Awareness Level of Autistic Teachers about the Extent of Using Assistive Technologies in Teaching Students with an Autism Spectrum Disorder in Saudi Arabia

By

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Abstract

This study aimed to identify autistic teachers' level of awareness regarding the use of Assistive Technologies (ATs) in teaching students with Autism Spectrum Disorder (ASD) in Saudi Arabia. A quantitative approach was employed with a questionnaire as the research tool. The questionnaire was created by the researcher. Based on previous studies, the questionnaire included 19 items that measured the level of awareness of autistic teachers regarding the extent ATs are utilized in teaching students with ASD in Saudi Arabia. The study sample included (54) teachers who taught students with ASD in Saudi Arabia. The results indicated there is a high level of awareness (92.0%) among teachers of students with ASD regarding the extent of the use of ATs in teaching students with ASD in the Kingdom of Saudi Arabia. Moreover, teachers with a Master's degree have a higher level of awareness regarding the use of AT than teachers with only a Bachelor's degree. These results could improve the field of special education regarding the use of ATs. The study recommended further teacher training regarding the use of ATs in the field of ASD as well as additional research assessing the effectiveness of ATs for other disabilities.

Keywords: Teachers of autism spectrum disorder, Autism spectrum disorder, Assistive technologies.

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مـدى وعـي معلمـي التوحـد بإستخدام التقنيـات المساعـدة في تدريس الطلاب ذو إضطراب طيف التوحد في المملكة العربية السعودية

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مستخلص الدراسة

هدفت هذه الدراسـة إلى التعرف على مسـتوى وعـي معلمـي التوحـد فيما يتعلق باستخدام التقنيات المساعدة في تدريس الطلاب ذو إضطراب طيف التوحد في المملكة العربية السعودية. تم استخدام المنهج الكمي، من خلال أداة الاستبيان التي تم إنشاءها من قبل الباحث بناءً على مراجعة الأدبيات، حيث تضمن الاستبيان ١٩ فقرة تقيس مستوى وعي معلمي التوحد فيما يتعلق باستخدام التقنيـات المساعدة في تدريس الطلاب ذو إضطراب طيف التوحد في المملكة العربية السعودية. اشتملت عينة الدراسة على (٥٤) معلماً يقومون بتدريس الطلاب ذوي اضطراب طيف التوحد في المملكـة العربيـة السعودية. أشارت النتائج إلى وجود مستوى عالٍ من الوعي (٩٢,٠%) لـدى معلمي الطلاب ذوي اضطراب التوحد فيما يتعلق باستخدام التقنيات المساعدة في تدريس الطلاب ذوي اضطراب طيف التوحد في المملكـة العربيـة السعودية. عـلاوة على ذلك، يتمتع المعلمون الحاصلون على درجـة الماجستير بمسـتوى أعلى مـن الـوعي فيمـا يتعلق باستخدام التكنولوجيا المساعدة مقارنة بالمعلمين الحاصلين على درجة البكالوريوس. هذه النتائج يمكن أن تحسن مجال التعليم الخاص فيمـا يتعلق باستخدام التقنيـات المساعدة. أوصت الدراسـة بالمزيد مـن التـدريب للمعلمين فيما يتعلق باستخدام التقنيات المساعدة في مجال اضطراب طيف التوحد، بالإضافة إلى إجراء أبحاث إضافية لتقييم فعالية التقنيات المساعدة مع الإعاقات الأخرى.

الكلمات المفتاحية: معلمي اضطراب طيف التوحد، اضطراب طيف التوحد، التقنيات المساعدة

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Introduction:

Education is imperative to the improvement and development of societies (Al-Khatib, 2021). Good schools containing teachers who can educate and provide appropriate services to students are a fundamental component to the field of education. Teachers are the ones who assess students' needs, prepare plans, follow up on student's progress, and provide necessary reinforcement (Farr, 2010).

Teachers are also responsible for the education of students with disabilities (Farr, 2010). No educational institution is devoid of individuals with disabilities. The performance of these students differs from that of ordinary individuals with an IQ lower or higher than average. Students with disabilities are not always able to complete the tasks assigned to them without special programs to help them complete the tasks (Al-Khatib, 2021). Disabilities include hearing disabilities, visual disabilities, intellectual disabilities, multiple disabilities, emotional and behavioral disturbances, learning disabilities, and Autism Spectrum Disorder (ASD), among others (Al-Khatib, 2021).

