the lifelong learning process. Many studies have also confirmed the importance of early Intervention in the development of pre-language communicative skills, improving the child's ability to communicate through daily life activities, and reducing stereotypical and undesirable behaviors in children with autism spectrum disorder.

PEAK is known as a linguistic curriculum dedicated to developing language skills and social interaction through

the science of behavior analysis, which promotes the independent approach and facilitates the development of new skills using previously acquired behaviors (Hahs & Jarynowski 2019).

Assessment through the use of this type is crucial to ensure that children have the most effective treatment options available. Therefore, the main objective of the current study was to determine the effectiveness of the PEAK program, as a program to develop language skills for children with autism spectrum disorder by comparing the PEAK assessment scores before and after treatment for children who received training using the PEAK curriculum against the same scores obtained from the same group in the usual way. The implementation of the PEAK program aids in the development of problem-solving and advanced language skills (Dixon et al., 2019).

This program includes skills for teaching in a way that enables learners to generalize and learn new skills more easily through the following models (Dixon et al., 2017):

- Direct training model: This model is based on training children with autism spectrum disorder to acquire academic skills and verbal behavior, and it relies mainly on Skinner's theory of academic skills and verbal behavior.
- Generalization model: This model is based on systematic training so that the learned skills are widely applied in the child's natural environment.
- Equivalence model: which relates to the process of training in the skills of reflexivity, symmetry, transitivity, and equivalence.
- Receptive transfer and assessment model: This is related to the process of training coordination, comparison, opposition, excellence, hierarchy skills, and showing or proving something directly.
- Transformation and Expressive Assessment Model: This model is concerned with the process of training coordination skills, the comparison and opposition framework, the distinction framework, the hierarchical framework, and then the precise framework.

Due to PEAK being frequently applied by front-line the staff of the school, there is a need to provide a long-term assessment of the efficacy of the curriculum when used as a systems-level intervention by teachers and staff of direct care. The instruction strategy recommended by PEAK is discrete trial training (DTT) because it allows the greatest amount of control over the presentation of stimuli and immediate reactions (Dixon et al., 2019).

Discrete trial training involves organizing responses to specific stimuli into individual displays called trials. This approach minimizes the time between stimulus presentations and reinforces correct responses, thereby helping learners comprehend the relationship between stimulus presentations and feedback on their responses.

The PEAK protocol includes a systematic study assessment and includes two protocols that have experimental support for the reliability and validity of the assessment. In addition to the effectiveness of the curriculum, PEAK also contains comprehensive training units, which are: direct training and generalization that emphasize a framework based on language development and social interaction, which is consistent with Skinner's relational framework theory (Dixon et al., 2019).

Through translating the Promoting Emergence of Advanced Knowledge (PEAK) program, it is noted that this program consists of five basic units. Two units were employed in this study, namely: the direct training unit and the generalization unit, as follows:

**First: Direct training unit:** It includes four skills, which are:

- 1) Basic learning skills.
- 2) Cognitive learning skills.
- 3) Verbal comprehension skills.
- 4) Memory skills, logical thinking, and mathematics.

**Second: Generalization unit,** which includes four basic skills:

- 1) Basic learning skills and basic social skills.
- 2) Basic verbal comprehension skills, memory skills, and advanced social skills.
- 3) Advanced verbal comprehension skills, basic problem-solving skills, and advanced mathematics skills.
- 4) Verbal thinking skills, advanced problem-solving skills, and advanced reading and writing skills.

The PEAK has sought to take into account the following principles in its objectives to clarify the objectives in

the training sessions: the possibility of measuring the objectives included in the training sessions, which helps to measure the extent to which the objectives are achieved or the extent to which the trainees learn, modify their behavior, design the objectives following the nature of the trainees, and make them the focus of the training process. It is noted that the content of the training sessions in the PEAK program is scientific, objective, and appropriate to the nature and characteristics of autistic children.

The PEAK program includes many training activities, characterized by a focus on various aspects of the trainees' personalities in an integrated and comprehensive manner, developing social skills, working to discover, develop, and guide the trainees' skills and abilities, training autistic children on self-reliance, and working to meet the needs of trainees through their participation in activities.

