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DIGITAL STRATEGIES FOR EFL LEARNING IN AUTISTIC CHILDREN: AN ACTION RESEARCH STUDY

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ABSTRACT

This study investigates digital methods for enhancing the learning of English as a Foreign Language (EFL) in eight autistic children, comprising four with mild autism and four with high-functioning autism. Students with autism spectrum disorder (ASD) often struggle with understanding and utilizing language in social contexts. Autism is characterized by a substantial number of adolescents who display delays in speech and challenges in both verbal and non-verbal communication. Autism is a disorder that impacts children and teenagers. Receiving English as a Second Language (ESL) instruction would be highly advantageous for kids with Autism Spectrum Disorder (ASD), since it is an essential element in acquiring English and navigating social interactions. This study employs classroom action research to investigate the impact of digital tools (Speech Therapy 3-Learn Words by Imagination and Autism BASICS Learning App by Wellness Hub) and resources (Interactive Rhymes) on the language development of children with autism, aiming to foster a supportive and effective learning environment. Diagnostic and progressive assessments of language proficiency offer a comprehensive analysis of each student's development. Students with mild autism exhibited a more rapid enhancement of their speaking abilities compared to those with moderate autism. This study utilizes observation checklists to evaluate student engagement, conduct, and learning during the implementation of digital strategies. Therapist feedback enhances assessments to illuminate students' cognitive, emotional, and social learning experiences. The study offers a comprehensive analysis of therapist input, categorized by significant themes, and proposes practical recommendations for enhancing the application of digital methods in teaching ESL to autistic children.

Key words: *Autism Spectrum Disorder (ASD), English foreign language (EFL), Pakistan, and digital strategies.*

INTRODUCTION

ASD, or autism spectrum disorder, is a neurological illness. Language development problems in autistic students include both verbal and nonverbal communication challenges. According to the Centers for Disease Control and Prevention (CDC), approximately one out of every 36 children is diagnosed with autism spectrum disorder. Individuals with autism spectrum disorder (ASD) will significantly benefit from receiving English as a Second Language (ESL) training, as it is essential for learning English and enhancing social relationships.

These children often face unique challenges related to social integration, communication, and sensory sensitivity that are linked to their foreign language learning process; all of these factors can impact their learning path. For children with autism to succeed in language learning and integration into regular classrooms, English as a Second Language (ESL) programs must be tailored to meet their unique needs.

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ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

These forms of treatment include games, software, and diverse interactive activities. Multimedia presentations, visual aids, the Picture Exchange Communication System (PECS), screen-based instruction for vocabulary development, and extracurricular activities via digital games are elements that can be incorporated into diverse digital strategy tools to establish a systematic and stimulating educational atmosphere. These technologies can also foster an engaging educational atmosphere.

To achieve the objective of this study, the following research questions have been formulated to test the effectiveness of using digital strategies for teaching English as a foreign language to autistic children.

- How do digital visual cues, such as pictures, videos, and online activities, help autistic children understand EFL learning vocabulary and concepts more effectively?
- How can digital learning apps (Speech Therapy 3-Learn Words by Imagination, Autism BASICS Learning App BY Wellness Hub, and Interactive rhymes) that are designed for children with autism make the EFL learning process more engaging and fun for them?

LITERATURE REVIEW

The analysis of the qualitative data produced eighteen themes organized into five categories. This study suggests a systematic method for training youngsters with Autism Spectrum Disorder (ASD) in empathy using a digital intervention. (Chung et al., 2024).

This study aimed to ascertain the effect of the virtual reality (VR) game House of Languages on vocabulary acquisition among intermediate school students receiving English as a Foreign Language (EFL) instruction. To examine the effect of the virtual reality intervention on the vocabulary acquisition process in English as a foreign language relative to the traditional technique, we employed a quasi-experimental paradigm. This enabled us to juxtapose the two methodologies. Utilizing a convenience sample of sixty-four male students, who were not randomly selected, we divided them into two groups: an experimental group and a control group. (Tsou et al., 2002).

The study examines the limitations and obstacles related to technology and design, as well as the controversies surrounding the application of virtual reality (VR) in autism research and therapy. It highlights the prospective trajectories of this evolving domain, encompassing the expansion and refinement of applications, technological advancements, the promotion of linguistic diversity, and the development of theoretical models and neurocognitive research (Strickland, 1997). The analysis of studies indicated enhancements in English language acquisition through the application of suitable techniques and varied methodologies, including visual representations, humanoid robots, Montessori-oriented approaches, applied behavior analysis (ABA), cognitive strategies, picture exchange communication systems (PECS), meticulously designed educational environments, mixed methods, speech therapy, media, total physical response (TPR), and individualized education plans (IEPs). This occurred despite the restricted availability of books globally. (Zohoorian et al., 2024).