ASD is one of the disabilities that needs more attention, care, and support services, as it is one of the most widespread disabilities at the current time, according to current statistics (McConkey, 2020; Lord et al., 2020). ASD is defined as a developmental disability characterized by core impairments in language communication, social communication, and repetitive behavior (Alves et al., 2020). ASD begins before the age of two and can last throughout a child's life. ASD has many subtypes. While each child with ASD has a distinct set of strengths and challenges, the abilities of children with ASD can vary significantly. Some can live independently, while

others may need significant support in their daily lives. Children with ASD often have problems with social communication and interaction skills, such as eye contact, responding to their name, and sharing interests with others. They may also have problems with repetitive behaviors, such as flapping their hands or spinning themselves in circles. Moreover, some of them may have delayed learning, movement or language skills (Lauritsen, 2013).

Teachers are needed to assess the needs of these students and provide the best education through the appropriate curriculum and plans, in conjunction with the IEP team (Farr, 2010). Students with ASD may need teaching aids, such as technology tools to assist them in processing information, organizational skills, and language (Daud et al., 2018). Experts committed to helping students with disabilities aim to enhance their performance and capabilities and, to that end, have worked on designing special technological tools to facilitate the needs of individuals with disabilities. Technology enhances the quality of life for children living with disabilities (Alnahdi, 2014).

In the era of technology, ATs play an important role for student with disabilities to improve their performance in education. Access to ATs is an attempt to "level the playing field" for children with disabilities by providing them with access to services, education, and employment (Ennis-Cole, & Smith, 2011). Moreover, AT has arisen as a solution to many of the problems students with disabilities are facing and has proven to be a useful resource in special education classrooms, permitting students with disabilities to engage with learning materials and educators, interact with peers, and develop confidence in education. AT enables students with disabilities to perform some of the activities they could not perform without

the technology and, thus, succeed in their academic performance (Estrada-Hernandez & Stachowiak, 2016). IDEA 2004 defined AT as "any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities." The broad definition of AT allows flexibility in making decisions about the appropriate assistive devices to help meet the unique needs of students at an individual level.

The different categories of AT tools used to improve the functional capabilities of students with disabilities in all aspects of life include low-tech, mid-tech, and high-tech devices (Eichleay & DuBuske, 2005). Low-tech AT tools are cheap and less sophisticated pieces of equipment, and they do not require much training to handle. Some of these tools include the rug locks test, shaped pens, paper with raised lines, handheld magnifiers, walkers, and large print texts. Middle-tech equipment may have complex features, which include being battery or electronically-operated (The Center on Technology and Disability, 2024). For this reason, these tools may be more expensive than low-tech devices, and they may also require a bit of training in relation to their usage. Examples include amplifiers, talking photo albums, manual wheelchairs, talking spell checkers, and electronic organizers (Eichleay & DuBuske, 2005). The devices classified at the high-tech end of the continuum are the most complex and may be computerized. They are also expensive and require extensive training to learn how to use them properly (The Center on Technology and Disability, 2024). High-tech AT tools include voice-activated telephones, digital hearing aids, touch windows, big keys, and

computers with magnification and voice recognition software (Eichleay & DuBuske, 2005). The exploration of various types of low-tech and high-tech AT tools before choosing the final AT solution depends on a teacher's knowledge, abilities, and confidence regarding AT and the complexity of the needs of the students with disabilities.

Based on the data collected through AT trials and assessments, teachers should select the best AT solution to match the student's need for AT devices (Special Education Technology – British Columbia, 2007). Accordingly, there are special AT innovation for students with ASD to help them interact with classmates and engage with instructors and learning materials, thus enhancing their academic performance (Sampath, 2013). Assistive technology tools are also used even with students with ASD to help them bypass their academic weaknesses and reach their individual potential (Goosen, 2022; Hawsawi, 2015). However, teachers and professionals involved in supporting children with disabilities by using AT must have the necessary skills and knowledge (Gal, Schreur, & Engel-Yeger, 2010). Knowledge about what is available in the field of AT and, importantly, the laws, policies, and regulations guiding the use of AT in special education is the starting point of supporting children with disabilities (Al-Mulhim, 2021)