Based on the above, it can be said that the Promoting Emergence of Advanced Knowledge (PEAK) program works to develop the language and social interaction skills of children with autism spectrum disorder, starting from basic skills and reaching the use of concepts in general and in-depth. The most prominent feature of this program is identifying the points of need in the verbal behavior of the child, as it is one of the most advanced programs for the development of language skills, and offers means of assessment, treatment, and training as soon as possible.

Autumn et al. (2015) conducted a study aimed at evaluating the effectiveness of the PEAK program using a randomized trial on children with autism spectrum disorder in Houston, USA. To know the effectiveness of the educational curriculum described in the direct training unit for the PEAK program on the linguistic outcome. Twenty-seven children diagnosed with pervasive developmental disorders were evaluated using the direct training assessment protocol of the PEAK program. The study followed the semi-experimental approach, the children were divided into an experimental and a control group. The results of the study indicated that participants in the experimental group made significantly more gains in language skills than in the control group. (13) out of (14) children in the experimental group showed positive gains. It was also noted that among the children in the experimental group, there was a significant influence on the change before and after treatment.

Belisle, et al., (2016) in the United States of America conducted a study aimed at identifying the effectiveness of the training program for PEAK on-site to train (3) direct care employees to implement the PEAK program with (3) children with autism spectrum disorder. The Program for PEAK was used to develop evidence-based behavioral analytic language that uses discrete experiences to enhance language emergence. Results indicated that behavioral skills training led to improved trainers' implementation of the PEAK program and led to similar improvement in selected language skills across (2 out of 3) learners with autism spectrum disorder.

Leachko's (2020) study aimed to promote the PEAK program in the special education classroom (Kelsey-B), in the state of Otterbein, in the United States of America. The researcher used the direct training unit, which focused on the behavior of an 8-year-old second-grade student with ASD inside a specialized educational center. This is done by conducting a pre-assessment, where deficiencies in basic skills were identified and three behaviors focused on early intervention were selected. The program was implemented, and the results of the study indicated an increase in the student's grades after the implementation of the intervention using the program. The observations on the student's behavior showed improvement through the analysis of his data by the researcher.

Kimzey's (2020) study aimed to evaluate changes in the scores of the training system in the PEAK program among children with autism spectrum disorder, and to evaluate whether PEAK-Equivalence and PEAK-Transformation in the program work effectively to achieve the objectives intended to be taught to children with autism in the state of Missouri. USA. The equivalence unit and the transformation unit were chosen in the PEAK program, which focuses on the emergence of the relational response derived from (Dixon et al., 2019). The study was applied to a (7-year-old) student, and the program was applied to teach him many skills in (10) weeks. The results indicated that there was a continuous improvement in the student's performance in most skills in varying proportions, but that improvement was not constant at first, and after intensive and continuous training on skills in which he did not show any improvement, he was able to master what he needed to continue improving in his application of PEAK.

## 2. Method

The nature and objectives of the current study require the use of a pre-experimental approach with one experimental group, with pre-and post-measurements. The study aims to impact the effectiveness of the PEAK programs in developing language skills among a sample of autism spectrum disorder children. It is concerned with providing an accurate description expressed in a quantitative expression that gives us a numerical description that shows the amount of development in the language of the study sample, by applying the study

tool to the study sample.

### 2.1 Study Individuals

The sample was chosen intentionally, such that (10) children with autism spectrum disorder (speakers) were selected and have good mental ability with intelligence rates ranging between 71 and 85. Those who received the lowest scores on the study tool for detecting language disorder consisted of (3 and 7) female and male children respectively, ranging in age from (5.4) years to (7.8) years at Al Awael International Center for Autism Spectrum Rehabilitation in Oman. Table 1 shows this.

Table 1. Speaking children with autism spectrum disorder

Student's No.	Age
1	3.6 years
2	5.7 Years
3	7.1 Years
4	4.5 Years
5	7.8 Years
6	6.9 Years
7	6.11 Years
8	5.9 Years
9	7.3 Years
10	7.1 Years
Average age	6.7 Years

### 2.2. Study Variables

#### 2.2.1 Independent Variable

The program: The effectiveness of the PEAK program in developing language skills among a sample of children with an autism spectrum disorder.

#### 2.2.2 Dependent Variable

Language Skills.

Thus, the design of the current study will be as follows:

Experimental group

O1 × O1

Whereas (O1): Includes a measure of language skills (pre and post. (X): Treatment using the PEAK.

