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# The Effectiveness of a Training Program to Develop an Attitude toward Creativity in Gifted Children with Autism Spectrum Disorder

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**Abstract.** Attitude toward creativity may play a central role in developing creative abilities in gifted children with autism spectrum disorder (ASD), so, examining attitudes toward creativity is important. This empirical research evaluated the effectiveness of a training program to develop attitudes toward creativity, that is, training that encourages the production of a wide range of ideas marked by freshness and originality in the realms of talent; these ideas should be practical and beneficial, and well received in the community in which these gifted children live). The sample involved six gifted children with ASD, aged between 8 and 12 years. A quasi-experimental approach was used, the Scale of Attitude toward Creativity was applied, and the training program was presented by the researcher. The results show a statistically significant difference ( $p < 0.05$ ) between the mean ranks of participants on the Scale of Attitude toward Creativity before and after the application of the training program, in favor of the post-test. After two months, a follow-up application of the Scale of Attitude toward Creativity found no statistically significant difference between the mean ranks of participants between the second and third evaluation. In light of these findings, the researcher recommends that the necessary services and funds are provided to develop the talents of gifted children with ASD. Specialized programs should be pursued in the fields of the talents discovered in these children. Research in the field of giftedness and ASD should be strengthened and gifted children with ASD must participate and be included in various relevant programs and events.

**Keywords:** Attitudes toward creativity; Autism spectrum disorder; Gifted children

## 1. Introduction

Neurodevelopmental disorders typically emerge in the early stages of development and are characterized by growth deficits that result in impairment

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in individuals' social, academic, and occupational performance. This growth deficit may vary from specific difficulties in learning or controlling executive functions, to pervasive deficits and general complications relating to social skills or intelligence. The fifth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorder (DSM-5), released on May 18, 2013, contains many changes and new diagnostic criteria for a number of disorders. The DSM-5 presents a comprehensive diagnosis for autism spectrum disorder (ASD)—a neurodevelopmental disorder—that includes a number of previously separate conditions, namely autistic disorder, Asperger's syndrome, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (Sanchack & Thomas, 2016).

The term ASD describes a group of deficiencies in communication and social interaction that appear at an early age, together with the emergence of recurrent sensorimotor behaviors. These disorders are associated with a strong genetic component, in addition to other causes. Today, the outlook for many people with ASD is much brighter than it was 50 years ago. Many people with ASD are able to speak, read, and live in the community, and some will be largely asymptomatic by adulthood (Lord et al., 2018).

Prior to the publication of the DSM-5, it was believed that children with ASD could not possess any form of talent. An exception is those with Asperger's syndrome, which Mohamed (2008) notes is rare in children with below-average intelligence. While many children with Asperger's syndrome have a high or very high level of intelligence, these children are not typically regarded as gifted. Some children with ASD may have high levels of abilities in certain domains that some might consider a talent; however, these abilities cannot be considered talents, for several reasons. First, criteria for considering a child as talented include that a child does not have an intellectual disability. Second, giftedness requires an IQ of at least average. Finally, talent requires innovation and a certain level of adaptive behavior (Mohamed, 2008).

Al-Maaytah and Al-Bawalis (2004) disagree that talents are special abilities of a formative origin and related to intelligence level. Rather, they view talent as the ability to reach a high level of performance in a field that is not related to intelligence; thus, they argue that some talents may be found among those diagnosed with intellectual disability.

Bennett and Heaton (2012) agree, and report that children with ASD often possess special skills that appear in three main areas: music, drawing, and data processing. The study did not view intelligence and adaptive behavior as two conditions for giftedness. Gifted individuals with ASD comprised 42% of the study sample, among them 5% had intellectual disabilities. Hughes et al. (2018) support the notion of the existence of special talents in those with ASD, specifically savant syndrome. However, it is unclear why some people with autism have these skills and others not.

Zhang and Han (2018) note that, while ASD is a pervasive developmental disorder, characterized by profound social and verbal communication deficits, stereotyped motor behaviors, specific interests, and abnormal cognitive aspects, one of the most distinctive and mysterious characteristics of this disorder is the superior talent of some children, who are called autistic savants. Suleiman (2012) points out that the talents of a child with ASD may appear in many forms, the most common of which are superior abilities in mathematics, memorization, architecture, drawing, and music. Additionally, some children have a superior ability for keeping calendars and others can remember facts and details such as dates of ancient historical events, names of presidents, geographic information, or dates of birth. Others have superior drawing ability or can remember small details, such as the number of trees on a street. Children may lose some of these talents, especially in drawing and music, during puberty. Clark (2017), similarly, observed that children and adults with ASD may demonstrate remarkable abilities or skills in one or several areas, namely art, music, mechanical or spatial skills, and calculations, among others. However, these talents often appear in the form of obsessive and repetitive behaviors.

