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Geography Teachers' Knowledge of and Perceptions on Dyslexia

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Abstract: At all levels of education, teachers are actively involved in improving students' learning outcomes and developing their own pedagogical experience. As a consequence, the teacher's role in managing learning difficulties is of particular importance. This research investigates secondary school geography teachers' knowledge of and perceptions of dyslexia. For research purposes, 61 questionnaires were distributed to secondary teachers teaching geography all over Greece. The questionnaire included a total of 30 questions about demographic and personal information, teachers' knowledge of and perceptions of dyslexia, and teaching approaches they adopt while teaching geography. The research examined teachers' willingness to use teaching tools and innovative approaches that would help all students and, more specifically, dyslexics. The responses were coded using SPSSv.23.00. The results show that teachers' knowledge of dyslexia is contradictory, as most teachers (93.4%) believe that dyslexia affects students' performance only in language courses, whereas a smaller percentage of teachers (just 27.8%) believe that dyslexic students also find it difficult to participate in science courses, and only 26.2% believe they face difficulties in orientation as well. Teachers also have unclear views on how to manage dyslexia and how to implement effective teaching strategies. The results show the importance of geography teachers' training on dyslexia and the integration of new technology in teaching dyslexic students.

Keywords: geography teachers' knowledge; perceptions; dyslexia; geography education

1. Introduction

Education can be defined as the process of spreading knowledge, skills, values, rules, and culture from one generation to another in a society. According to this definition, it is said that "education is the influence that adult generations have on those who are not yet ready for social life" [1]. At all levels of education, teachers' top priority should be to improve students' learning outcomes and academic performance. Because of today's increasing demands on schools, the educational process has become more complex than ever before; the teachers' role is not restricted to how to transmit knowledge and cognitive information. Their current role is mainly to coordinate teaching and help students learn how to explore knowledge, how to apply it, how to use it, and how to produce new knowledge [1]. Therefore, teachers take over the role of encouraging students [2], and, in order to be able to respond to this role, they should know each student's needs and abilities, guide, enhance, give feedback to and evaluate their students, organize the learning environment, and promote and support self-assessment on a regular basis.

Research has shown that effective teachers are the most important factor that contributes to students' good performance [3]. Inappropriate teaching can have long-term consequences on someone's life [4]. Although contemporary curricula, reduced class size, new technologies, family, and community

contribute to students' progress, the most important factor is the teacher [5]. Teachers are especially important for student's effective learning and their knowledge level as well as their perceptions of teaching practices are of paramount importance [6]. A key prerequisite for achieving this goal is the appropriate training and development of teachers' own pedagogical experience, since scientific training offers teachers the necessary confidence in teaching [7,8].

Therefore, a prerequisite for successful teaching is that the teacher should be deeply familiar with their teaching subject in order to be able to properly apply this knowledge to teaching and to adapt teaching practices according to his/her students' needs. More specifically, the teacher's role in managing learning difficulties is crucial, so that students can be more active in the classroom. Teachers' knowledge, skills, and attitudes are the most important variables in the education of children with learning disabilities. Through their perceptions of, knowledge of, and attitudes towards students with learning disabilities, teachers also influence integration policies [9].

However, specific teaching skills are required to meet the needs of students with special learning disabilities [10]. In particular, teaching dyslexic students is a challenge for teachers and requires some additional training [11]. The teacher's ability to teach students with dyslexia depends on his/her attitudes and knowledge [12]. Every teacher, apart from his/her theoretical knowledge and mental abilities, should acquire emotional behaviors and attitudes towards self-understanding and willingness [13].

Dyslexia is a learning disability that affects various areas of academic performance. The European Dyslexia Association [14] defines dyslexia as a difference in the adoption and use of reading, spelling and writing skills, organizational skills, computing abilities, and other cognitive and emotional abilities caused by a combination of difficulties in phonological processing, working memory, rapid naming, sequencing, and automation of basic skills [15]. Furthermore, this common learning disability involves about 80 percent of the learning disabled population, although the prevalence rate may differ from country to country [16]. Many researchers report that dyslexia is created by four causes: perceptual deficits [17–21], memory deficits [22,23], language processing deficits [7], and visual processing deficits [24–26]. Dyslexia does not only affect reading and writing but it has also been proved to cause topographic disorders and orientation problems [27–30].

In Greece, the identification of a dyslexic student is performed by the local Diagnostic Assessment, and Support Centers (DASC). Dyslexic students are educated in mainstream school settings and DASC proposes an integrated educational program designed for every dyslexic student. Written examinations are widely used and the oral examinations demand memorization according to the Greek Education system [31]. This is a challenging task for most dyslexic students, as it is known that they face memory deficits and writing problems [32]. To address this issue, differentiated, inclusive teaching practices and, if required, individualized support by well-trained teachers should be implemented [31]. In order for each teacher's teaching methods to be achieved, teachers should be adapted to student's needs and the needs and content of the lesson. In Greece, according to law 2737/2020, geography is taught by teachers of many different specialties, such as geologists, geographers, physicians, chemists, mathematicians, biologists, and home economics teachers. Consequently, some of these teachers are not familiar with the content of geography or the appropriate teaching methods of the field. Only primary school teachers have attended courses on learning difficulties at the Greek universities, while in geologists', geographers', physicists', mathematicians', chemists', and biologists' curriculum (Department of Sciences), there are neither courses on didactics nor on pedagogy, and there are no courses on learning difficulties. As a result, they have limited knowledge of this issue. It should also be noted that the geology–geography subject is taught for only 1 h/week in the 7th grade and 2 h/week in the 8th grade of junior high school (or gymnasium in Secondary Education). This means that only one teacher in each school teaches the subject of geology–geography, and sometimes one teacher goes to two or three schools to teach in order to complete his/her 22 teaching hours per week.

