

The Use of ICT in Special Education: Special Education Teachers' Perceptions

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Abstract

The purpose of this study was to investigate the views of special education teachers on the use of information and communication technology (ICT) in the education of children with special needs and disabilities, as well as the factors that have a decisive impact. The results of the study showed that, in general, the attitudes of special education teachers towards ICT are positive, as they consider it a useful tool for conducting the educational process. Gender, marital status, and work experience position do not appear to be directly related to teachers' views. Work experience and training, however, seem to be related to changing attitudes towards ICT. Additionally, results suggested that teachers consider the positive impact that ICT has on students' outcomes as well as on the inclusion of people with disabilities. However, there are factors that act repressively on the use of ICT and are mainly found in the support provided by the state.

Keywords: ICT integration, inclusive education, educational technology, special education, teacher perceptions

Introduction

It is evident that with time, humans have managed to evolve more and more in order to optimize their daily lives. The progress made by humanity globally is leaps and bounds, and the barrage of new data affects almost all areas of human activity. The evolution of information and communication technologies (ICTs) is of particular importance for developing economic, social, and cultural aspects of an individual's life. Therefore, ICT is now a top development priority for all countries at the European Union level and a powerful tool for the advancement of society. When it comes to people with disabilities, the whole situation is getting more complicated (Markodimitraki et al., 2022; Polychroni et al., 2024).

In today's constantly evolving era, one of the sectors that ICT has penetrated is education, which keeps pace with social, economic, and cultural changes forever. Therefore, education, as the main factor of any form of development, is also called upon to face future challenges and adapt to the new data, where ICT is considered an important factor of progress and development.

The relationship between innovative education and the use of ICT is a key issue of educational "making," significantly changing the landscape of education in all sectors (teaching and learning) as ICT expands access to quality education, providing equal learning opportunities, bridging the gap of existing learning inequalities (Charitaki & Alevriadou, 2024; Charitaki et al., 2021, 2022, 2024).

ICT is characterized by a wide range of uses and applications that act helpfully in the individual's daily life. Therefore, in the context of the rapid development of technologies, special education has not remained unaffected, as it is now possible to provide people with special needs (disabled) and disabilities with access to information, communication, etc., as well as creating new learning opportunities for education and social inclusion (Vogiatzi et al., 2021, 2022). Social inclusion of people with disabilities in Greece is still a challenging issue (Bania et al., 2019, 2020).

The introduction of ICT in the field of education has brought solutions to many issues but has also provoked various reactions. The entire educational community did not equally accept the use of new technologies and divided opinions prevailed. On the one hand, many believe that the use of ICT contributes to the educational process. On the other hand, some believe that their inclusion in the context of education brings problems (Nikolopoulou, 2009). Despite the recognition of the usefulness of ICT, in many teachers, there are phenomena of technological illiteracy and avoidance of their use (Giavrimis et al., 2010; Keramida, 2010).

Despite the importance of ICT and its rapid development in recent years, its use in education and special education is not taken for granted by teachers due to the divergence of opinions. At the same time, other inhibiting factors coexist. ICT can be useful on many levels and seems to help both teachers and other professionals involved and parents. However, research on access to and use of technologies needs further investigation (Drigas & Ioannidou, 2013).

Review of the Related Literature

Review of the related literature in the field of integration of ICT in schools, teachers' beliefs and attitudes towards teaching and learning were considered as central criteria for the successful implementation of new technologies (Eickelmann & Vennemann, 2017). In a 2011 survey of teachers' beliefs that influence their ICT practices, Prestridge reported that teachers' pedagogical beliefs influence their teaching behaviors in the classroom. With the advent of ICT in education, teachers form their own beliefs about the role of ICT as a teaching tool, its value for students' learning outcomes, and their confidence and competence. These beliefs intersect with the established pedagogical beliefs of teachers. Teachers are likely to design and implement practices with technologies that reflect their beliefs about teaching and learning. According to the survey findings, it is evident that

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teachers recognize the role of ICT as a tool for knowledge construction through the collaboration and relevance of ICT to society. In addition, a link between ICT familiarity, trust, and practice emerges from the data. As teachers who expressed greater familiarity with ICT, they were more confident in their use in the classroom. As found in skills-based ICT practices, teachers expressed competence and confidence. However, their ICT practices could be seen as operating within a traditional, teacher-centered approach where skills and functionality development are at the center. The competence-trust relationship between ICT is important for its use in the classroom. Teachers do not need to have high levels of competence with ICT before they have the confidence to use it in the classroom. Exploring this relationship between competencies and trust will influence the required balance between training and pedagogically focused approaches to ICT professional development (Prestridge, 2011).