The literature, thus, demonstrates that some children with ASD have superior abilities and capabilities in one or more specific fields. These children may benefit from research and programs aimed at developing their attitudes toward creativity, and nurturing their talents. Therefore, the current study sought to develop an attitude toward creativity among gifted children with ASD through the application of a training program. The training program also sought to encourage them to adapt and use their talents to serve their communities, to ensure their beneficial involvement with the society in which they live, which would have a positive reflection on their mental health.

### **1.1. Statement of the Problem**

The concept of giftedness refers to a child's possession of extraordinary, innate potential in one or more areas, and that is appreciated in a particular place and time. From a linguistic point of view, talent is considered to be a child's innate aptitude. However, defining some of the terms related to the concept of talent is more difficult from an educational and idiomatic point of view. Complex traits may predispose the child to high achievement in some skills and jobs. While the gifted child is perceived as having an innate aptitude, the appropriate environment may be necessary to develop the related skill, which could be music, poetry, or drawing (Al-Assal, 2013). The term autistic savant syndrome is often used by researchers to refer to children with ASD who have superior talent. Mada (2021) reports that the term "double-exceptional learners" may be used to refer to children who are in a gifted program and a special education program at the same time. Further, the American Psychological Association indicates that an autistic scientist is a gifted child with an intellectual disability or ASD who shows distinct abilities or talents in a field such as arithmetic, paranormal memory, or music (APA, 2015, p. 934).

Children with ASD may be doubly exceptional – marked by the presence of both talent and disorder at the same time. The shortcomings that gifted children with

ASD suffer from, such as lack of communication and social interaction, and the practice of repetitive and restricted patterns of behavior, interests and activities, does not preclude their level of performance being distinctive, especially regarding excellence in scientific fields. It is suggested that guiding these children into a less restrictive educational environment gives them the opportunity to develop and enhance their giftedness, and enables them to achieve the highest level of efficiency (Wadani & Aboul Fotouh, 2019). Therefore, the researcher sought to develop a type of attitude toward creativity in these children, in order to train them to produce a variety of original ideas in the fields in which they are gifted, and to be appreciated for their contribution to society. Suleiman (2012) explains that, while theories have been put forward in this regard, none have received sufficient scientific support. Current educational efforts and practices are limited in the support or development it can offer for talents of children with ASD (Wadani & Aboul Fotouh, 2019). Some studies found that individuals with ASD demonstrate lower performance on creativity tasks, yet may have innovative output in some domains (Kasirer & Mashal, 2014; Kasirer et al., 2020; Pring et al., 2012). Mada (2021) recommends taking special care to provide an appropriate environment that is mentally stimulating for these exceptional children, so that they can develop further and learn how to apply their talents better. In this context, the following research question was investigated: Does the training program used in this study affect the development of an attitude toward creativity in gifted children with ASD? The following questions were used to evaluate the effectiveness of the training program:

1. What was the degree of difference between the mean ranks of the study sample on the Scale of Attitude toward Creativity before and after the application of the program?
2. What was the degree of difference between the mean ranks of the study sample on the Scale of Attitude toward Creativity after completing the program and at follow-up after two months?

## **1.2. Significance of the Research**

The theoretical and practical importance of the current research is as follows:

### **A - Theoretical importance**

1. Enriched theoretical frameworks that concern children with ASD in general, and gifted children with ASD in particular;
2. Enriched theoretical frameworks concerned with the importance of an attitude toward creativity in gifted children with ASD;
3. Contributed to increasing attention on gifted children with ASD, and developing their abilities; and
4. Added to the body of research aimed at developing an attitude toward creativity in gifted children with ASD. To the researcher's knowledge, there is a lack of research generally, and Arab studies in particular, on this topic.

### **B - Practical importance**

1. The results of this study can be used to prepare training programs to develop the talents and behavior of gifted children with ASD.
2. This study provides a scale to measure an attitude toward creativity in gifted children with ASD.