Observations and focus group talks were conducted to examine the challenges faced by children with autism in language acquisition, involving 45 diagnosed children, four autism education specialists, two occupational therapists, and a parent of a child with mild autism. Evidence suggests that children with autism often face challenges in acquiring the English language. The study

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JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

findings were gathered and categorized by topics. This paper elaborates on further thoughts and proposals.(AbdAlgane & Ali, 2024). Areal-Vocab functions as a platform to enhance leisure learning at home and refine language articulation and pronunciation, while also assisting children with moderate autism in acquiring English vocabulary in a more engaging and pertinent manner. The results of this study are anticipated to benefit all stakeholders, especially parents of autistic children, educators specializing in autism, and youngsters diagnosed with autism (M. Alfadil, 2020).

Evidence suggests that university students with autism frequently have enhanced cognitive and writing skills; however, they may struggle with perfectionism. This study underscores the necessity of collaborating with autistic students to identify their inherent qualities that may facilitate their success in higher education (Gillespie-Lynch et al., 2020). There is a consensus among several organizations, and our quantitative and qualitative data demonstrate that no universally accepted approach exists for defining autism spectrum disorder. Our topic analysis identified six core themes that clarified the reasons behind participants' selections and underscored the importance of honoring personal preferences. The implications of these findings are significant for informing practice, research, and language policy worldwide (Keating et al., 2023).

RESEARCH METHODOLOGY

Through iterative cycles of Classroom Action Research (CAR), which include testing, observation checklists, syllabi, lesson plans, and feedback, this study employed a quantitative action research technique. Because it allows for real-time modifications depending on participant feedback, this architecture is especially well-suited for educational situations. Utilizing digital strategies, classroom action research (CAR) can facilitate the learning of English as a foreign language (EFL) among children with autism. Through the use of digital techniques, this Classroom Action Research (CAR) seeks to improve autistic children's acquisition of English as a Foreign Language (EFL). Keeping in mind the particular obstacles that autistic students have, such as variable sensory sensitivity and social communication issues. The purpose of this study is to evaluate the effectiveness of specific digital resources and techniques in enhancing language learning.

Moser et al. (2021) argue that language educators must adapt their skills for in-person instruction to improve online learning. Each cycle focuses on specific digital strategies designed to enhance language acquisition in autistic children.

The research was conducted in an inclusive classroom setting, where Autistic children are taught together. Participants included

- Students: A group of ten autistic children aged 6-15 years currently learning EFL.
- Teachers and Educators experienced in teaching EFL and working with autistic students.
- Caregivers, Parents, or guardians of each child, provide awareness into their children's learning experiences.

Test: This worksheet is designed to guide children with autism spectrum disorder (ASD) in recognizing and learning about various body parts in an engaging and enjoyable way. Understanding the different parts of the body is essential for performing daily tasks, maintaining self-awareness, and engaging in conversation. This worksheet's tasks are designed to help children

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JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

identify and name body parts through repeated practice, clear directions, and visual assistance. This worksheet contains the following parts.

- Vocabulary (Learn by matching)
- Comprehension (Understanding)
- Listening Skill and Expression(Pointing)
- Speaking Skills

Observation Checklist

To evaluate the effectiveness of the digital strategies during the implementation phase, an observation checklist was utilized. The checklist focuses on the following areas

Student Engagement: Utilizing digital tools, engaging in discussions, and demonstrating interest in activities

Communication Skills: Employing new vocabulary accurately, participating in peer relationships and articulating concepts with clarity

Behavioral Observations: Adhering to directives**,** displaying concentration and attentiveness, and manifesting constructive social engagements.

Feedback

This quantitative survey for therapists contains questions that do not allow for open-ended responses regarding how digital technology can improve the English language learning of autistic children (Scarcella et al., 2023). Respondents can use a Likert scale that ranges from 1 to 5, with 5 indicating strong agreement and 1 indicating strong disagreement with the statement.