Implementation of AT devices and systems in special education classrooms has not only made students with disabilities more independent in the learning process but has also improved their functional capabilities (Reynolds, Wellington, & Zhao, 2016). Educators who strive to promote inclusiveness must have the expertise to select the right AT devices that are capable of improving the quality of education for the children they serve (Peterson-Karlan & Parette, 2007). Inadequate knowledge about the

requirements of AT results in poor implementation and abandonment of AT devices. Therefore, teachers can use the aforementioned laws, frameworks, and practices to improve their understanding of AT for the purpose of achieving quality education for children with disabilities.

2. problem statement:

Students with disabilities need to have services available which promote independence, enabling them to perform tasks that they had difficulty with or were unable to accomplish on their own (Abdel-Al, & Hamed, 2021). There are variances, including the teacher and their familiarity with their students' needs, the resources available and teachers comfort level with implementing the aforementioned resources. However, despite the explosion of AT developments in the marketplace, the special education field to date, has been slow to recognize the need to integrate state-of-the-art technology into special education programs and services for students with ASD. Even though the challenges confronting the special education field concerning AT and ASD are significant, the current state of affairs also provides opportunities. At the present time, assistive technology should be considered as one of the means that help advance the educational process, especially when planning the individualized education program (IEP) for all students with ASD (Farr, 2010). However, AT is not a helpful resource unless teachers are knowledgeable about the resources available and how to use them most effectively in the classroom for their students with disabilities. Therefore, there is a need to identify the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia. Additionally, the relations between

academic degree and the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia also needs to be considered.

3. Study questions:

This study addressed two questions:

- **Research Question No. 1**: What is the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia?

- **Research Question No. 2**: What is the relationship between the academic degree and the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia?

4. Purpose of the study:

The purpose of this study was to identify the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia.

5. significance of the study:

Theoretical Importance. The findings may draw attention to the importance of preparing and training teachers to use ATs in the field of special education. Also, this research could help future researchers in developing a more comprehensive research approach.

Applied Importance. The results of this study may provide the Ministry of Education in Saudi Arabia with information regarding importance of using AT with ASD in the field of training and rehabilitation. Also, the outcome of this study can be used to improve the quality of special education.

6. Study Limitations:

There were four limitations which this study faced:

- *6.1 The objective limitations:* Using ATs in Teaching Students with an ASD.

- *6.2 The human limitations:* This study was conducted with special education teachers who teach students with ASD in Saudi Arabia.

- *6.3 The place limitation:* The setting of this study included special education teachers who teach students with ASD in Saudi Arabia.

- *6.4 The time limitation:* This study was conducted in the school year 2023-2024.

7. Study Terminology:

- *7.1 Autistic Teachers:* Are the teachers who teach students with ASD in private and public schools in Saudi Arabia.

- *7.2 Awareness Level of Autistic Teachers:* Is the awareness Level degree of the teachers who teach students with ASD about the extent of using AT that they get on the survey.

- *7.3 AT:* Is both non-technical auxiliary aids and mechanical, and electrical devices that are used to increase, maintain, or improve the functional capabilities of individuals with disabilities. (The Individuals with Disabilities Education Act, 2019)

- *7.4 ASD:* Is a neurodevelopment disorder that takes place during the first two and a half years of childhood and may lead to significant impairment in repetitive behavior, social communication, and imagination. (Alves et al., 2020).

8. Previous studies:

A study by Khazaleh and Abzakh (2023) aimed to identify the level of using ATs in inclusive education for students with ASD. The analytical

descriptive method was used. The study sample included (193) teachers in Amman, Jordan. The study results indicated that the level of using AT was moderate. However, the findings showed no significant difference between gender variables and the level of using ATs in inclusive education for students with ASD. Finally, the results showed that there were significant differences between the educational qualification variable and the level of using ATs in inclusive education for students with ASD in favor of post-graduate qualification. The researchers recommended ensuring teachers were equipped with the provision of what they need from the technologies to use with ASD students.

Deng and Rattadilok (2022) utilized the analytical descriptive method to assess the use of ATs by technology developers, ASD professionals, and parents of ASD children. The results found that all the individuals in China have lower utilization and awareness of ATs. The researchers found that the inability to afford costs and possible side effects were barriers that may prevent ASD individuals in China from using ATs. The study recommended the need for affordable mobile applications to help Chinese ASD individuals.