### 2.3 Study Tools

First: A measure of language skills for children with autism spectrum disorder

The language skills scale for children with autism spectrum disorder was developed in light of reviewing a lot of literature, such as referring to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and previous studies, such as the study (Calum et al., 2019; Ackley et al., 2019). The study tool consisted of (34) items divided into two dimensions: (receptive language, and expressive language) within the triple Likert scale, which is concerned with measuring language skills among a sample of autism spectrum disorder children in Oman. Note that all items of the scale are positive, which have been corrected as follows:

Low is given a score of (1), medium is given a (2) score, and high is given a (3) score.

### 2.4 Validity and Reliability of the Tool

#### 2.4.1 Validity of the Language Skills Scale for Children with Autism Spectrum Disorder

##### A. Content validity

The scale was presented in its initial form to (17) arbitrators with experience in the specialization of special education, measurement, and evaluation, numbering (14) in the Omani, Jordanian, and other universities and (3) from specialists working in autism centers. To judge the appropriateness of the linguistic formulation of statements ensure that they belong to the dimensions of the scale, and ensure that it is free of typographical, spelling, and linguistic errors. The amendments proposed by the arbitrators were made to several paragraphs and

noted that the degree of agreement between the arbitrators on the tool was (82.3%).

#### B. Internal consistency validity

To ensure the validity of the internal consistency of the scale's items, it was applied to an exploratory sample consisting of (30) autistic children from outside the study sample. The internal consistency validity coefficients using Pearson Correlation to show the consistency of the paragraphs in measuring the dimensions contained therein.

#### C. Construct validity

The construct validity of the language skills scale for children with autism spectrum disorder was verified by finding the correlation of the score of each item with the total score of the tool on the one hand and calculating the correlation coefficient of the score of each item with the dimension to which the item belongs, using Pearson correlation coefficients, and Table 2 shows this.

Table 2. Pearson correlation coefficients for items in the Language Skills Scale for children with autism spectrum disorder, with their total score and the dimension to which the item belongs

Dimension	Items' No	Correlation coefficient with dimension	Correlation coefficient with the total score
Receptive Language	1	.909**	.890**
	2	.918**	.897**
	3	.947**	.927**
	4	.819**	.839**
	5	.849**	.872**
	6	.834**	.855**
	7	.835**	.733**
	8	.914**	.816**
	9	.925**	.920**
	10	.865**	.855**
	11	.623**	.504**
	12	.608**	.586**
	13	.632**	.610**
	14	.647**	.626**
	15	.834**	.831**
	16	.837**	.938**
	17	.715**	.801**
Expressive Language	18	.605**	.664**
	19	.761**	.840**
	20	.325**	.533**
	21	.314**	.545**
	22	.314**	.545**
	23	.277**	.503**
	24	.323**	.537**
	25	.837**	.928**
	26	.871**	.905**
	27	.878**	.898**
	28	.334**	.307**
	29	.364**	.389**
	30	.356**	.379**
	31	.404**	.402**
	32	.336**	.372**
	33	.544**	.572**
	34	.186**	.151**

\*\*Significance level at (0.01).

It is clear from the previous table that all the correlation coefficients between all the items and the total score of

the tool on one hand and between the item and the dimension to which it belongs were statistically significant at the significance level ( $\alpha = 0.01$ ). This indicates that the internal consistency between the items that make up the tool is acceptable and that it is structurally valid, and is considered valid for application to the study sample members.

#### 2.4.2 Stability of the Language Skills Scale for Autism Spectrum Disorder Children

After verifying the validity of the internal consistency of the scale, the stability of the scale items and all the (30) exploratory sample individuals with autism spectrum disorder were calculated, the stability coefficient was calculated using the Person Correlation equation, and those coefficients were extracted for the total score of the scale for the two skills (receptive and expressive). The internal consistency of the scale items was also calculated, and the stability coefficient was calculated using the Cronbach alpha equation. Table 3 shows the results.

Table 3. Stability coefficients for a measure of language skills for autism spectrum disorder children

Skills	Person coefficient	Cronbach alpha
Receptive Language skills	0.885	0.755
Expressive Language skills	0.833	0.764
Total	0.833	0.870

Table 3 indicates that the stability coefficient for the total score of the language skills scale using the Pearson coefficient was (0.833), and the stability coefficients for the dimensions of the scale in this way ranged between (0.885-0.833), while the stability coefficient for the total score of the scale using Cronbach alpha was (0.870), and the stability coefficients for the dimensions of the scale in this method ranged between (0.764-0.755). All of these values are acceptable and have appropriate degrees of stability for the current study.