Data Collection

Following the selection of participants, data collection commences, employing diverse methodologies to gain insights into the efficacy of digital initiatives in enhancing EFL learning. Studies were conducted using a pre- and post-intervention assessment to evaluate instructors' and students' perceptions of the digital tools used and their impact on language acquisition. Observational data were collected to assess student involvement, interaction, and the utilization of digital tools in real time throughout the learning of English as a Foreign Language (EFL). Feedback was collected from therapists (Lloyd et al., 2013). These quantitative data were utilized to enable assessments of language proficiency across the firm. The quantitative data obtained from surveys and evaluations will be entered into statistical software, such as SPSS or Excel, for analysis.

DATA ANALYSIS AND FINDINGS

The purpose of this research is to evaluate how eight autistic learners with mild to high-functioning autism have increased their English as a Second Language (ESL) skills through the utilization of digital tools. Individuals with autism range from mild to high-functioning. In this context, the term "digital strategies" refers to the incorporation of technology-based tools, such as language learning applications, interactive games, speech-to-text technology, and multimedia resources, to assist students with autism in developing their language abilities. Interactive games are an example of a technology-based tool. The learners were given a diagnostic test before the intervention (digital tactics), and then they were given a progressive test after the intervention was finished. Both tests

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

were administered individually to the learners. The following study provides a comprehensive understanding of the effectiveness of digital strategies, exploring the data through descriptive statistics, frequency tables, and a paired sample t-test. This study provides a comprehensive knowledge of the effectiveness of digital strategies.

Analysis of Descriptive Statistics

Diagnostic Test Descriptive Statistics

Descriptive statistics offer a summary of the data collected before the implementation of digital technologies, providing insights into the initial performance of learners. The mean score is the average of all the students' test scores, and it is displayed as the mean. The purpose of this is to provide an overview of the learners' overall English competency at the beginning of the study. Learners, on average, have a basic yet limited comprehension of English, as indicated by a diagnostic test mean score of 59.38 (out of 100), which suggests that they have a limited understanding of the language. In light of this, it appears that a significant number of students struggle with essential language skills, including vocabulary, grammar, and comprehension. When the scores of all learners are arranged in ascending order, the median provides a representation of the value that is considered to be the most central in a dataset. It is possible to gain insight into the central tendency of the scores by calculating the median. The median score is 59.00. It may be deduced from this that fifty percent of the students achieved scores that were lower than sixty-nine, while the remaining fifty percent achieved scores that were higher than this criterion.

The score that appears the most frequently is referred to as the mode, which is the definition of the mode. The median score is 45, which indicates that the majority of students scored close to this amount. This suggests that a significant number of students are located at the lower end of the proficiency range.

This statistic is used to quantify the dispersion of scores about the mean. It is called the standard deviation. A high standard deviation implies that there is a substantial amount of variability in the students' performance. In contrast, a low standard deviation suggests that the scores are distributed relatively closely to the mean. The standard deviation is 11.045, indicating substantial variation in learners' language proficiency levels. It appears from this that some pupils are having a significant amount of difficulty, while others are demonstrating a stronger understanding of the language. Within the context of the diagnostic test, the range is defined as the difference between the greatest and lowest scores obtained. A wider range indicates a greater degree of variety in the skills of learners. The range of 29, marked by a highest score of 74 and a lowest score of 45, demonstrates a significant disparity in initial proficiency levels among students, with some exhibiting markedly superior performance compared to their peers.

Table 1: Descriptive Statistics for Diagnostic Test

Statistics	
N Valid Missing	8 0
Mean	59.38
Median	59.00

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Mode			45	
Std. Deviation			11.045	
Range			29	
Valid	Frequency	Percent	Valid Percent	Cumulative Percent
45	1	12.5	12.5	12.5
49	1	12.5	12.5	25.0
50	1	12.5	12.5	37.5
55	1	12.5	12.5	50.0
63	1	12.5	12.5	62.5
69	1	12.5	12.5	75
70	1	12.5	12.5	87.5
74	1	12.5	12.5	100

Progressive test Descriptive Statistics

The purpose of the progressive test administered after the deployment of digital strategies was to determine whether the students' English speaking abilities had improved as a result of adopting the digital strategy. Through the use of descriptive statistics obtained from the progressive test, one can gain insights into the development that the learners have achieved.

The mean score of the progressive test, which is determined by the average score, is a measure of the overall development that the learners have made in terms of their language ability. It can be deduced from the fact that the mean score before the test was 59.38 and the mean score after the exam is 72.38 that there was a substantial improvement from the diagnostic test mean. The fact that the mean score has increased is proof that, on average, the students have achieved a better degree of competency in their English language abilities by the time the test was administered.

