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Linguistic performance of Students with Autism Spectrum Disorders, and the role of Digital Technologies

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Abstract This study examines the perceptions that language teachers have in secondary schools about the performance of students diagnosed with autism spectrum disorders (ASD) in language lessons. More specifically, it tries to illustrate the views of language teachers on the ability of students with high functionality, to respond to the objectives of the Language curriculum in secondary schools. The sample was forty-eight (48) language teachers, three of which were men and forty-five women teaching at secondary schools in the Attica Perfecture. The results of the research showed that the majority of the language teachers believed that students with ASD cannot respond adequately to the requirements of the Language curriculum. Additionally, they consider that students with ASD cannot successfully respond to the language assessment criteria set by the Institute of Educational Policy. According to the research questions, it is concluded that the education level of the language teachers is directly related to their views about the proficiency of the students with ASD to respond to the requirements of the curriculum. Research data also showed that due to the inherent deficits of the students with ASD, Language teaching includes many difficulties.

Keywords: autism spectrum disorders, Language, research, views of language teachers

1.Introduction

Children with high-functioning autism have sufficient language ability regarding language morphology and semantics, but show pragmatic difficulties (1). However, they seem to differ from their peers, because it is obvious that they cannot participate in an ordinary conversation. Although in terms of phonology and syntax (i.e., the pronunciation of words and grammar), their development is the same as their peers, the differences are mainly detected in specific areas of pragmatics (i.e., how they use speech in the social environment), of semantics (i.e., they do not recognize that a word can have more than one meaning), and of prosody (i.e., their spoken language is accompanied by unusual intensity and a monotonous vocal intonation). Carina and Christopher Gillberg's diagnostic criteria also described the unusual speech and language characteristics of these children, included at least three of the following deficits (2):

• delayed speech development

• superficially perfect expressive language

• formal, pedantic speech

• peculiar prosody, unusual vocal intonation

• inability to understand concepts, misinterpretation of literal/metaphorical expressions

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In addition to the diagnostic criterion of unusual or peculiar speech, has been added that the children may talk too much or too little, use words peculiarly and repeat certain expressions in their speech (3).

2.Purpose of the research

The main objective of this research was to investigate the language teachers' opinions regarding the performance of students with autism spectrum disorders (ASD) in the Greek Language. Specifically, the research seeks to detect language teachers' views on the potential of students with high-functioning autism to respond to the Language curriculum objectives in the Gymnasium[1].

2.1 Research hypotheses

The research hypotheses originating from the Greek and international literature were:

1. To what extent do the language teachers' a) age and b) training in Special Education determine their opinions on the ability of students with ASD to respond to the requirements of the Greek Language curriculum?

2. To what extent, according to the language teachers' point of view, does students' ability to understand a) the concepts and b) the polysemy of the language texts contribute to integrating the knowledge they acquired into their everyday life?

3. To what extent, according to the language teachers' point of view, does understanding the vocabulary of the language texts contribute to the improvement of their linguistic expression?

4. To what extent, according to the language teachers' point of view, the difficulties students on the autism spectrum show in understanding the functional dimension of the linguistic phenomena in language texts, prevent them from successfully responding to the language assessment criteria set by the Institute of Educational Policy?

2.2 Methods

A questionnaire was used based on the objectives of the Language curriculum for the Gymnasium.
The questionnaire consisted of two parts:
1. The first part sought to collect the language teachers' demographic data as well as the type of training they had in special education.
2. The second part included a five-point Likert-type scale (Not at all, A little, To some extent, Rather much, Very much) for the language teachers to rank their opinion on their students' with ASD abilities in Language.

2.3 Sample

An empirical sampling procedure was used. 48 language teachers, 3 men and 45 women, who were teaching Greek Language in Gymnasia in the Attica Prefecture and were available to participate at the specific time, filled in the questionnaires.

3 Data analysis

Non-parametric statistical analyses techniques were used to assess the differences between the research variables as the data obtained in this research did not follow a normal distribution(4). First, descriptive statistical analysis was used. Pearson Chi-square tests for categorical variables were performed to examine whether there was a relationship between the variables examined. Secondly, inductive statistical analysis was applied to the data. Kruskal-Wallis H Tests examined whether there was a statistical difference between the variables in the hypotheses.