3. A training program is proposed to develop an attitude toward creativity in gifted children with ASD.

### **1.3. Research Objectives**

The current study aimed to evaluate the effectiveness of a training program to develop an attitude toward creativity in gifted children with ASD and to test the effectiveness of this program in helping these children achieve the required procedural goals.

### **1.4. Definitions of the Main Concepts**

- a. **Training program:** Procedurally defined as a set of integrated, interconnected, sequenced, planned activities presented to gifted children with ASD and between the ages of 8 and 12 years, in a specific period of time, with the aim of developing their attitudes toward creativity, in order to refine and develop their talents.
- b. **Attitude toward creativity:** Procedurally defined as positive preparation that enables gifted children with ASD to produce a variety of ideas characterized by novelty and originality in the fields of talent that appear in these children, provided that these ideas are purposeful and useful and receive appreciation in the society in which they live.
- c. **Gifted children with ASD:** Procedurally defined as children who were regularly enrolled in autism programs at special education schools or classes attached to institutions of intellectual education in Al-Ahsa governorate, Saudi Arabia, and who have been diagnosed according to the criteria for ASD in the Kingdom of Saudi Arabia.

## **2. Literature Review**

The Saudi Ministry of Education (2015) defines ASD as a persistent deficit in social communication and social interaction across multiple contexts, through deficits in social and emotional exchange, deficits in nonverbal communication behaviors used in social communication, and deficits in developing, maintaining, and understanding relationships (Saudi Ministry of Education, 2015, pp. 10–11). A 2018 report by the Centers for Disease Control and Prevention on the Autism and Development Disabilities Monitoring Network shows that the prevalence of ASD has risen, to 1 of every 54 natural births, which is twice the average in 2004 (Autism Society, 2020). The report also indicates that males were 4.5 times more likely than females to have ASD. However, the report notes that recent research suggests that females may not display ASD in the same way as males and, thus, may not be diagnosed with it.

The symptoms that are used to diagnose ASD vary. Displayed behaviors encompass social, cognitive, linguistic and kinesthetic development. Symptoms can vary between mild and severe (Abu Al-Nour et al., 2014). The new diagnostic criteria for ASD, according to the DSM-5, can be briefly described as follows:

1. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history:

- Limited and repetitive behavior, interests, or activities, whether current or prior.
3. Symptoms should appear in the early developmental period (but the symptoms may only appear completely when social needs exceed limited capabilities, or may be masked by learned strategies in later life).
  4. The symptoms cause significant social or functional impairment, or significant current functional impairment.
  5. These imbalances are not well explained by intellectual disability (mental developmental disorder) or total developmental delay, as intellectual disability and ASD often go hand in hand. The expected level is relative to the general level of growth (American Psychiatric Association, 2013).

Yahya (2010) observed that, while psychologists and educators define a gifted child in multiple ways, these definitions fall into two categories. First, the traditional, classic definitions focus on the standard of mental ability, which is considered as the child's level of intelligence. The second emerged as a result of criticisms leveled at the classical definitions, which do not measure children's abilities and traits, such as creative abilities and special talents, in addition to other criticisms regarding the cultural, racial and class biases of some definitions. Similarly, Al-Quraiti (2011) points out that scholars and researchers differ in their definition of creativity. Some focus on the creative process, such as how creativity is expressed within the individual, while others emphasize creativity as a lifestyle that leads to self-development and achievement. Still others regard creativity from the standpoint of the creative preparations and energies that qualify the person for creative performance later on, and some emphasize the creative person, by defining creativity in relation to an individual's characteristics. Finally, some define creativity from the perspective of the outcome that results from an individual's preparations and the process, that is, the particular psychology of the entire process. Likewise, Ibrahim and Sheikh (2010) note that defining talent is also problematic, as it is difficult to agree on a right and proper definition. Talent has been defined as both intelligence and as the ability to solve problems or devise solutions, among other definitions. Finally, gifted people are defined as those who have extraordinary aptitudes and abilities, or who perform distinctly from their peers in one or more areas valued by society, especially in educational attainment, innovative thinking and special skills. Typically, gifted students need special educational care that is seldom available to them in an integrated manner.

Savant skills are a form of islands of abilities, which are unusual and noticeable abilities in certain areas in a small number of people with ASD. These remarkable abilities appear in approximately 10% of people with ASD, but in only 1% of people without ASD. Previously, people with these abilities were called "idiot savants" (brilliant idiots), but this designation has been replaced by the term autistic savant or high functioning autistic (Al-Quraiti, 2011, p. 448; Suleiman, 2012).