Recently, Qarqi et al., (2021) conducted a study that aimed to identify the degree of awareness of special education teachers regarding the extent of using instructional technology in the process of teaching students with special needs in Amman. The descriptive survey method was used in the study in light of the qualification variable. The study used a sample of (112) male and female special education teachers. The results of the study indicate the level of awareness among teachers was found to be "high", and statistically significant differences attributable to the scientific qualification variable (Bachelor, Graduate) in favor of postgraduate studies were found.

Al-Obaidi and Abbas (2021) aimed to uncover the reality of the use of educational techniques by teachers of children with ASD with descriptive analytical research. A total of (25) teachers of autistic children participated in the study. The questionnaire was used as a research tool and included (23) paragraphs. The results showed that the most common techniques used in teaching children with ASD by teachers were photographs and video. The researchers recommended ensuring teachers were equipped with the provision of educational techniques that would enable them to adequately teach students with ASD.

Saeedaat and Dnia (2020) assessed the use of educational technology in educating individuals who were visually impaired. The descriptive approach was used to answer the research question through the distribution of a questionnaire. The study sample included (30) teachers in the school for the visually impaired. The study results indicated that there is a lack of teacher training and qualifications regarding the use of educational technology. The researchers found this led to inadequate use of educational technology for individuals with disabilities (Saeedaat & Dnia, 2020).

Nisreen and Amal (2019a) utilized the analytical descriptive method to assess the use of educational techniques by teachers of children with ASD. The analytical descriptive method was used. A total of 25 teachers of autistic children at the Center for ASD participated in the study. The survey was used as a tool and included 23 questions. The results affirmed photographs and video were the most commonly used techniques for teaching autistic children by teachers. The study recommended the need for a specialist in educational technology, the need for teacher training on educational technology, and the need for specialized rooms equipped with effective ASD technology.

Nisreen and Amal (2019b) conversely focused on obstacles that prevent the use of educational technology by teachers of students with ASD. The analytical descriptive method was used in this study. The study used a sample of (25) teachers of autistic children at the Center for ASD. A questionnaire was used as a tool for the study. The results affirmed the need for a classroom equipped with educational technology. Additional monetary resources, as well as additional staff needs were also identified. The study recommended the need to provide special rooms, additional support staff and additional training for the educators and staff.

Regan et al., (2019) conducted research to better understand teacher attitudes and perceptions regarding writing instruction and use of technology. A qualitative approach was used to answer the research question. A total of (47) middle school teachers were interviewed. The results demonstrated that most teachers considered themselves to be technology users who perceived their students' writing skills to be deficient, yet spent little time on writing instruction in content areas. On another hand, teachers revealed that technology was helpful in educating students with disabilities, differentiating instruction, and providing learning opportunities. Moreover, teachers indicated that the biggest barriers to using technology were the time involved, the resources available, and the access. The study recommended the provision of pre-service and in-service training by schools.

8.1 Commenting on Previous Studies

Previous literature confirms ATs are imperative resources which can facilitate learning for individuals with disabilities. Some previous research focused on educational technology, rather than AT, specifically (Nisreen &

Amal,2019; Qarqi et al., 2021; Regan et al., 2019; Saeedaat & Dnia, 2020). This study also differed from some studies in the scientific method used, as some studies used qualitative research methodology (Regan et al., 2019) and experimental research methodology (Alnahdi, 2014). This study used a descriptive research methodology, which seemed to be most fitting with the objectives of the research (Al-Obaidi & Abbas, 2021; Deng & Rattadilok, 2022; Khazaleh & Abzakh, 2023; Nisreen & Amal, 2019; Qarqi et al., 2021; Saeedaat and Dnia, 2020).

This research aligned with research by Khazaleh and Abzakh (2023), and Qarqi et al. (2021), which emphasized the importance of educators' awareness regarding instructional technology. However, this current study was more specific, as it focused on ASD, while Khazaleh and Abzakh (2023), research focused on inclusive education for students with ASD, and Qarqi et al.'s (2021) research focused on general special education. Despite the importance of developing research on using ATs in the field of special education in general and the field of ASD in particular, no previous studies were found that included the variables of this study that focused on identifying the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia. This means that this study will make a unique contribution to the literature regarding the use of supportive technologies in the field of ASD and special education.