The most appropriate way to achieve effective learning and improve school performance is to provide students with teachers with high academic and professional qualifications [33] who can use

multimedia, which is believed to assist dyslexic students [7,27]. Therefore, if teachers are willing to use ICT (Information and Communication Technology) and interactive educational material, dyslexic students would have better outcomes. Moreover, teachers could increase students' performance by providing supportive environments that would help their emotional development [34].

We find in the literature that there is also a great deal of research on the deficit of students' geographical knowledge as well as on students' and teachers' negative attitudes towards geography [12,29,35]. Many researchers have studied teachers' knowledge of and perceptions of dyslexic student's learning abilities in reading, writing, memory, and foreign-language learning. These teachers taught theoretical, foreign language, or mathematics courses.

The present research offers some primary information about the status of geography education in junior high schools in Greece. Although there are many studies dealing with dyslexia, there are very few dealing with dyslexic student's geographic literacy and geospatial skills of dyslexic students [3]. In addition, it is proven that there are differences between dyslexic and non-dyslexic students in the performance of spatial and geographical thinking [29]. However, in order dyslexic students to overcome their difficulties there is a prerequisite: teachers' effective training to become aware of the nature of dyslexia, to understand it, and to get qualifications (knowledge and skills) how to teach dyslexic students successfully [12].

This study consists an attempt to portray the geography teachers' perceptions toward dyslexia. The main objective of the paper is to investigate the issues and problems of teaching geography to dyslexic students. More specifically, this research investigates: (a) teacher perceptions of and knowledge of dyslexia; (b) teaching methods used for dyslexic students and (c) the obstacles the teachers face when implementing appropriate methods and techniques. All these are related to the teacher's personal and family characteristics and ICT experience.

2. Methods

To achieve the research objectives, we employed a quantitative approach complemented by a small qualitative part. We used a structured questionnaire consisting of five parts with 34 closed type questions and two open-ended ones and targeted all geography teachers in junior high school in Greece. The selection of the participants was based on stratified random sampling.

2.1. Participants

The collection of the questionnaires was based on random sampling in which we have a random sample rather than a convenience sample [36]. We used stratified random sampling. Out of 1677 junior high schools in Greece (2019), according to the official ministry records, we created 13 groups based on each school's region. A random selection of 10% of the schools of each region using the official registry records resulted in a total of 170 schools. This way, we secured geographical spread among the responses.

According to the Statistical Authority of Greece, the total population of junior high school geography teachers in 2016 was 878. Our sample of 61 geography teachers consists of 6.95% of the total population (based on 2016 population) and is therefore representative. The participating geography teachers teach in 49 different schools across 32 prefectures of Greece. The small amount of the teacher population in relation to the total population of junior high schools (1677) is due to many of them not being permanent teachers but deputies teaching not only in one school but in two, three, or even four if the schools are located in rural areas and consist of a few students.

Our respondents, 61 Greek teachers teaching geography in the 7th and the 8th grade in public junior high schools were 52% male. They served in urban (47.5%), suburban (21.3%), and rural areas (31.2%) throughout Greece (32 regions, Figure 1). Our sample constitutes 3% of the total sample of junior high schools in Greece. All teachers in our sample have declared that they have taught dyslexic students. The great majority of them (83.6%) were older than 41 years. Most of them were physicists (26.2%), mathematicians (24.6%), and home economics teachers (20.3%), while geologists

and geographers represented a small percentage (13.1%). Most of them (75.4%) had more than 11 years of teaching experience. Furthermore, 57.4% had only undertaken undergraduate studies and (55.7%) an ICT certification degree.

Figure 1. Map with schools that participated in this research.