[1] Gymnasium: Lower secondary education in Greece

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3.1 Results

Research question 1

To what extent do the language teachers' a) age and b) training in Special Education determine their opinions on the ability of students with ASD to respond to the requirements of the Greek Language curriculum?

Age

A Pearson Chi-Square Test was used to examine if there was a relationship between the language teachers' age and their opinions on the ability of students with ASD to respond to the Language curriculum requirements. Chi-Square Test showed that there was no statistically significant difference between the participants' age and their opinions on the ability of students with ASD in Language, $x\ (8) = 7.081$, $p = .528$ (Table 1).

Table 1. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6,651a	8	,575
Likelihood Ratio	7,081	8	,528
Linear-by-Linear Association	,008	1	,927
N of Valid Cases	48		
a. 11 cells (73,3%) have expected count less than 5. The minimum expected count is ,10.			

In addition, the non-parametric Kruskal-Wallis Test for independent samples did not show a statistically significant difference between the language teachers' age and their opinions on the ability of students with ASD to respond to the Language curriculum requirements, $H\ (3) = 4.984$, $p = .291$.

Level of education

A Pearson Chi-Square Test was applied to study the relationship between the language teachers' level of education and their opinions on the ability of students with ASD to respond to the requirements of the Language curriculum. According to Chi-Square Test results, there was a statistically significant difference between the language teachers' level of education and their opinions on autistic students' ability, $x\ (6) = 15.017$, $p = .020$ (Table 2).

Table 2. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.764[a]	6	.032
Likelihood Ratio	15.017	6	.020
Linear-by-Linear Association	6.601	1	.010
N of Valid Cases	48		
a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .10.			

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The non-parametric Kruskal-Wallis Test for independent samples also showed a statistically significant difference between the language teachers' level of education and their opinions on the ability of students with ASD to respond to the requirements of the Greek Language curriculum. *H (3) = 9.390. p = .025.* The language teachers' level of education seems to be related to their opinions on students' with ASD ability in Language (higher level of education. more positive opinions). The language teachers' level of education also seems to affect their opinions regarding the ability of students with ASD to respond to the demands of the Greek Language curriculum in the Gymnasium.

Research question 2

To what extent. according to the language teachers' point of view. does students' ability to understand a) the concepts and b) the polysemy of the language texts contribute to integrating the knowledge they acquired in their everyday life?

Understanding the concepts

A Pearson Chi-Square Test was used to ascertain whether there was a relationship between the autistic students' ability to understand the language concepts taught and the integration of the knowledge acquired in the language lessons into their daily lives. According to the Chi-Square Test results, there was no statistically significant difference between the students' ability to understand the language concepts and the integration of the knowledge acquired in language by them into their daily life. *x (4) = 4.687. p = .321* (Table 3).

Table 3. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4,177[a]	4	,383
Likelihood Ratio	4,687	4	,321
Linear-by-Linear Association	1,605	1	,205
N of Valid Cases	48		

a. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,42.

The Kruskal-Wallis Test for independent samples in this case also showed no significant statistical difference. *H (2) = 2.139. p = .343.*

Understanding the polysemy of the language texts

A Pearson Chi-Square Test examined the relationship between the students' ability to understand the polysemy of the language texts and the integration of the knowledge acquired in the language lessons into their everyday life. The Chi-Square Test revealed a statistically significant difference between the students' ability to understand the polysemy of the language texts and the integration of their acquired knowledge in language into their daily life. *x (4) =16.122. p = .003* (Table 4).

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Table 4. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13,129[a]	4	,011
Likelihood Ratio	16,122	4	,003
Linear-by-Linear Association	7,859	1	,005
N of Valid Cases	48		
a. 7 cells (77,8%) have expected count less than 5. The minimum expected count is ,21.			

The Kruskal-Wallis Test for independent samples showed a statistically significant difference. *H (2) = 11.987. p = .002.* According to the language teachers' opinions. the understanding of the polysemy of the language texts is directly related to the integration of the knowledge that the students acquire in the language course into their everyday life.

Research question 3

To what extent. according to the language teachers' point of view. does understanding the vocabulary of the language texts contribute to the improvement of their linguistic expression?

The Pearson Chi-Square Test used to ascertain whether there was a relationship between the comprehension of the vocabulary of the language texts and the improvement of their language expression showed no statistically significant difference between the variables tested. *x (9) = 10.863. p = .285* (Table 5).