9. Methodology

9.1 Study Approach:

To achieve the objectives of the study and answer the study questions, the descriptive approach was used. Al-Assaf (2016, p. 211)

defines it as an approach "that is carried out by interrogating all members of the research community or a large sample of them, with the aim of describing the studied phenomenon in terms of its nature and degree of existence only, without going beyond that to studying the relationship or deducing the causes, for example." This is one of the most appropriate approaches for the current study, because it relies on describing the reality of the phenomenon and then analyzing the results and building conclusions in light of the current reality.

9.2 Study population:

The population of the current study consisted of (128) teachers who teach students with ASD. (Statistics of the Ministry of Education, 2023).

9.3 The study sample:

The study sample consisted of (54) teachers who teach student with ASD, who were selected by the stratified random method from the study population. Table (1) shows the distribution of the sample according to the educational qualification variable.

Table (1)

The Sample According to the Educational Qualification Variable

Academic degree	Frequency	Percentage %
Bachelor's	31	57.4
Master's	21	38.9
Doctorate	2	3.7
Total	54	100%

Table (1) shows that (31) of the study individuals represent (57.4%), and their practical qualification is a Bachelor's degree, while (21) of the study individuals represent (38.9%) of the total study population, and their practical qualification is a Master's degree. Finally, (2) of the study members represent (3.7%) of the total study population. Their professional qualifications are a Doctorate degree.

9.4 Tools of the Study:

The questionnaire was used as a tool to collect data. This is due to its suitability to the objectives of the study, community, and to answer the questions.

9.5 Building the study tool:

After reviewing the literature and previous studies related to the topic of the current study, such as the study of Qarqi, Al Salah and Karim (2021), the study of Saeedaat and Dnia (2020), and the study of Nisreen and Amal (2019), and in light of the study questions and objectives of the study, the questionnaire was built, and in its final form it consisted of three parts to collect data from the participants. The first part contains an introductory introduction to the objectives of the study and the type of data and information the type of information collected from the study participants, along with a guarantee of the confidentiality of the information provided, as well as a pledge to use it for scientific research purposes only. The second part of the questionnaire focused on the primary data, or academic degree, for the study participants. The third part of of the questionnaire consists of (19) items, which measure the awareness level of autistic teachers regarding the extent of using ATs in teaching students with ASD in Saudi Arabia.

A three-point Likert scale was used to obtain the responses of the study subjects, according to the following degrees of agreement: (Agree - Neutral - Disagree), and then this scale was expressed quantitatively, by giving each of the previous statements a score, according to the following: I agree (3) degrees, Neutral (2) degrees, Disagree (1) degrees. To determine the length of the three-point Likert scale categories, the range was calculated by subtracting the upper limit from the lower limit $(3 - 1 = 2)$, then dividing it by the largest value in the scale $(2 \div 3 = 0.67)$, and then this value was added to the lowest value in scale(1); To determine the upper limit for this category, the length of the categories became as shown in the table (2).

Table (2)

Division of the Three-way Likert Scale Categories

(Limits of Average Responses)

Category	from	to	
Disagree	1.00	1.67	low
Neutral	1.68	2.34	mid
I agree	2.35	3.00	high

9.6 Validity of the study tool:

The validity of the study tool means ensuring that it measures what it has prepared. It also means that the questionnaire is understandable to everyone who uses it. The validity of the study tool was confirmed through:
The apparent validity of the study tool (The arbitrators):

Questions were refined with the help of experts in special education. A total of (8) arbitrators were asked to evaluate the quality of the questionnaire, in terms of its ability to measure what it was prepared to

measure, and to judge its suitability to the objectives of the study, by determining the clarity of the expressions, its affiliation to the tool, its importance, and its linguistic integrity. The arbitrators expressed what they saw as modifications or deletions. They added to the statements and reviewed the notes and then made necessary amendments, which were agreed upon by the majority of arbitrators, and then the questionnaire was produced in its final form.