2.2. Research Tools

A five-part questionnaire was used to collect the survey data as analyzed below:

- The 1st part recorded general details about the schools. Specifically, the teachers were asked to provide the prefecture where the school is located, the school's name, and whether it is located in an urban, suburban, or rural area.
- The 2nd part recorded demographic and personal data such as gender, age, years of experience, specialty, studies, and ICT certification, using multiple choice type questions.
- The 3rd part was titled "knowledge and attitudes about dyslexia" and contained 14 questions. Four multiple choice type questions recorded whether their bachelor's degree contained dyslexia related lessons, how they acquired knowledge about dyslexia, which teaching subject they believe is more affected by dyslexia related implications, and whether they have taught dyslexic students. Eight Likert 5 scale questions were used to collect the following data: how sufficient the knowledge about dyslexia acquired by their bachelor's degree is, how well they understand what dyslexia is, how effectively they are able to spot a dyslexic student in the classroom, how much dyslexic students are affected in certain tasks (such as oral speech, written speech, orientation, etc.), how much the existence of dyslexic students in the class affects their teaching methods, how appropriate their teaching methods are, how many different factors such as "teachers' deficient training" and "lack of curriculum flexibility to implement teachers' innovative methods" are responsible for not using appropriate methods, and how often they use specific methods (3d visualization,

mental maps, etc.) in their teaching interventions. Additionally, two open-ended questions were used. The first asked the teachers opinion about dyslexic students' intelligence and the second whether teachers believe that dyslexic students' spatial perception is worse than that of non-dyslexic students.

- The 4th part was titled "use of new technologies". Using four Likert 5 scale questions, it recorded how much their school's equipment can support methods to improve dyslexic students' performance, how familiar they are with ICT related skills, how often they use ICT in their teaching, and how often and for what reasons they use personal computers.

- The 5th part was titled "use of maps". It contained two Likert 5 scale questions, one Likert 6 scale question, and one multiple choice type question. The two Likert 5 scale type questions asked how important map use is in geography teaching and how often they use various types of maps in their teaching. The Likert 6 scale question asked whether they believe that the use of maps help dyslexic students to better understand the teaching subject and how much. The last, multiple choice type question asked teachers whether they want to participate in a future study.

Validity of the instrument refers to the fact that a tool measures exactly what it proposes to measure [37,38]. There are three types of validity: (a) content validity, (b) criterion validity, and (c) construct validity.

In this research, we used the criterion validity test. There were three questions that were used as a validity switch. In the case of the responses to these questions being inconsistent with others, the questionnaire would be discarded. In our occasion, none of the received questionnaires were discarded.

2.3. Procedure

Data collection began in October 2019 and was completed in February 2020. The participation was voluntary, and the responses were anonymous. A letter was sent to the headmaster of each selected school followed by telephone communication to clarify the procedure and the purpose of the research and to ask about the number of geography teachers at the school. We contacted 170 headmasters, and 134 geography teachers agreed to participate (79%). Questionnaires were sent and 61 responded (45.5%).

2.4. Data Analysis

Williams et al. [39] describe the research methodology as the holistic steps a researcher employs in embarking on a research work. A quantitative research design with the main research tool being a questionnaire was chosen. Therefore, a quantitative research method deals with quantifying and analyzing variables in order to get results [37].

Statistical Package for the Social Sciences (SPSS version 23.0) was used to analyze the collected data. All variables were coded and categorized as either nominal or ordinal. For categorical responses, frequencies, and percentages were calculated for data analysis (3rd, 4th, and 5th part of questionnaire). Furthermore, statistically significant relationships were computed between all variables and gender, age, specialty, years of service, as well as ICT certification by using x^2 statistical significance. For ordinal variables, Spearman linear correlations and descriptive statistics were calculated. All responses were checked for internal consistency using cross-tabulation analysis between predetermined sets of questions. The analysis revealed that all questionnaires that were received passed the internal consistency tests. To check the fit of the data to a normal distribution, an additional test was performed with histograms and Q–Q graphs [11].

3. Results

3.1. Decriptive Statistics—Geography Teachers' Knowledge of and Perceptions of Dyslexia

This part of the questionnaire examines what geography teachers' knowledge of and perceptions of dyslexia are (3rd part of questionnaire). Just 3.3% of the teachers had attended courses on dyslexia at the university. Excluding their bachelor's university courses, 21.31% of the teachers reported that they have obtained knowledge of dyslexia from conferences, 18.03% from seminars, 16.39% lectures, 14.75% books, journals, and articles, 5.56% training programs, 4.92% Master's degrees, and 18.03% none of the above. Although the majority of teachers (54.1%) believe that students with dyslexia have difficulties in all subjects, there is a significant percentage (44.3%) who believe that students with dyslexia have difficulties only in theoretical courses. Furthermore, only one (1.6%) teacher believes that dyslexic students have difficulties with science courses, and none of them answered that students with dyslexia have difficulties in foreign languages and ICT courses.

Moreover, the teachers were asked in which sectors they believe that students with dyslexia have difficulty, and the results are presented in Table 1, and in Table 2 there are means and standard deviation.

Table 1. Teachers' responses to the question: "Where do you think dyslexic students have difficulties?"