Examining the median score of the progressive test is one way to determine whether or not the central tendency of the learners' scores has increased. This conclusion can be reached by analyzing the median score. It is possible to conclude that half of the students scored lower than 72.0, while the other half scored higher than 72.0, given that the median score was 72.00. This represents a significant improvement compared to the median score of 59.00 attained before the examination.

The mode of the progressive test is the score that occurred the most frequently after the intervention was carried out. It is displayed according to the mode. Having access to this information enables a more in-depth understanding of the most commonly acquired degree of competency by learners as a result of their use of digital strategies. A significant number of students scored in the vicinity of 59, representing a notable improvement from the diagnostic test score of 45, which suggests that the majority of students have enhanced their language abilities. The fact that the mode was 59 implies that a notable number of students scored in the region of these scores.
A decrease in the standard deviation from the diagnostic test to the progressive test would indicate that the learners' performance has become more consistent. This would be the case provided that the standard deviation had decreased. On the other hand, the fact that the standard deviation has decreased would support this conclusion. After taking the test, it is possible to conclude that the students' scores are now more closely clustered around the mean. This conclusion can be reached

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

because the standard deviation was 10.7. It appears from this that the digital strategies were successful in reducing the gap between students with the lowest and highest performance levels. To determine whether the learners' linguistic abilities have become more consistent as a result of the intervention, the range on the progressive test was used. A range of 28 (with the highest score being 87 and the lowest score being 59) suggests that, after the intervention, the learners' scores are more closely aligned, indicating more consistent improvement across the group. The top score is 87, and the lowest score is 59.

Table 2: Descriptive Statistics for Progressive Test

Statistics		
Progressive assessment test		
N	Valid	8
	Missing	0
Mean		72.38
Median		72.00
Mode		59
Std. Deviation		10.770
Range		28

Progressive assessment test

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	59	1	12.5	12.5	12.5
	60	1	12.5	12.5	25.0
	65	1	12.5	12.5	37.5
	69	1	12.5	12.5	50.0
	75	1	12.5	12.5	62.5
	80	1	12.5	12.5	75.0
	84	1	12.5	12.5	87.5
	87	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

Frequency Table Analysis

Frequency tables show how many learners fall within specific score ranges, offering a clear visual representation of how the learners' scores have shifted from the diagnostic test to the progressive test.

Diagnostic Test Frequency Table

In the diagnostic test, the frequency table appears as follows.

Table 3: Frequency Table for Diagnostic Test

Score Range	Frequency
40-49	2
50-59	3

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

60-69	2
70-79	2
80-89	0

Progressive Test Frequency Table

In the progressive test, the frequency table appears as follows.

Table 4: Frequency Table for Progressive Test

Score Range	Frequency
60-69	4
70-79	1
80-89	3
90-100	0

Frequency Distribution

The frequency distribution shows a clear shift. In the diagnostic test, a large proportion of students scored in the 40-49 range. Progressive test: a majority of students scored in the 60-69 range, with some students scoring between 80 and 90. This shows that most learners made substantial progress after using digital strategies. The fact that this shift has occurred implies that digital tools have been able to provide sufficient support for all pupils, including those with autism, and have contributed to the improvement of their language abilities.