Table 5. Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26,414[a]	9	,002
Likelihood Ratio	10,873	9	,285
Linear-by-Linear Association	3,806	1	,051
N of Valid Cases	48		
a. 12 cells (75,0%) have expected count less than 5. The minimum expected count is ,04**.**			

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Kruskal-Wallis H Test for independent samples showed no statistically significant difference between the variables as well, *H (3) = 5.633. p = .131*.

Research question 4

To what extent. according to the language teachers' point of view. the difficulties students on the autism spectrum show in understanding the functional dimension of the linguistic phenomena in language texts. prevent them from successfully responding to the language assessment criteria set by the Institute of Educational Policy?

A Pearson Chi-Square Test was used to study whether students' difficulties in understanding the functional dimension of linguistic phenomena in language texts prevent them from successfully meeting the language assessment criteria set by the Institute of Educational Policy. The results showed a statistically significant difference between ASD students' difficulties in understanding the functional dimension of linguistic phenomena in language texts and their ability to successfully respond to the evaluation criteria. *x (4) = 16.687. p = .002* (Table 6).

Table 6. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22,536[a]	4	,000
Likelihood Ratio	16,687	4	,002
Linear-by-Linear Association	11,691	1	,001
N of Valid Cases	48		

a. 7 cells (77,8%) have expected count less than 5. The minimum expected count is ,50.

The Kruskal-Wallis H Test for independent samples showed a statistically significant difference between the variables tested. *H (2) = 12.633. p = .002*. According to the language teachers' opinions, it seems there is a statistically significant difference between the students' understanding of the functional dimension of the linguistic phenomena in the language texts and their ability to successfully respond to the language evaluation criteria.

4. Discussion-Conclusion

Finally we underline the importance of the digital technologies in education domain and language comprehension that is very productive and successful, facilitates and improves the assessment, the intervention and the educational procedures via Mobiles which brings educational activities everywhere [18-30], various ICTs applications which are the core supporters of education [31-64], AI, STEM & ROBOTICS which raise educational procedures into new levers of performance [65-78], and games which transforms the education in a very friendly and enjoyable interaction [79-86]. Additionally the enhancement and combination of ICTs with theories and models of metacognition, mindfulness, meditation and emotional intelligence cultivation [87-122] as well as with environmental factors and nutrition [14-17], accelerates and improves more over the educational practices and results, especially in the language comprehension domain and its practices like assessment and intervention.

The findings of this research revealed that 25 out of a total of 48 language teachers consider that students with ASD can barely meet the requirements of the Language curriculum. When asked about their students' performance and whether they follow that of their peers, 24 out of 48 responded "a little", 13 "not at all" and only 10 answered "very much". The language teachers' answers about autistic students' understanding of the language texts are noteworthy, since 29 of them claimed that their students understood language texts "a little" and only 15 answered "to some extend". The language teachers' views on their students' understanding the vocabulary also revealed approximately the same percentages. It is also noteworthy that the language teachers' majority expressed negative opinions regarding autistic students' understanding of figurative language and the polysemy of language texts.

The specific findings that echo Language teachers' opinions of their students' with ASD language learning profile - as described through their answers - are also confirmed by research on the language-cognitive deficits of autistic students published in the international literature (5,6). The language-communication difficulties of children with ASD affect their language function in the field of language understanding and hold back the student's ability to process and manage all kinds of information-concepts arising during the language lesson. Of significant research interest are the language teachers' responses regarding whether students with ASD are able to successfully meet the language evaluation criteria set by the Institute of Educational Policy. 9 out of 48 language teachers stated "not at all", 33 answered "a little" and only 6 supported "very much".

To sum up, it seems that the language teachers' level of education is directly related to their views on the ability of students with ASD to respond to the Language Curriculum requirements. These results agree with the international literature findings on the necessity for General Education teachers' training on issues that pertain to ASD (7,8.9). In addition, the findings demonstrated that the autistic students' understanding of the polysemy of the language texts is directly related to the integration of the knowledge they acquired into their everyday life. Understanding language polysemy is a complex cognitive function in which semantic and pragmatic aspects are integrated. Depending on their degree of language development, students with ASD may present deficits in multi-semantic decoding which in turn crucially interfere with the integration and transformation of new knowledge (10,11,12,13).

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