Difficulty in/with	Very Much (%)	Very (%)	Fairly (%)	Little (%)	Not at All (%)
Organizing spoken language	2 (3.3)	2 (3.3)	13 (21.3)	20 (32.8)	24 (39.3)
Writing	25 (41.0)	24 (39.3)	10 (16.4)	2 (3.3)	-
Orientation	11 (18.0)	5 (8.2)	8 (13.1)	16 (26.7)	21 (34.4)
Organizing thinking and time	14 (23.0)	3 (4.4)	11 (18.0)	16 (26.2)	17 (27.9)
Attention deficit hyperactivity disorder	3 (4.9)	-	3 (4.9)	13 (21.3)	42 (68.9)
Lack of synchronization	11 (18.0)	2 (3.3)	9 (14.8)	12 (19.7)	27 (44.3)
Comprehending long text	10 (16.4)	12 (19.7)	20 (32.8)	11 (18.0)	8 (13.1)
Memorizing	15 (24.6)	9 (14.8)	16 (26.2)	6 (9.8)	15 (24.6)

Table 2. Mean and std. deviation values of Table 1.

Difficulty in/with	n	Minimum	Maximum	Mean	Std. Deviation
Organizing spoken language	61	0	4	0.98	1.025
Writing	61	1	4	3.18	0.827
Orientation	61	0	4	1.49	1.490
Organizing thinking and time	61	0	4	1.69	1.512
Attention deficit hyperactivity disorder	61	0	4	0.51	0.977
Lack of synchronization	61	0	4	1.31	1.512
Comprehending long text	61	1	4	3.69	0.593
Memorizing	61	0	4	2.05	1.499

When asked whether the presence of students with dyslexia affects their teaching, the teachers' answers were: 12 (19.7%) not at all, 23 (37.7%) little, 21 (34.4%) fairly, and only three (4.9) very and two (3.3) very much. Then, the teachers were asked if they believe that their teaching methods are appropriate for dyslexic students. Only one (1.6%) answered very much, six (9.8%) very, 14 (23%) fairly, while 15 answered (24.6%) not at all and most of them (41%) answered little. In addition, when asked why they do not use appropriate methods, some of them answered that it is due to teachers' deficient training (Tables 3 and 4 for means and standard deviation).

In Table 5 (Table 6 for means and standard deviation) it is shown how much teachers use some teaching strategies like mental maps, 3d maps, representations, and so on. At the end of this part, there were two open questions. The first one was what the teachers believe about students' perception. The great majority of them (81.7%) thought that students with dyslexia have almost the same intelligence as non-dyslexic students. The second question was about the dyslexic students' spatial thinking. A great percentage (65.6%) of teachers answered that they have not observed differences between dyslexic and non-dyslexic students.

Table 3. Teachers' responses to the question: "Why don't teachers use appropriate methods for teaching dyslexic students?"

Reasons	Very Much (%)	Very (%)	Fairly (%)	Little (%)	Not at All (%)
Teachers' deficient training	-	15 (24.6)	12 (19.7)	11 (18.0)	3 (4.9)
Students do not spend enough time	-	2 (3.3)	6 (9.8)	16 (26.2)	14 (23.0)
Lack of curriculum flexibility to implement teachers' innovative methods	2 (3.3)	8 (13.1)	13 (21.3)	10 (16.4)	5 (8.2)
School's lack of technological equipment	-	9 (14.8)	10 (16.4)	9 (14.8)	10 (16.4)
Teachers' ignorance on how to use ICT	-	11 (18.0)	14 (23.0)	13 (21.3)	3 (4.9)
Schools' lack of interest in supporting innovative teaching methods	-	6 (9.8)	6 (9.8)	23 (37.7)	6 (9.8)

Table 4. Mean and std. deviation values of Table 3.

Reasons	*n*	Minimum	Maximum	Mean	Std. Deviation
Teachers' deficient training	55	0	4	2.20	1.544
Students do not spend enough time	55	0	4	1.31	1.136
Lack of curriculum flexibility to implement teachers' innovative methods	55	0	5	1.93	1.585
School's lack of technological equipment	55	0	4	1.71	1.487
Teachers' ignorance on how to use ICT	55	0	4	2.09	1.469
Schools' lack of interest in supporting innovative teaching methods	55	0	4	1.71	1.272

Table 5. Teachers' responses to the question: "How often do you use the follow strategies in your teaching?"

Usage of	Very Much (%)	Very (%)	Fairly (%)	Little (%)	Not at All (%)
Visual representations	3 (4.9)	6 (9.8)	9 (14.8)	10 (16.4)	33 (54.1)
Mental maps	2 (3.3)	4 (6.6)	6 (9.8)	16 (26.2)	33 (54.1)
Memory aids	1 (1.6)	9 (14.8)	18 (29.5)	19 (31.1)	14 (23.0)
Diagrams and schematic representations	3 (4.9)	7 (11.5)	10 (16.4)	13 (21.3)	28 (45.9)
Teamwork	42 (68.9)	10 (16.4)	5 (8.2)	2 (3.3)	2 (3.3)
ICT	1 (1.6)	1 (1.6)	8 (13.1)	17 (27.9)	34 (55.7)
3D objects	-	-	2 (3.3)	9 (14.8)	50 (82.0)

Table 6. Mean and std. deviation values of Table 5.