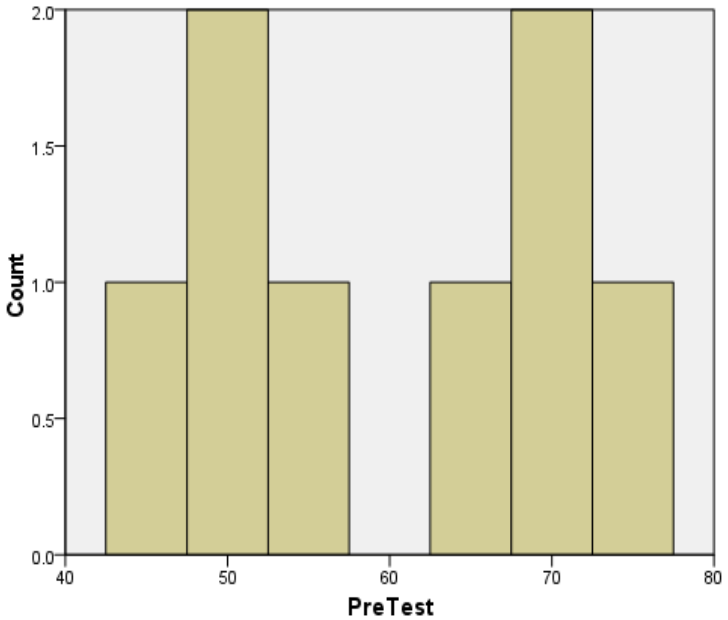

Figure 1. Comparative Analysis of Diagnostic and Progressive Test Results

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Table 5: Descriptive Statistics of Comparative Analysis of Diagnostic and Progressive Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
Participant	8	1	8	4.50	2.449
Total Marks	8	100	100	100.00	.000
Diagnostic Test	8	55	74	66.13	6.707
Posttest	8	11	87	70.50	24.946
Score Change	8	54.00	18.00	4.3750	23.74229
Valid N (list-wise)	8				

Paired Samples T-Test

The purpose of this test is to assess whether or not there is a statistically significant difference between the means of two groups that are related to one another (the diagnostic test and the progressive test).

Interpret the Output

Statistical analysis using paired samples reveals the averages and standard deviations of the scores obtained on the diagnostic test and the progressive test.
Paired Samples Test: The t-value is determined based on the findings of the t-test, which calculates the disparity between the means to assess the amount of variation present in the data.DF stands for degrees of freedom. One less than the total number of participants, which in this case is seven. Sig. (2-tailed) A p-value that represents the test. Since the p-value is less than 0.05, I can conclude that there is a statistically significant difference between the results of the diagnostic test and the progressive test.

Table 6-Paired Samples Test of Diagnostic and Progressive Test.

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower
Pair 1	diagnostic assessment test - progressive assessment test	-13.000	2.777	.982	-15.322

Paired Samples Test

		Paired Differences				
		95% Confidence Interval of the Difference Upper	t	df	Sig. (2taile)
Pair 1	Diagnostic assessment test — progressive assessment test	-10.678	-13.239	7	.000

Effect Size (Optional)

To determine the extent of the change, I can compute the coefficient of determination (Cohen's d) for the paired samples t-test as follows.
(Mean of Posttest Score - Mean of Pretest Score) / Standard is the formula for calculating Cohen's

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

d. The range of values that the scores differ from one another. In this way, a standardized measurement of the magnitude of the effect is obtained, which is -2.186. The results of this analysis provide insights into the intervention or teaching style that was most successful in enhancing the performance of autistic youngsters.

Table 7: Paired Samples Effect Sizes

Table 4.8 Paired Samples Effect Sizes

			Standardizer	Point Estimate	95% Confidence Interval
					Lower
Pair 1	Diagnostic assessment test, progressive assessment test	Cohen's d	2.777	-4.681	-7.166
		Hedges' correction	2.938	-4.424	-6.774

Paired Samples Effect Sizes

			95% Confidence Interval
			Upper
Pair 1	Diagnostic assessment test – progressive assessment test	Cohen's d	-2.186
		Hedges' correction	-2.066

Observation Checklist Analysis

To analyze the data from my observation checklist of eight participants in a Classroom Action Research study using SPSS, I follow these steps.

Data Input in SPSS software

Participants (N = 8) are represented in a row in the SPSS data file, with each participant listed separately.

Days (5 days) each day is a separate variable or measurement point for each participant. Each row represents one observation day for each participant.

Question: Each observation item (the 10 questions) is a column (variable) in SPSS. The 10 questions (e.g., Q1, Q2, Q3, etc.) are measured as separate variables, where each is measured on a Likert scale (e.g., 1 = Strongly Disagree, 5 = Strongly Agree) or a similar scale.

Variable Scaling

If you used a Likert-type scale (1-5) for each question, each question (Q1, Q2, Q10) is coded as a numerical variable. Check. All values are consistent (e.g., 1 = strongly disagree, 5 = strongly agree).