Pring et al. (2012) evaluated nine talented artists with ASD, nine artistically gifted students with ASD, nine students with ASD who were not artistically gifted, and nine individuals with mild/medium learning difficulties within and outside their

area of expertise. The study aimed to ascertain whether the artists' performance was related to their artistic ability, their diagnosis of ASD, or their level of intellectual functioning. The results showed that, in a drawing task, artistically gifted students with ASD were more creative on fluency, originality, mastery, and flexibility than the other three groups. Although the first group provided more detailed responses than the third and fourth groups, no differences in other indicators of creativity in the non-drawing task were observed between the four groups.

A study by Akl (2014) assessed the effectiveness of a play-based training program in developing the visual perception of gifted children with ASD, and its impact on their verbal communication. The study sample consisted of eight children, ranging in age from 6–10 years. The results confirm the effectiveness of the play-based training program for developing visual perception of gifted children with ASD, which the study achieved to varying degrees.

Kasirer and Mashal (2014) conducted a study of verbal creativity in adults with ASD, using tasks based on new figurative language. Seventeen adults with ASD (mean age 21.06 years), and 17 adults without ASD (mean age 22.71 years) completed a multiple-choice questionnaire consisting of traditional and new tropes to test comprehension, and a sentence completion questionnaire to test creative language generation. The results showed similar performance in understanding traditional and new tropes in both groups. Furthermore, adults with ASD produced more creative tropes compared to the other group. Scores of both groups on the vocabulary and naming tests predicted understanding of traditional metaphors, while scores on tests of mental flexibility predicted new metaphors. Additionally, scores on a nonverbal intelligence test contributed to predicting metaphor generation. The study suggests that verbal creativity is unique in individuals with ASD.

Fairouz (2018) aimed to identify differences in type of giftedness according to the cognitive skills of gifted individuals with ASD. The study also sought to determine differences between individuals with ASD who were gifted with cognitive skills, and non-gifted individuals with ASD. The study sample comprised 28 males with ASD, ranging in age from 8–20 years old, including eight people with talents. Eight mothers and 10 teachers were also included in the study sample. The study used a qualitative and descriptive approach. The results suggest that gifted people with ASD are similar in cognitive skills, such as selective attention, distinct memory, attitude for detailed processing of information, and exhibition of stereotypical behavioral characteristics and special interests. Quantitative results for gifted individuals with ASD showed the highest averages for the two dimensions of memory and stereotyped behaviors, while the lowest average reflected social interaction. A statistically significant difference was found in the memory dimension, and the total questionnaire score, which favored gifted individuals with ASD.

Hughes et al. (2018) tested three groups. The first group consisted of gifted individuals with ASD, the second group consisted of non-gifted adults with ASD,

and the third group included adults without ASD who did not have superior skills. Cognitive and behavioral characteristics were measured with a self-report battery and a number of scales that measured sensory overload, obsessive behaviors, cognitive patterns, and broader features related to ASD, such as social communication and organization. The study also evaluated the presence of superior skills in the three groups. Results showed increased sensory sensitivity, obsessive behaviors, technical/spatial abilities, and organizational ability for gifted individuals with ASD, in addition to a different approach to learning tasks. The results also showed rare cognitive and behavioral characteristics in adults with ASD who possessed superior skills, compared to adults with ASD without such skills.

A study by Hetzroni et al. (2019) compared the creative thinking abilities of 20 children with ASD and 20 children without ASD, ranging in age from 9–11 years. The study compared performance on four different tests of creativity: the Pictorial Multiple Solutions test, a general creativity test, and the Creating Equal Number test, and a mathematics creativity test. The relationships between general and mathematics creative thinking were investigated through cognitive scales, including nonverbal intelligence, verbal and nonverbal working memory, and attention. The results suggest that creativity can be found in people with ASD.

Wadani and Aboul Fotouh (2019) aimed to build and standardize an assessment scale for behavioral indicators predictive of talent. Their sample consisted of 98 randomly chosen students with ASD enrolled in 10 special education programs in the Jazan region, Saudi Arabia. Participants were from the same social, cultural and economic class, and ranged in age between 7 and 12 years. The construction and standardization procedures included several methods to verify the validity and reliability of the scale. The final scale consisted of three dimensions: metacognitive skills, visual-motor skills, and psycho-social skills. A total of 66 items represented behavioral indicators that could be considered predictors of talent in students with ASD. These students require an effective supportive environment to manifest high performance.