Internal consistency validity of the instrument:

To ensure the validity of the internal consistency of the questionnaire, it was applied to a survey sample, consisting of (18) male and female teachers in the field of special education. To verify the internal consistency of the questionnaire, Pearson's correlation coefficient was calculated to assess the degree of correlation of each questionnaire item with the total score of the questionnaire.

Table (3)

Pearson Correlation Coefficients for the Questionnaire Items

with the Total Score of the Questionnaire

items	Correlation coefficient	items	Correlation coefficient
1	**0.634	11	**0.661
2	**0.768	12	**0.697
3	**0.634	13	**0.748
4	**0.637	14	**0.814
5	**0.547	15	**0.564
6	**0.644	16	**0.738
7	**0.613	17	**0.834
8	**0.661	18	**0.529
9	**0.767	19	**0.605
10	**0.689	-	-

** Significant at the significance level of 0.01 or less

It is clear from Table (3) that the correlation coefficient values for each of the statements with the total score of the questionnaire are positive and statistically significant at the significance level (0.01) or less, which indicates the validity of the internal consistency between the statements of the first axis, and its suitability for measuring what it was designed to measure.

9.7 Reliability of the study tool:

The reliability of the study tool was applied to a survey sample, consisting of (18) male and female teachers in the field of special education, and it was confirmed through the use of Cronbach's Alpha (Cronbach's Alpha (α) equation) and the half-split equation. Table (4) shows the values of the Cronbach's Alpha (Cronbach's Alpha) reliability coefficients.

Table (4)

Cronbach's Alpha Coefficient and Half-split to Measure the Reliability of the Study Tool

The questionnaire	number of items	Cronbach's Alpha	half-split
A questionnaire on the awareness level of teachers' of the extent of Using Assistive Technologies	19	0.917	0.854

It is clear from Table (4) that the general reliability coefficient is high, reaching (0.917) according to the Cronbach Alpha equation, while in the semi-split it reached (0.854). This indicates that the questionnaire has a high degree of reliability that can be relied upon in the field application of the study.

4- 10. data analysis procedures:

After receiving permission, the survey was sent out and enough completed surveys were received, which was (54) participants. To achieve the objectives of the study and analyze the collected data, many appropriate statistical methods were used using the Statistical Package for Social Sciences (SPSS). The frequencies and percentages of the study individuals were calculated along with the mean and weighted mean, standard deviation, Pearson's correlation coefficient to determine internal consistency, and Cronbach's alpha coefficient to verify the stability of the study tool. The split half equation was done to verify the stability of the study instrument. The Kruskal-Wallis test was completed to verify the differences between the responses of the study sample, depending on the variable, and the Scheffé test was also conducted to verify the direction of differences between the responses of the study sample.

11. Results:

11.1 Results for Research Question No. 1:

The first research question asked: What is the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia? Arithmetic means, standard deviations, percentages, and ranks were calculated for the responses of the study participants to statements about the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia, and the results were as follows:

Table (5)
Responses of Study Participants Regarding the Level of Awareness of Autistic Teachers About the Extent of Using AT in Teaching Students with ASD in Saudi Arabia, Arranged in Descending Order According to Averages of Agreement

No	Items	arithmetic means	Std. deviation	percentages	Category	Rank	Responses
1	I am aware of the importance of using ATs with students with ASD	2.78	0.420	%92.7	Agree	8	High
2	I am aware that ATs help integrate students with ASD	802.	0.491	%93.3	Agree	7	High
3	Using ATs adds new practical experiences to my field	12.8	0.392	%93.7	Agree	5	High
4	I am aware that ATs reduce the dependence of students with ASD on others	672.	0.583	%89.0	Agree	17	High
5	ATs increase learning motivation for students with ASD	722.	0.452	%90.7	Agree	12	High
6	I am aware that A Ts contribute to immediate feedback for students with ASD	692.	0.543	%89.7	Agree	16	High
7	ATs contribute to facilitating the educational process	92.8	0.317	%96.3	Agree	1	High
8	The use of ATs provides easy access to information at any time	832.	0.376	%94.3	Agree	3	High
9	ATs contribute to correcting errors for students with ASD	782.	0.420	%92.7	Agree	9	High
10	The use of ATs provides expertise in all areas for students with ASD	802.	0.407	%93.3	Agree	6	High