#### Second: PEAK Program

The training program includes a set of sessions that include objectives formulated according to promoting emergence of advanced knowledge, which are concerned with children with autism spectrum disorder. It includes a set of verbal commands that the child is required to respond to and stimuli that the child is required to respond to by interacting with them.

After its translation, the program was presented in its initial form to (17) arbitrators with experience in the specialization of special education, measurement, and evaluation, numbering (14) in the Omani, Jordanian and other universities, and (3) from specialists working in autism centers. To judge the appropriateness of the language formulation of the translated sessions and ensure that they belong to the program, and to ensure that he is free of typographical, spelling, and linguistic errors and accuracy of the translation, also to ensure that the skills are appropriate to the Omani child's environment, and the proposed amendments by the arbitrators were made.

### 3. Results and Discussion

This section shows the results of the study and discusses which aimed to verify the effectiveness of the PEAK program in developing language skills among a sample of children with autism spectrum disorder in Oman. The following are the results of the study based on its questions:

Q1.1: Is there a statistically significant difference ( $\alpha = 0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the dimension of receptive language skills attributable to the effect of the training program? To answer this question, the Wilcoxon test for correlated samples was applied to the averages of the experimental group's performance ranks in the pre-and post-measurements on the receptive language skills dimension, and the results were as follows.



Table 4. Wilcoxon test for correlated samples on the averages of the experimental group's performance ranks in the pre-and post-measurements on the receptive language skills dimension

Dimension	Measurement	Arithmetic Average	Standard Deviation	Ranks distribution	No.	Average ranks	No.	Average ranks	Sign. level
Receptive Language Skills	Pre-measurement	1.85	0.35	Negative	0	0.00	0.00		
	Post-measurement	2.21	0.28	Positive	10	5.50	55.00	- 2.810	0.005
				Equality	0				
				Total	10				

It appears from the previous Table that the value of (Z) for the difference between the pre-and post-applications of the receptive language skills dimension reached (-2.810), with a significance level equal to (0.005), and this value is statistically significant at ( $\alpha = 0.05$ ) level. That indicates that there is a statistically significant difference ( $\alpha = 0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the dimension of receptive language skills attributable to the effect of the training program. The difference was in favor of the post-application, as evidenced by the fact that the average ranks (5.50) were higher than the average ranks for the pre-application (0.00).

The researchers attribute this result to the fact that the PEAK program works to provide various activities and training that children with autism spectrum disorder prefer, the philosophy of this program also aims to develop their receptive language skills (vocabulary and sentence structure).

This result was attributed to the fact that the trainers presented the program using a variety of multimedia from: images and sounds, and they guided the autistic children who formed the research sample to watch the images and listen to the sounds. The trainers noticed the children's response to the media presented to them, the themes of which revolve around (animals/ geometric shapes /vegetables/ fruits). As well as actions expressing everyday life, actions expressing personal hygiene, and what indicates situations and problems that we are exposed to in our daily lives, verbs expressing emotions, spatial relationships, and simple adjectives were also used. All this can contribute to the learning of each of the autistic children through these media to form a sentence of two or three words, which leads to the development of receptive language skills in them.

The reason for this result may also be due to the evaluation process included in the program, which the trainers conducted at each session and showed that each child can recognize all or most of his five senses, and he performs the process of distinguishing between various geometric shapes and basic colors. It was also noted that each child in the sample can identify vegetables, fruits, and animals by pointing to their images. This may confirm the effectiveness of the Promoting Emergence of Advanced Knowledge (PEAK) program in developing receptive language skills in children with autism spectrum disorder.

The result of this study is consistent with the study of (Autumn et al., 2015); the results of the study showed that there are statistically significant differences in favor of the experimental group in the acquisition of language skills due to the impact of the PEAK program. The result of this study is also consistent with the study of (Dixon et al., 2017), the results of which showed the effectiveness of the program (PEAK) in enabling children with autism spectrum disorder to acquire the language skills that were selected in the assessment of the PEAK program.

The result of this study is also consistent with the study of (Bangert et al., 2019), the results of which concluded that children with ASD with low symptoms can successfully carry out the process of learning and receiving new vocabulary if this category of children receives an intervention that includes implicit and explicit instructions.