A study by Kasirer et al. (2020) examined verbal and figurative creativity in a sample of 40 children with ASD, ranging in age between 11 and 14 years, and 39 children without ASD ranging in age between 11 and 15. A sentence completion questionnaire was used to test verbal creativity, while a non-existent object drawing task was used to assess figurative abilities. Use of creative metaphors was also examined. The results showed that children with ASD showed greater use of a particular type of representational change in the metaphorical creativity task (e.g., drawing a house with a tail). While phonemic fluency contributed to the variance in the generation of new metaphors in the group of children with ASD, fluid intelligence, although only marginal, contributed to variance in the generation of new metaphors in the group of children without ASD. The results also indicate that verbal creativity and figurative creativity were two separate abilities that depended on different cognitive sources. Children with ASD and children without ASD differed in the cognitive abilities they used to perform the task of generating metaphors. The study also indicated a unique creative cognitive

profile for children with ASD, namely the contribution of executive functions to creative performance.

### **3. Materials and Methods**

#### **3.1. Research Approach**

The researcher used the quasi-experimental approach, as it relied on the design of a single group. Moreover, a training program that had been developed by the researcher was used as independent variable to verify its effect on the attitude towards creativity (dependent variable) in the sample.

#### **3.2. Research Sample**

The original population of the study consisted of all gifted children with ASD who regularly enrolled at the Autism Institute, and inclusive integration in general education classes in Al-Ahsa Governorate, Saudi Arabia; the total numbered 24 children. The sample consisted of six gifted male children with ASD enrolled in the Autism Institute. The children were diagnosed according to the criteria of the Saudi Ministry of Education. Ages ranged between 8 and 12 years (mean 10.50, standard deviation 1.64). The researcher obtained permission from the Scientific Research Ethics Committee through the Deanship of Scientific Research at King Faisal University, and also obtained written consent from the participants' parents. The research was conducted during the first semester of 2021/2022.

#### **3.3. Research Instruments**

##### *3.3.1. Attitude toward Creativity Scale (ATCS)*

This scale was developed by the researcher for gifted children with ASD, to evaluate their attitude toward creativity. It consists of 18 items. A three-point Likert scale is used to answer questions: from 1 (*never*), to 3 (*always*). The researcher calculated the external criterion validity for the scores of the ATCS, and the Attitude Toward Creativity scale of Al-Dakhil (2019) on a sample of nine children. The correlation coefficient value was found to be 0.794, and the test-retest reliability after two weeks was 0.885 ( $p < 0.01$ ), which is statistically significant.

##### *3.3.2. Training Program*

The researcher prepared a training program with the aim of developing an attitude toward creativity in gifted children with ASD. It is important to develop an attitude toward creativity in these children, so that their skills and superior abilities can be developed in the talent areas that distinguish them from their peers, as well as to enrich the Arab environment, especially the Saudi environment, with training programs for children with ASD in general and gifted children with ASD in particular. To verify the validity of the training program, the researcher presented the initial version of the program to a number of evaluators. Based on their consensus, the researcher divided the procedural objectives of the program into three sections: (1) cognitive objectives, (2) skill goals, and (3) emotional goals. Cognitive objectives are that the child concludes that creativity reflects a sophisticated social aspect of society; pays attention to new developments in the field of their talent; chooses to spend their free time in activities they find interesting; attends to the topics related in the field of talent;

and recognizes that creativity is the highest achievement that they reach in their field of talent. Skill goals include that the child listens to creators in their field of talent; chooses activities to acquire accuracy in their field of talent; adapts personal desires to the field of their talent; and watches educational programs focused on the field of talent. Emotional goals include that the child is excited when hearing about their field of talent; achieves success in their field of talent; is enthusiastic about continuing to explore their field of talent; continues their studies in their field of talent; feels valued by their peers' recognition of their talent; and invites peers at school to join activities.

The program used a variety of techniques, such as dialogue and discussion, free play, emotional venting, cooperative learning, brainstorming, homework, and reinforcement. The training program was divided into 26 sessions of 40 minutes each, presented at a rate of three per week. Furthermore, the program was divided into three stages. The introductory stage consisted of two sessions. Next, the training stage consisted of 21 sessions. Finally, the evaluation stage consisted of three sessions. Table 1 depicts these sessions in terms of their number, stage, objectives, and techniques.