No	Items	arithmetic means	Std. deviation	percentages	Category	Rank	Responses
11	Using ATs helps students avoid excessive behavioral and emotional movements	702.	0.461	%90.0	Agree	14	High
12	ATs contribute to developing language communication skills for students with ASD	22.7	0.529	%90.7	Agree	13	High
13	ATs contribute to developing social interaction skills for students with ASD	652.	0.619	%88.3	Agree	18	High
14	ATs contribute to developing movement skills and reducing routine movements for students with ASD	612.	0.627	%87.0	Agree	19	High
15	ATs for students with ASD provide programs that help the student express themselves and feel	12.8	0.392	%93.7	Agree	4	High
16	ATs help students with ASD integrate into society	62.7	0.432	%92.0	Agree	11	High
17	ATs address the issue of individual differences for students with ASD	52.8	0.359	%95.0	Agree	2	High
18	ATs provide educational and guidance plans for students with ASD	82.7	0.462	%92.7	Agree	10	High
19	The use of ATs contributes to reducing distractions for students with ASD	702.	5370.	90.0%	Agree	15	High
	Mean	2.76	0.314	%092.	Agree	-	High

Table (5) shows that there is a high level of awareness among teachers of students with ASD about the extent of the use of AT in teaching students with ASD in the Kingdom of Saudi Arabia, with an arithmetic average of (2.76 out of 3.00), and a percentage of (92.0%), which is an average that falls into the third category of Tripartite scale categories (from 2.35 to 3.00), which is the category that indicates the I agree option on the study instrument.

The results in Table (5) show that the highest levels of awareness of teachers of students with ASD about the extent of the use of AT in teaching students with ASD in the Kingdom of Saudi Arabia are represented by statements No. (7, 17, 8), which were arranged in descending order according to the agreement of the study members with a high degree, as follows:

Statement No. (7), which is: "ATs contribute to facilitating the educational process," came in first place in terms of the study members' agreement with it, and to a high degree, with an arithmetic mean of (2.89 out of 3.00), and a percentage of (96.3%). This result is explained by the fact that teachers of students with ASD felt their students benefitted from it. ATs facilitated the educational process by giving teachers an effective method to employ for their students with disabilities.

Statement No. (17), which is: "ATs address the problem of individual differences in students with ASD," came in second place in terms of the study members' approval of it, with a high degree, with a mean of (2.85 out of 3.00), and a percentage of (95.0%). This result is explained by the fact that ATs have helped teachers with ASD deal with all their students with different conditions, which has enhanced their awareness of their effectiveness in addressing the problem of individual differences in students with ASD.

Statement No. (8), which is: "The use of ATs provides easy access to information at any time," came in third place in terms of the study's members' approval of it, and to a high degree, with an arithmetic average of (2.83 out of 3.00), with a percentage of (94.3%). This result is explained by the fact that AT enabled teachers of students with ASD to benefit from research and knowledge techniques, which enhanced their awareness of their effectiveness in providing easy access to information at any time.

Moreover, the results in Table (5) show that the lowest levels of awareness of teachers of students with ASD about the extent of the use of AT in teaching students with ASD in the Kingdom of Saudi Arabia are represented by the two statements No. (13, 14), which were arranged in descending order according to the study members' approval of them, with a high degree, as follows:

Statement No. (13), which is: "ATs contribute to developing social interaction skills for students with ASD," ranked fourteenth in terms of the study members' agreement with it, with a high degree, with an arithmetic mean of (2.65 out of 3.00), and a percentage of (88.3%). This result indicates teachers of students with ASD do not firmly believe that AT facilitates the development of social interaction skills or their students benefit from AT sufficiently.

Statement No. (14), which is: "ATs contribute to developing movement skills and reducing routine movements for students with ASD," ranked fifteenth in terms of the study members' approval of it, with a high degree, with an arithmetic average of (2.61 out of 3.00), and a percentage of (87.0%). This result is explained by the fact that teachers of students with ASD focus on educational benefits from AT, rather than a reduction in routine movements or an enhancement of movement skills.