Q1.2: Is there a statistically significant difference ( $\alpha= 0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the dimension of expressive language skills attributable to the effect of the training program?

To answer this question, the Wilcoxon test for correlated samples was applied to the averages of the experimental group's performance ranks in the pre-and post-measurements on the expressive language skills dimension, and the results were as follows.

Table 5. Wilcoxon test for correlated samples on the averages of the experimental group's performance ranks in the pre-and post-measurements on the expressive language skills dimension

Dimension	Measurement	Arithmetic Average	Standard Deviation	Ranks distribution	No.	Average ranks	Total ranks	Z-value	Sign level
Expressive Language Skills	Pre-measurement	1.92	0.35	Negative	0	0.00	0.00	-2.530	0.011
	Post-measurement	2.20	0.28	Positive	10	4.50	36.00		
				Equality	0				
				Total	10				

It appears from the previous Table that the value of (Z) for the difference between the pre-and post-applications of the expressive language skills dimension reached (-2.530), with a significance level equal to (0.011), and this value is statistically significant at the level of ( $\alpha=0.05$ ). This indicates that there is a statistically significant difference ( $\alpha=0.05$ ) between the average ranks of the experimental group in the pre-and post-measurements on the expressive language skills dimension attributed to the effect of the training program. The difference was in favor of the post-application, as evidenced by the fact that the average ranks (4.50) were higher than the average scores for the pre-application (0.00).

The researchers attribute this result to the PEAK program including a set of strategies that had an effective impact during the implementation of the program sessions, including (positive reinforcement). After the application of the program, the trainers asked the children to pronounce some of the linguistic vocabulary (expressive language) that they learned and received (the receptive language) while they were applying for the program like saying (look by the eye, hear by the ear, touch the objects by hand, the sun is yellow, wash my hands with soap) and other sentences and phrases. The trainers also asked the children to imitate some movements or actions (eating, laughing, drinking, sleeping), and based on the above, the researchers believe that the strategies included in the PEAK may contribute to developing the ability of children (research sample) to express words and movements, which positively affected their expressive language skills.

This may be because the small age of the study sample of (5-8) years led to an improvement in the performance of the experimental group in the language exercises on which the program depended, which focused on providing the study sample with expressive language skills. The researchers' use of consolidation methods for correct responses increased the knowledge of the meanings of words. The development of expressive language skills of the experimental group members is due to the inclusion of many sensory sources in the PEAK program, following the correct rules in pronunciation and speech training, and even focusing on pronouncing the word and using more than one means of expression.

The researchers also explain this result by the fact that during the application of the program of PEAK, the child is exposed to experiences and interacts with them, for example, showing the child pictures during training and participating him in the appropriate comments on them gives the child a sense of participation and effectiveness, which results in learning and generalizing desirable concepts and behavioral patterns.

The result of this study is consistent with the study (Schmidt, 2017), the results of which indicated that the experimental group achieved gains in expressive language variables attributable to the impact of the training program.

#### 4. Conclusions

Children with Autism Spectrum Disorder (ASD) often face challenges in developing language skills. Communication difficulties are a hallmark of ASD, making it crucial to implement specialized programs to support language development in these individuals. PEAK programs tailored to the unique needs of children with ASD can significantly promote the emergence of language skills and the potential for language acquisition and expression. While challenges exist, the benefits of such programs far outweigh the hurdles, ultimately leading to improved communication and quality of life for children with ASD.

#### 5. Recommendation

In light of the results of this study and its discussion, the researchers recommend the following:

- Preparing periodic meetings and workshops for special education workers and parents of children with autism spectrum disorder in the Sultanate of Oman to learn how to employ the PEAK program in dealing with this category of children. It is one of the appropriate programs that have proven effective in educating these children and enabling them to deal with the environment surrounding them.

- Adoption of the PEAK program in the training of special education workers in the Sultanate of Oman before and during the service to give them new knowledge skills to help them deal with children with autism spectrum disorder.
- Researching the effectiveness of the PEAK program and studying its impact on other standards, such as alleviating aggressive behavior, alleviating stereotypical behaviors, developing arithmetic concepts, developing daily life skills, and thinking skills in children with autism spectrum disorder.
- Focusing on rehabilitation programs for children with autism spectrum disorder and training them in language skills.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### **Data sharing statement**

No additional data are available.

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