Usage of	*n*	Minimum	Maximum	Mean	Std. Deviation
Visual representations	61	0	4	0.95	1.244
Mental maps	61	0	4	0.79	1.082
Memory aids	61	0	4	1.41	1.055
Diagrams and schematic representations	61	0	4	1.08	1.242
Teamwork	61	0	4	0.61	1.130
ICT	61	0	4	0.66	0.892
3D objects	61	0	2	0.21	0.487

3.2. Decriptive Statistics—Use of ICT

According to Ross [33], ICT positively affects high quality teaching and learning of dyslexic children. Therefore, in this part of questionnaire, we investigated whether the teachers use ICT during their teaching to address dyslexic students' difficulties. Initially, teachers were asked about the suitability and adequacy of technological equipment in the school, and whether they were able to implement innovative and effective teaching methods to improve all students' performance. Most of them (44.3%) reported fairly, 13.1% not at all, 31.3% a little, 13.1% very, and 8.2% very much.

Consequently, they were asked for their knowledge and use of ICT in the classroom (Table 7). Table 8 is for means and standard deviation.

Table 7. Teachers' responses about their knowledge on ICT.

Question	Very Much (%)	Very (%)	Fairly (%)	Little (%)	Not at All (%)
Do you believe that the school's technological equipment is satisfactory?	5 (8.2)	8 (13.1)	27 (44.3)	13 (21.3)	8 (13.1)
Are you able to use a computer?	4 (6.6)	14 (23.0)	32 (52.5)	10 (16.4)	1 (1.6)
Do you believe that you know how to use appropriate educational software for teaching?	6 (9.8)	17 (27.9)	12 (19.7)	16 (26.2)	10 (16.4)
Do you believe that ICT would improve your teaching?	12 (19.7)	26 (42.6)	14 (23.0)	3 (4.9)	6 (9.8)
Do you think there should be more awareness of the use of new technologies that will make the subject more interesting and approachable to students of all abilities?	31 (50.8)	16 (26.2)	8 (13.1)	1 (1.6)	5 (8.2)

Table 8. Mean and std. deviation values of Table 7.

Questions	n	Minimum	Maximum	Mean	Std. Deviation
Do you believe that the school's technological equipment is satisfactory?	61	0	4	1.82	1.088
Are you able to use a computer?	61	0	4	2.16	0.840
Do you believe that you know how to use appropriate educational software for teaching?	61	0	4	1.89	1.266
Do you believe that ICT would improve your teaching?	61	0	4	2.57	1.161
Do you think there should be more awareness of the use of new technologies that will make the subject more interesting and approachable to students of all abilities?	61	0	2	3.10	1.207

Moreover, the great majority of teachers stated that they have never used presentations, educational software, and search engines, but some of them (11 teachers) said that they use an interactive whiteboard once a week (Figure 2). At the end of this part, many teachers answered that they do not use computers for students' homework or simulations, while a sufficient amount of them use computers to create teaching material or search for information. These data are shown in Figure 3.
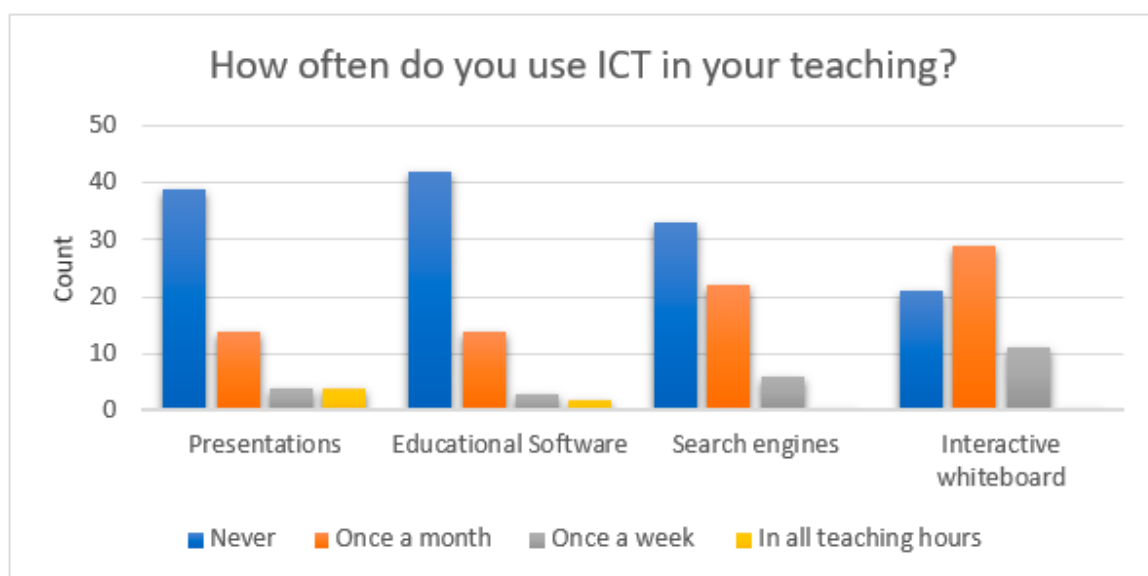