**Table 1. Program stages, number of sessions, objectives and techniques**

<b>Program stage</b>	<b>Program objectives</b>	<b>Techniques used</b>
Stage 1, Introduction (sessions 1-2)	<ul style="list-style-type: none"> <li>- The researcher should establish an emotional relationship between themselves and the students.</li> <li>- The researcher should talk about the goal and procedures of the program.</li> </ul>	<ul style="list-style-type: none"> <li>Dialogue and discussion</li> <li>Free play</li> <li>Reinforcement</li> </ul>
Stage 2, Training on the procedural objectives of the program (sessions 3-23)	<ul style="list-style-type: none"> <li>- To conclude that creativity reflects a sophisticated social aspect in society.</li> <li>- To hear what is new in their field of talent.</li> <li>- To identify activities that will enable them to spend their free time on something enjoyable.</li> <li>- To be inclined to topics related to their field of talent.</li> <li>- To know that creativity is the highest degree that they can reach in their field of talent.</li> <li>- To listen to explanations by creators in their field of talent.</li> <li>- To select activities to gain accuracy in the field of talent.</li> <li>- To adapt personal desires to the field of talent.</li> <li>- To watch specialized educational programs in the field of talent.</li> <li>- To be excited to hear about success in the field of talent.</li> <li>- To be enthusiastic to continue to be a scholar in the field of talent.</li> <li>- To accept to continue their studies in the field of talent.</li> <li>- To feel that they are valued by peers who recognize that they are gifted.</li> <li>- To invite peers at school to join activities.</li> </ul>	<ul style="list-style-type: none"> <li>Emotional relief</li> <li>Cooperative learning</li> <li>Brainstorming</li> <li>Reinforcement</li> <li>Homework</li> </ul>

Stage 3, Evaluation (sessions 24-26)	- Students are evaluated on the procedural objectives of the program.	Reinforcement
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#### 4. Results

The Wilcoxon signed-rank test was used to determine whether there was a statistically significant difference between the mean ranks of participants on the ATCS before and after completion of the training program. Statistical significance was set at  $p < 0.05$  for all analyses. Referring to the average ranks of the two measurements, the results showed a difference in favor of the largest average, which was the dimensional measurement. This result indicates the training program was effective at developing an attitude toward creativity in the study sample. See Table 2.

**Table 2. Results of Wilcoxon-rank test for the difference between the mean ranks of participants on the ATCS before and after training program**

Research Sample (Post-Pre)	N	Mean Rank	Sum of Ranks	Z	P-Value
Negative Ranks	0	0	0	-2.264	0.024*
Positive Ranks	6	3.50	21		
Ties	0				

Note. \*  $p < 0.05$

Table 2 shows that the value of Z for the total score of the scale was -2.264, and the significance value was 0.024, thus, a value less than 0.05.

The Wilcoxon signed-rank test was also used to determine whether there was a statistically significant difference between the mean ranks of participants on the ATCS after program completion, and at two months follow-up. The results showed no statistically significant difference. This result indicates that participants maintained an attitude toward creativity after completing training. See Table 3.

**Table 3. Results of Wilcoxon-rank test for the difference between the mean ranks of participants on the ATCS after completing the program and at a two-month follow-up**

Research Sample (Post-Follow-up)	N	Mean Rank	Sum of Ranks	Z	P-Value
Negative Ranks	4	3.63	14.50	-0.850	0.395
Positive Ranks	2	3.25	6.50		
Ties	0				

Table 3 shows that the value of Z for the total score of the scale was -0.850, and the significance value was 0.395 - a value more than 0.05.

## 5. Discussion

Talented people are the wealth of all societies. For this wealth to benefit societies, societies must invest in the talents of their children, by providing the necessary services and opportunities, by ameliorating the difficulties children face, and by caring for and nurturing the children. Specifically, gifted people who are considered to be members of “marginalized groups” need care, training, education, and rehabilitation; there is also a need for research to understand them better. Gifted people with ASD are one of these marginalized groups. Suleiman (2012) points out that gifted people with ASD have superior abilities and skills that are common to the ASD category, although they do not appear in all people with ASD. These individuals usually excel in these types of abilities and have better skills than their peers of similar age without ASD. Skills typically focus on drawing, music, and arithmetic, though other skills have been observed, such as recognizing geometric shapes and learning to read at an early age; a number of studies support this description (e.g. Clark, 2017; Mada, 2021; Zhang & Han, 2018). However, a number of descriptive studies, such as those by Pring et al. (2012), Kasirer and Mashal (2014), Kasirer et al. (2014), and Kasirer et al. (2020) found that, despite their superior and special talents in multiple and diverse fields, these individuals have a clear shortcoming in their attitude toward creativity. The current study aimed to evaluate whether application of a training program resulted in pre- and post-test differences in participants’ attitudes toward creativity.