Descriptive Statistics

To summarize the data, I perform descriptive statistics to gain an overview of the responses for each question. This shows you the mean, standard deviation, minimum, and maximum scores for each question.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Table 8: Descriptive Statistics of Observation Checklist

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Q1.The student shows interest in learning English vocabulary through digital strategies.	40	2.00	5.00	3.3500	1.02657
Q2.The student interacts with the therapist during digital lessons.	40	1.00	5.00	3.1500	1.16685
Q3.The student maintains focus on digital tasks to ensure appropriate pronunciation.	40	2.00	5.00	3.6500	.80224
Q4.The student uses English vocabulary appropriately during digital activities.	40	2.00	5.00	2.9500	1.01147
Q5.The student expresses thoughts or questions about the body part vocabulary	40	1.00	5.00	3.1750	1.25856
Q6.The student understands instructions delivered through digital platforms by the therapist.	40	2.00	5.00	3.3250	.94428
Q7.The student appears motivated to engage with digital learning tools.	40	3.00	5.00	4.3750	.54006
Q8The student displays frustration or anxiety during digital tasks learning	40	3.00	5.00	4.1250	.68641
Q9.The student demonstrates improvement in English language skills through the use of digital strategies.	40	1.00	5.00	2.5500	.98580
Q10.The student can recall vocabulary learned from digital resources.	40	1.00	5.00	3.4750	1.13199
Valid N (list-wise)	40				

The descriptive analysis of Q1 mean of 3.35 show student interest in learning English vocabulary through digital technology, Q2 mean of 3.15 show student interact with therapist, Q3 with means 3.6 and standard deviation .802 show student maintain focus on digital activities for appropriate vocabulary, Q4 with mean 2.9 with standard deviation show 1.01 show student use vocabulary appropriately, Q5 with mean 3.1 and standard deviation 1.2 show student express their thought about learning, Q6 with mean 3.3 and standard deviation .94 show student understand instruction by therapist, Q7 with mean 4.3 and standard deviation .54 show student motivation regarded digital learning, Q8 with mean 4.1 and standard deviation .64 show student frustration during digital learning and Q9 with mean 2.5 and standard deviation with .98 show improvement in digital learning and Q10 with mean 3.4 and standard deviation 1.1 show student recall vocabulary learned through digital lesson

Reliability Analysis (Cronbach's Alpha)

To assess the internal consistency of the checklist (i.e., whether the 10 questions measure the same construct), a reliability analysis is conducted using Cronbach's Alpha as the model. This helps determine whether the set of questions is a reliable scale. The Cronbach's Alpha of 0.8 indicates

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

the reliability of Autistic children learning English as a second language through digital technology.

Feedback Analysis

This extensive study examines therapists' feedback on using digital technologies to teach ESL to autistic youngsters. On a Likert scale, therapists rate the usefulness, engagement, and accessibility of digital learning tools in their sessions. The questionnaire comprises fifteen statements to assess respondents' opinions. The survey used a Likert scale to quantify replies. Five was the highest score on the 1–5 scale. An examination was conducted to determine therapists' agreement on the use of digital approaches in the language development of autistic children. This study examines the perceived efficacy and challenges of digital technologies in treatment. Research summarizes major themes from responses.

Survey Structure

The questionnaire consists of fifteen questions that assess various aspects of using digital resources to teach English as a second language to autistic children. The survey is for autistic people. This area includes questions about the efficacy of digital techniques, therapists' use of them, and student outcomes. The comments were recorded on a five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

Data Analysis

For each question, we calculated the mean score, standard deviation, and frequency distribution to understand the overall response trends. A higher mean indicates more positive feedback, while a lower means suggest areas for improvement.

Effectiveness of Digital Strategies in Language Learning

Question 1: I adapt digital content to fulfill the distinct educational needs of each autistic child. The majority of therapists concur that digital tactics effectively enhance language development in autistic children, as seen by a mean score of 4.20 for this issue, indicating widespread agreement among therapists. In light of the favorable feedback obtained, it is recommended that the utilization of digital resources be promoted for future use. Furthermore, it is recommended that further research be conducted to identify the digital strategies that are most beneficial for specific young people.

Question 10: I have observed significant improvements in my language proficiency through the use of digital techniques. This indicates that therapists have a high level of confidence in the usefulness of digital technology in improving the language proficiency of their pupils, as noted in the mean score of 3.8. Given that therapists have reported a noticeable change, it is possible to conduct further studies to identify the specific language skills most significantly affected by the use of digital tools.