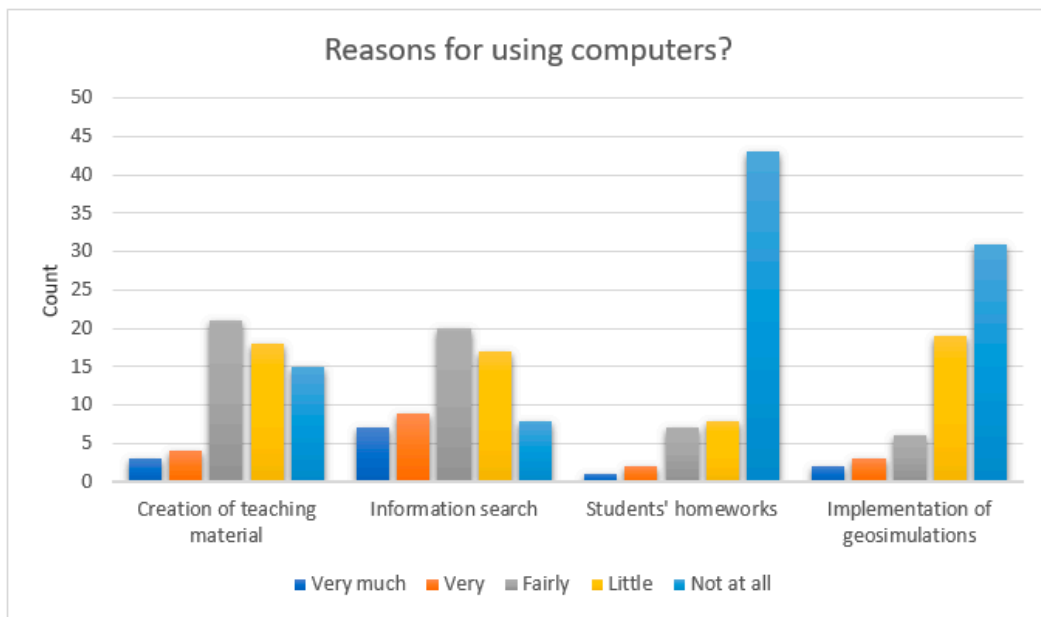**Figure 2.** Teachers' responses to how often they use ICT in their teaching.

Figure 3. Teachers' responses to the reasons they use computers.

3.3. Decriptive Statistics—Use of Maps

At the beginning of this part, the majority of teachers (90.2%) stated that maps are a very significant tool in teaching geography. Moreover, most teachers use maps from textbooks, while 53 out of 61 teachers never use 3D maps (Figure 4). When asked whether they believe that the use of maps helps dyslexic students, the answers were: 11 (18.0%) not at all, seven (11.5%) little, five (8.2%) fairly, 18 (29.5%) very, and 20 (32.8%) very much. The last question was whether teachers would like to participate in a future implementation of new appropriate educational material that is currently being developed by us in their courses, but only 16 (26.2%) teachers were positive, while 45 (73.8%) teachers refused to participate.
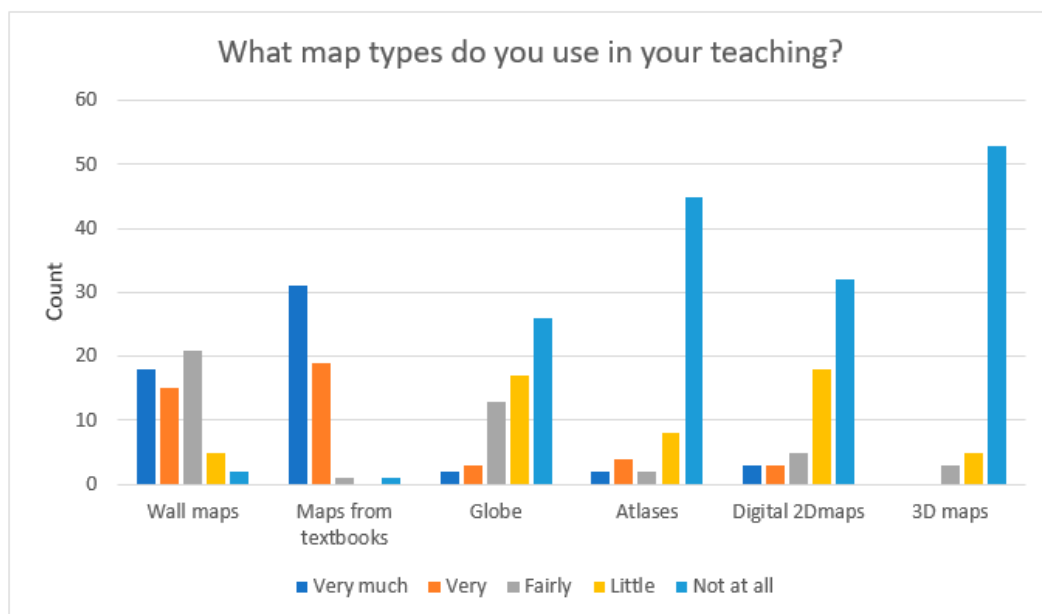
Figure 4. Teachers' responses to the types of maps that they use in their teaching.