Regarding the first research question, the results showed a statistically significant difference ( $p < 0.05$ ) between the participants’ mean ranks on the ATCS pre- and post-test. This finding is supported by Pring et al. (2012), who reports that the responses of gifted children with ASD who were artistically gifted were more creative. Akl (2014) showed the effectiveness of a play-based training program for developing skills (visual perception and verbal communication) in gifted children with ASD. Kasirer and Mashal (2014) provide evidence that creativity can be found in children with ASD, and refer to the unique verbal creativity of gifted children with ASD. Hetzroni et al. (2019) also report that creativity can be found in children with ASD, and Kasirer et al. (2020) found that children with ASD generated more creative metaphors, and also showed greater use of a certain type of representational change on a creative metaphor task.

The training program in the current study included several diverse activities (including free play), on which participants were trained in order to develop their attitudes toward creativity and to adapt their talents to benefit themselves and society.

Regarding the second research question, no statistically significant difference was found between participants’ ATCS mean ranks at the end of the training program and at a two-month follow-up. This lack of difference was attributed to participants’ strength of memory for the training program. Similarly, Fairouz (2018) reports on the strength of memory of a sample of gifted individuals with ASD. Hughes et al. (2018) and Wadani and Aboul Fotouh (2019) found that adults with ASD have rare cognitive, metacognitive, and behavioral skills, in addition to

visual-motor skills and psychosocial skills, that differ from that of others with ASD who do not possess these special skills. The researcher took these characteristics into account when preparing the training program, setting its procedural objectives, and choosing its techniques, so as to exploit and strengthen these distinct features while developing participants' attitudes toward creativity. These features also ensured the continuation of training objectives after the end of the program. The effectiveness of the training program may also be attributed to the suitability of the procedural objectives to the mental ages and characteristics of participants; the appropriateness of the techniques used; the relatedness of the activities to the participants' talents; and the proper implementation of techniques and activities. Furthermore, the provision of moral and material support in all sessions of the program led to participants maintaining their attitudes toward creativity in relation to their own talents, which indicates the continuing impact of the training beyond the end of the program application in this study.

## **6. Conclusions**

Through the results of the study, it became clear that training programs can develop attitudes toward creativity of children with ASD. The researcher concludes from these results that not all programs for gifted children with ASD are effective; they must be subjected to careful planning, preparation, and actual execution. In addition, the programs of care for these children are not restricted to specific patterns and forms that cannot be modified, but are intrinsically scalable. There are individual differences between the creativity and strengths of gifted children with ASD. These children have somewhat different educational needs from children who have not been diagnosed with ASD; these needs are diverse and incorporate personal, social, and academic needs. It is anticipated that the findings of this study will motivate researchers to develop other training programs to help gifted children with ASD to develop creative abilities, and foster positive attitudes toward creativity.

## **7. Recommendations**

In light of these findings, the researcher recommends that survey studies are undertaken to identify gifted children with ASD, so that their talents can be identified early on. An early start may contribute to refining their high capabilities and maintaining and applying those talents. Necessary services and funds must be provided to develop the talents of gifted children with ASD. Specialized programs should be presented in the fields of the talents discovered in children with ASD, and adapted to suit them. Further, the participation and inclusion of gifted children with ASD should be facilitated in programs and events for gifted children. Training courses should be held for teachers of children with ASD, to introduce them to the concept of creativity, how to identify the high capabilities of some of these children, and how to develop these abilities. Additionally, counselling programs should be developed for parents of gifted children with ASD, to introduce them to their children's talents and the appropriate methods to develop their children's attitudes toward creativity. Training programs should also be prepared for the families and teachers of gifted children with ASD to address behaviors that may, without appropriate intervention, lead to a decline in the level of talent, and failure to develop it. Scientific information should be

disseminated in various media about gifted children with ASD, to correct misconceptions about the disorder, such as the view that children with ASD are only characterized by deficiencies in communication and social and behavioral interactions. Research in the field of giftedness and ASD should be strengthened as well. Finally, the training program should be used with participants of different ages.

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