Table 9: Statistics of Feedback OF Q1, Q10

Statistics			
		Q1.Ithinkthatusingdigitaltacticshelpskidswithautismdeveloplanguageskill.	Q10.Iveseennoticeablegainsinlanguage proficiencyutilizingdigitaltactics.
N	Valid	5	5
	Missing	0	0
Mean		4.20	3.80
Std. Deviation		.447	.837

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Minimum	4	3
Maximum	5	5

Engagement and Motivation

The use of digital strategies increases the level of engagement among children with autism. It can be inferred from the fact that digital tools received a mean score of 4.40 that they are perceived as beneficial in encouraging academic participation among students. However, there are one or two therapists who believe that involvement may be improved even more. These therapists obtained a score of three or lower. To ensure ongoing participation over an extended period, it may be beneficial to incorporate more interactive and gamified elements into the digital tools.

Question 5: When it comes to language acquisition, children with autism can benefit from watching videos. A mean score of 4.0 indicates that therapists are in complete agreement that video-based content is an effective learning strategy for children with autism, particularly for those who learn best through visual means. This is especially true for younger children, who tend to be more visual learners. A further improvement in language retention for these children could be achieved by the adoption of additional sessions based on video.

Table 10: Statistics of Feedback of Q3, Q5

Statistics			
		Q3.Digitaltacticsbooststudentswithautismslevelofengagement.	Q5.Childrenwithautismbenefitfromwatchingvideoswhenlearninglanguage.
N	Valid	5	5
	Missing	0	0
Mean		4.40	4.00
Std. Deviation		.894	.707
Minimum		3	3
Maximum		5	5

Use of Digital Tools

It is possible that utilizing digital technologies could be advantageous in increasing the degree of involvement among youngsters with autism.

The fact that digital tools received a mean score of 4.40 indicates that they are regarded as advantageous in enhancing academic participation among students. This interpretation may be drawn from the fact that the score was given. On the other hand, a few therapists believe that involvement can be further improved. These counselors had a score of three or lower on the evaluation. A greater number of interactive and gamified elements could be beneficially incorporated into digital tools to achieve the goal of ensuring continuous engagement over a more extended period. Children with autism can benefit from watching movies in the process of language acquisition. Question 5: What are the benefits of watching movies? A mean score of 4.0 indicates that therapists are totally in agreement that video-based content is an excellent learning technique for children with autism, particularly for those who learn best through visual means. This is especially true for children who struggle with words. Younger children, who tend to learn better through visual means, are particularly susceptible to this truth. It is possible that implementing additional video-based sessions could result in even greater improvement in the children's ability to retain the language.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

Table 11: Statistics of Feedback of Q4, Q6

Statistics			
		Q4.Iroutinelyemployinteractiveapplicationsinmytreatmentsessions.	Q6.Youngsterswithautismbenefitfromplayingonlinegamestoincreasethelearning.
N	Valid	5	5
	Missing	0	0
Mean		3.40	4.00
Std. Deviation		.548	.707
Minimum		3	3
Maximum		4	5

Emotional and Behavioral Impact

Q7. I have discovered that the utilization of digital strategies assists autistic children in experiencing less anxiety while they are learning a language.

The fact that digital tools obtained a mean score of 3.9 suggests that they may contribute to reducing anxiety; nonetheless, there is a wide range of perspectives among therapists regarding the effectiveness of these tools. The effects may be more noticeable to some people than to others, depending on the individual. It is essential to conduct further research to determine whether various digital tactics have the most beneficial effects on anxious adolescents.

Table 12: Statistics of Feedback of Q7

Statistics		
Q7.Ihavvefoundthatusingdigitaltacticshelpsautisticyoungstersfeellessanxiety.		
N	Valid	5
	Missing	0
Mean		3.40
Std. Deviation		.548
Minimum		3
Maximum		4

Parental Involvement

Regarding question number eight, I believe that the presence of parents makes digital strategies more effective. It is clear from the score of 4.4 that there is a high level of agreement among therapists regarding the concept that involving parents in the process of supporting children in language acquisition can considerably improve the effectiveness of digital tools. There is a possibility that the advantages of digital methods could be increased by fostering parental involvement through the use of digital platforms (for instance, programs that facilitate learning between parents and children).

Table 13: Statistics of Feedback of Q8

Statistics		
Q8.Inmyopinionparentalparticipationincreasestheefficacyofdigitaltechnology.		
N	Valid	5
	Missing	0
Mean		4.40
Std. Deviation		.894

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JALT

Minimum	3
Maximum	5

Personalized Learning

Question 9: I modify digital content to meet the specific educational requirements of each autistic child. There is a clear indication that therapists are in total agreement (mean score of 4.0), which implies that digital resources are frequently adapted to fit the particular requirements of the child. Personalization is being implemented effectively; however, additional training could help therapists better tailor digital content to accommodate a variety of learning styles and requirements. Personalization is being utilized effectively. In question thirteen, the use of digital tools enables personalized learning experiences. Digital techniques are beneficial in supporting individualized learning, which in turn permits more individualized approaches. This has been stated by those working in the field of therapy. The mean score for this particular statement is 4.2. You should continue your investigation of digital solutions that enable even greater customization to accommodate the learning pace and style of each child.