3.4. Correlation Findings

Subsequently, in order to examine whether there was an impact on the variables of the study on geography teachers' knowledge of and perceptions of dyslexic students, we used the criterion of chi square (x^2) for independent variables (gender, age, specialty, years of service, and ICT certification), while Spearman linear correlations were calculated for ordinal variables.

Our findings show that younger teachers have better perceptions and knowledge than older teachers, since the correlations between age and detection of dyslexia, knowledge of ICT, "did you attend courses about dyslexia at university?", "do you have knowledge on dyslexia?", "do you believe that dyslexic students have difficulties in writing?", and ''what do you believe about dyslexic students' intelligence?" are significant ($p = 0.000$–0.764, $p = 0.000$–0.707, $p = 0.012$ df $= 4$, $p = 0.004$ df $= 24$, $p = 0.026 + 0.284$, $p = 0.046$–0.257 respectively). Additionally, the teachers with few years of service can detect dyslexia, have attended courses about dyslexia at university, and have knowledge on dyslexia, and they use 3D models, educational software, and 3Dmaps, while the teachers with many years of service do not ($p = 0.000$–0.737, $p = 0.003$ df $= 4$, $p = 0.001$ df $= 24$, $p = 0.027$–0.283, $p = 0.017$–0.304, $p = 0.037$–0.268). Moreover, the correlation between studies and detection of dyslexia is significant ($p = 0.005$ df $= 4$), because the teachers with a master's degree claimed that they can detect dyslexia. Two more correlations between studies and "do you know what dyslexia is?" and "do you use simulations?" ($p = 0.032$ df $= 12$, $p = 0.041$ df $= 8$) were also significant. Many teachers believe that dyslexic students have difficulties in a foreign language, and it depends on their specialty ($p = 0.035$, df $= 28$), namely, the home economics teachers believe this. In addition, the correlations between specialty, "do you believe that dyslexic students had ADHD?" and "do you use teamwork activities?" are significant ($p = 0.017$ df $= 21$, $p = 0.030$ df $= 28$). Finally, we found three significant correlations between sex and "what do you believe about dyslexic students' intelligence?", "do you believe that dyslexic students have difficulties in orientation?", and "do you use appropriate methods?" ($p = 0.049$ df $= 2$, $p = 0.024$ df $= 4$, $p = 0.017$ df $= 4$).

In Table 9, we present Spearman correlations between the following variables: years of service, ICT certification, ICT knowledge, detection of dyslexic students in the classroom, "do you know what dyslexia is?", "does the existence of dyslexic students in the classroom affect your teaching methods?", and "do you use appropriate methods for teaching dyslexic students".

Table 9. Spearman Correlations.

		Years of Service	ICT Certification	ICT Knowledge	Detection of Dyslexic Students (in Class)	Do you Know What Dyslexia Is?	Dyslexic Students Affect Your Teaching Methods	Do you Use Appropriate Methods for Teaching Dyslexic Students
Years of service	Correlation Coefficient	1.000	−0.196	−0.722 **	−0.737 **	−0.236	−0.140	−0.185
	n	61	35	43	47	61	61	61
ICT Certification	Correlation Coefficient	−0.196	1.000	0.123	0.065	−0.105	−0.621 **	−0.120
	n	35	35	22	28	35	35	35
ICT knowledge	Correlation Coefficient	−0.722 **	0.123	1.000	0.734 **	0.166	0.049	0.355 *
	n	43	22	43	36	43	43	43
Detection of dyslexic students (in class)	Correlation Coefficient	−0.737 **	0.065	0.734 **	1.000	0.370 *	0.266	0.454 **
	n	47	28	36	47	47	47	47
Do you know what dyslexia is?	Correlation Coefficient	−0.236	−0.105	0.166	0.370 *	1.000	0.317 *	0.414 **

		Years of Service	ICT Certification	ICT Knowledge	Detection of Dyslexic Students (in Class)	Do you Know What Dyslexia Is?	Dyslexic Students Affect Your Teaching Methods	Do you Use Appropriate Methods for Teaching Dyslexic Students
	n	61	35	43	47	61	61	61
Do dyslexic students affect your teaching methods?	Correlation Coefficient	−0.140	−0.621 **	0.049	0.266	0.317 *	1.000	0.246
	n	61	35	43	47	61	61	61
Do you use appropriate methods while teaching dyslexic students?	Correlation Coefficient	−0.185	−0.120	0.355 *	0.454 **	0.414 **	0.246	1.000
	n	61	35	43	47	61	61	61

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

4. Discussion

In this study, we examined geography teachers' knowledge of and perceptions of dyslexic students. During this research, the researchers were responsible for all legitimate procedures foreseen, such as relevant approvals provided by the Ministry of Education and the school principals. What is interesting is that the answers given by the teachers do agree with the findings of other studies.