11.2 Results for Research Question No. 2 :

The second question asked: What is the relations between the academic degree and the level of awareness of autistic teachers about the extent of using AT in teaching students with ASD in Saudi Arabia? To determine whether there were statistically significant differences in the responses of study individuals according to the academic degree variable, the "Wallis Test Kruskal analysis" was used. To clarify the significance of the differences in the responses of study individuals according to the academic degree variable, the results were as shown in the following table:

Table (6)

Results of the Wallis Test Kruskal Analysis for the Academic Degree Variable

	Academic degree	No	Mean	Chi-square	Statistical significance	
A measure of the level of awareness of teachers	Bachelor	31	22.84	6.979	*0.031	
	Master	21	33.19			
	Doctorate	2	40.00			

Function at the level of 0.05 or less:

Table (6) shows that there are statistically significant differences at the level of (0.05) or less in the responses of study members regarding (a measure of the level of awareness of teachers) according to the academic degree variable.

To determine the validity of differences between academic degree categories, the Scheffé test was used, the results of which were as follows:

Table 7

The Scheffé test to Verify Differences Between Academic

Degree Categories

	Academic degree	No	Mean	Bachelor	Master	Doctorate
A measure of the level of awareness of teachers	Bachelor	31	2.66	- *	- *	-
	Master	21	2.87			
	Doctorate	2	2.97			

*Function at the level of 0.05 or less:

The results in Table (7) show that there are statistically significant differences at the level of (0.05) or less between the study individuals whose academic degrees are Bachelor's and the study individuals whose academic degrees are Master's in the level of awareness of the extent of the use of assistive technology in teaching students with ASD in the Kingdom of Saudi Arabia for the benefit of Study individuals whose academic degrees are Master's.

12. Discussion:

12.1 Discuss the Results for Research Question No. 1:

For the first research question, the results generated several conclusions, the most prominent of which are: There is a high level of awareness among teachers of students with ASD regarding the extent of the use of AT in teaching students with ASD in the Kingdom of Saudi Arabia, and this finding is supported by Qarqi et al., (2021). The reason may be teachers of students with ASD take classes on AT while doing their

undergraduate coursework. Most of the teachers agreed that AT facilitated the educational process and enhanced learning for their students, as well as, addressed the issue of individual differences for students with ASD. Moreover, this finding is supported by Regan et al., (2019) affirmed the use of AT provides easy access to information at any time, which can make the education process easier.

On other hand, the lowest levels of awareness among teachers of students with ASD regarding the extent of using AT in teaching students with ASD in the Kingdom of Saudi Arabia was in regards to the development of social interaction skills. Teachers could perceive a need for community engagement for the development of these skills, rather than the use of AT. Teachers also did not agree AT helps with the reduction of routine movements or the enhancement of movement skills for students with ASD. It seems teachers viewed AT as a tool that enhances educational skills, rather than skills associated with movement. These findings align with Al-Obaidi and Abbas's (2021) research results showed that the most common techniques used in teaching children with ASD by teachers were photographs and videos that only focused on learning skills.

12.2 Discuss the Results for Research Question No. 2 :

For the second research question, the results surmised there are statistically significant differences at the level of (0.05) or less between the study subjects whose academic degrees are Bachelor's and the study subjects whose academic degrees are Master's regarding the level of awareness of the extent of the use of AT in teaching students with ASD in the Kingdom of Saudi Arabia. The results were in favor of the study subjects whose academic degrees were Master's. This study's finding is

supported by Khazaleh and Abzakh (2023), and Qarqi et al., (2021) studies indicating that teachers with higher degrees had higher levels of awareness of the use of AT than teachers with bachelor's degrees. The reason for this may be that teachers who hold a master's degree have received more training and experience regarding the use of ꞏAT when they obtained this degree. The results of this study do not support Saeedaat and Dnia's (2020) finding that there is a lack of teacher training and qualifications regarding the use of educational technology.

12.3 Recommendations :

1- Train teachers to use specific ATs for only for student with ASD.

2- Providing in-service training to all teachers through distance education and other self-learning techniques.

3- Follow up on new developments and research in the field of ATs for students with ASD.

4- Conducting similar studies with other disabilities to substantiate the findings.

5- Conducting future studies on the obstacles that limit the awareness of teachers of students with ASD in the Kingdom of Saudi Arabia regarding the importance of using assistive technology in their teaching.

6- Conducting future studies on ways to reduce the obstacles that limit the awareness of teachers of students with ASD in the Kingdom of Saudi Arabia about the importance of using AT in their teaching.

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