Table 14: Statistics of Feedback of Q9

Statistics			
		Q9.Iadaptdigitalcontenttoeachautisticchildsuniquelearningneeds.	Q13.Personalizedlearningexperiencesaremadepossiblebydigitaltechnology.
N	Valid	5	5
	Missing	0	0
Mean		4.00	4.20
Std. Deviation		.707	.837
Minimum		3	3
Maximum		5	5

Confidence and Advice

Regarding question 12, I am confident in my ability to utilize digital tools during counseling sessions. Therapists have a mean confidence level of 4.4, indicating that they are generally optimistic in their ability to incorporate digital approaches into their therapy sessions. The statistical analysis suggests this. Despite the high degree of confidence, continued professional development and seminars can provide additional support to therapists in maintaining their familiarity with the latest digital strategies. The use of digital strategy is something I would recommend to other therapists who work with children with autism, in question 15. The fact that the therapists obtained a mean score of 4.6, which is considered relatively high, suggests that they have a strong belief in the usefulness of digital tools for other professionals working with autistic children. There is a possibility that it may be feasible to significantly improve the outcomes of language acquisition for autistic children across various therapeutic settings if more therapists are encouraged to adopt these strategies.

Table 15 Statistics of Feedback of Q12, Q15

Statistics			
		Q12.Ihavefaithinmycapacitytousedigitaltechniquesintoclassroom.	Q15.Iwouldadviseothertherapistswhoworkwithchildrenwhohaveautismtousethisdigitaltechnology.
N	Valid	5	5

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Missing	0	0
Mean	4.00	3.80
Std. Deviation	.707	.447
Minimum	3	3
Maximum	5	4

Conclusion

The pre- and post-test study, which includes both descriptive statistics and frequency tables, demonstrates that the utilization of digital techniques has had a positive and significant impact on the acquisition of the English language by students with autism, ranging from mild to high-functioning. The noteworthy gains in the mean, median, and mode from the diagnostic test to the progressive test, along with the remarkable improvement in overall competency, underscore the effectiveness of digital tools in enhancing learning outcomes. Students generally fared better after using the digital tools, as indicated by the mean score, which shows a general improvement among participants. Unaffected by severe outliers, the median, which represents the middle score, suggests that the average participant also experienced better outcomes. Further highlighting the fact that more students attained a comparable increased performance is the mean, or most frequent score, which indicates that a greater proportion of participants achieved higher competence levels. All of these statistical increases point to the overall efficacy of digital tools in promoting learning, suggesting that they have improved competency across a wide range of learners, not just a select few.

After employing digital tools, learners' language competency has grown more consistent, as seen by the decrease in standard deviation and range between the diagnostic test and progressive test scores. The greater range of scores in the diagnostic test indicated different degrees of proficiency, with some students outperforming others. Nonetheless, the progressive test suggests a decline in both range and standard deviation, indicating that students' performance has stabilized. The lower standard deviation indicates that there is less variance among students, and scores are now closer to the mean. In a similar vein, the reduced range indicates that the difference between the highest and lowest scores has shrunk, suggesting that the digital tools assisted learners who performed worse in catching up without impeding the advancement of higher performers. This implies that the resources provide a more equitable educational experience, encouraging steady progress for every student and lessening differences in skill levels. The decline in variability demonstrates the effectiveness of digital technologies in creating a more consistent and welcoming learning environment.

With a noticeable rise in the proportion of students attaining higher proficiency scores, the frequency distribution of the diagnostic test and progressive test findings amply demonstrates a favorable change in students' overall performance. The change in the frequency distribution highlights how well the digital tools have worked overall in helping students' language competence increase significantly.

Overall, digital tactics have been very helpful in supporting the language learning process for children with autism. These strategies have helped these students achieve higher levels of proficiency and made their language abilities more consistent. According to the findings of this

study, digital tools are a significant resource for English as a Second Language (ESL) learners with autism, as they offer individualized support to enhance their learning outcomes.

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