Regarding teachers' perceptions and knowledge on dyslexia, quantitative analysis of geography teachers' responses revealed that only 3.3% of these teachers had attended courses on dyslexia at the university. According to the findings, most of them who had attended courses on dyslexia at university were young teachers with few years of service. This is due to the fact that the university's curriculum has changed over the last years. The results showed that younger geography teachers and those who had attended courses on dyslexia at the university have better perceptions toward dyslexic students. However, many teachers (60.6%) have misconceptions. They believe that dyslexic students do not have at all or have limited difficulties in orientation, a fact that is debatable in several studies [39–41]. Furthermore, the majority of educators (68.9%) claimed that dyslexia and ADHD are different, but, as it is known from other research [42,43], sometimes these exist synchronously. The great majority of teachers believe that dyslexic students have difficulties only in writing (80.3%), in learning a foreign language (59%), and in theoretical courses (93.4%); that is a false assumption, as dyslexia affects reading, writing, theoretical courses [9,32,44–50], as well as science courses [51]. The findings revealed that the majority of teachers have poor knowledge of and misunderstandings about dyslexia [11,52,53], although some accurate understandings when asked about reading, writing, and learning a foreign language were recorded.

The second item we investigated in this research is the teaching methods used for dyslexic students. The fact that more than half of the teachers believe that the presence of a dyslexic student does not affect at all or only slightly affects their teaching indicates that many of them do not use appropriate methods (65.6%). The majority of them do not use any at all, or they use a few representations, memory aids, mental maps, teamwork teaching, new technologies, diagrams, 3D images, and explanatory notes. However, it has been proven that dyslexic students have memory deficits [32,54]. In addition, too much cognitive load reduces the working memory capacity that is available for reading comprehension [55]. However, the usage of memory aids would help dyslexic students in having better learning outcomes. Dyslexic students are able to memorize images [56], so the visual approach to the geography subject would help dyslexic students develop better understanding and achieve better performance. Unfortunately, this ability of dyslexic students is not taken into account by teachers. Research has shown that students with dyslexia are gifted in 3D models [12,57], and if teachers use 3D images, 3D maps, and 3D simulations, dyslexic students may develop better understanding of the subject and improve geographical skills important for their life like orientation,

decoding map symbols, and so on. Despite the fact that 55.7% of geography teachers had an ICT certification, and 65.6% of teachers believe enough or very much that the school's technological equipment is satisfactory, it is interesting that the majority of them do not actually use it. Moreover, 65.6% believe that ICT could improve their teaching enough or very much, but 90.3% of teachers believe that there should be more awareness of using new tools that would make their teaching subject more interesting and effective for all students. Furthermore, teachers usually use traditional maps (wall maps) (54.1%) and globes (42.6%) in geography courses (and the great majority of them did not use 3D maps (86.9%) or digital maps (52.5%). According to Tsampalas et al. [56], the teaching method combined with educational software is more effective compared to traditional teaching methods. At this point, we should comment that, although the correlations are not significant, we observed that the younger teachers used an electronic learning environment, memory aids, students' tasks, teamwork learning and an interactive white board more often. Based on the above, it is obvious that geography teachers do not use appropriate methods for teaching dyslexic students.

Are there serious obstacles in applying appropriate methods and techniques? Investigating why the majority of teachers do not use appropriate methods, we noticed that they claimed it is due to lack of teachers' training (very 24.6%, fairly 19.7%), although in Greece there are many learning programs about ICT and learning disabilities. Additionally, some of them believe that dyslexic students do not spend enough time studying at home (very 3.3%, fairly 9.8%). This is a misconception, because it is known that dyslexic students are not lazy, but they have some disabilities which can be faced with appropriate teaching methods and material [53]. Furthermore, a significant percentage of teachers (very much 3.3%, very 13.1%, fairly 21.3%) argue that the reason why they do not use appropriate methods for teaching dyslexic students is due to the lack of curriculum flexibility to implement teachers' innovative methods, as the Greek curriculum does not provide teachers the ability to make their course more innovative and alternative according to the needs of the students. Additionally, enough teachers (very 18.0%, fairly 23.0%) believe that they do not use appropriate methods because they ignore the usage of ICT. Although the great majority of teachers said that they need information about the use of educational software and new technologies, 73.8% of teachers were negative toward their participation in a future implementation of new and appropriate digital educational material. Teachers' responses showed that the main obstacle is their unwillingness to use new strategies and techniques to help dyslexic students.

Based on the above discussed findings, some practical suggestions can be made. Teachers, apart from their scientific background and teaching skills, should develop emotional behaviors and attitudes towards self-understanding and willingness [43]. However, in order to do this, they first should be interested in the subject they teach, and in this particular case we refer to the subject of geography. According to Hodges et al. [57], teachers with negative attitudes spend little time discussing and teaching science topics in their classroom, rely more on standardized methods and low-level teaching, and are less trained. As a result, they are less able to motivate their students toward the subject they teach [29].

Unfortunately, as far as geography is concerned, the dominant expedient of learning so far is the transmission of descriptive knowledge using the textbook. This method is clearly more difficult for students with dyslexia. Organizing a geography lab with qualified teachers could be very useful. The use of the necessary supervisory tools would help promote active learning and improve geography teachers' effectiveness. The visual approach to the geography subject would help students keep images in the memory, and a better learning outcome would emerge, especially for dyslexic students.

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