European Union (2013) reported that teachers' beliefs have been identified as an obstacle to integrating ICT into teaching and learning. Barriers are not only focused on the teacher himself but also include lack of resources, time, access, and technical support. Some of the main points of the study done in 31 European countries (European Union, 2013) report that most teachers have been familiar with ICT for teaching and learning for a few years but still use it first and foremost to prepare their teaching. Only a few use it – and still to a limited extent – to collaborate with students during lessons. In addition, digital resources (e.g., exercise software, online quizzes, data logging tools, etc.) are still very rarely used by students during classes. The survey findings show that teachers are convinced of using ICT and organize more frequent activities based on ICT than in the past. Teachers' participation in ICT training for teaching and learning is rarely mandatory. Although online resources and networks are widely available in Europe, they are a relatively new way for teachers to participate in professional development, and only a minority of these opportunities are used by schools. The more teachers are confident using ICT, the more they participate in professional development and spend time on such training (European Union, 2013).

In addition, according to a survey of participating preschool teachers, most praised the usefulness of ICT, however, "as a complement" to existing practices and activities rather than as an integral part of the curriculum. The use of ICT by early childhood educators may depend, to a large extent, on their existing values, know-how, and pedagogical experience (Masoumi, 2015).

In recent years, studies on teachers' opinions on the use of ICT in Special Education have been limited. Most of them are carried out as part of dissertations in postgraduate programs. However, there are also cases of scientific studies on the subject.

In 2018, Mohaned Ghazi Abed surveyed teachers' views and experiences regarding the adoption of ICT for SEN students in the overall learning environment and the identification of the relationship between inclusion and ICT. The data collection process was done through interviews with 20 people who were analyzed based on the rationale of phenomenography. According to the results of the survey, most teachers consider that the use of ICT at school among students with SEN is quite common, but some reported that they have never taught using ICT. A more important finding was that computers are recognized as applicable when, primarily, students write or search for information or for watching multimedia material. When asked about whether teaching can change for students with SEN who adopt ICT in the classroom, there was the identification of three different categories, where teachers consider that teaching needs to be adapted (6 teachers), adapted to some extent (8 teachers) or not adapted (6 teachers) (Abed, 2018).

In 2019, a team of researchers from the Czech Republic conducted a study on the use of ICT in their country (Gybas, 2019). In special education schools in Czechia, the use of ICT is common. Interactive whiteboards are widely used and tablets are preferred over computers. In addition, ergonomic keyboards and mice are used that are operated by touch, mouth or head. Finally, special applications are used to support several lessons (mathematics, reading, writing, physics, etc.). Therefore, teachers believe that some software can help students better understand the topic and motivate them. In the open-ended questions about

the advantages and disadvantages that ICT can bring to EA, the advantages far outweighed them. This included multimedia and complementing traditional teaching methods (e.g., books) and support for students' weak functions. Among the major drawbacks were the risk of addiction to the use of technology and the fear of damage to the device. However, 48% of respondents said they do not find disadvantages in using ICT (Gybas et al., 2019).

In contrast to the Czech Republic, teachers in Greece are more hesitant to use ICT. In a survey published in 2020, special education teachers' views on ICT use were examined. The survey was conducted through an interview with 15 teachers. An interview guide was used which included 20 questions. Four of them were demographic, nine were teachers using ICT and the rest were teachers not using technologies. The interviews were given in the teachers' classrooms as they felt more comfortable answering. Of the 15 people, 9 were women and six men were aged 26 to 56. Specialization in special education was mainly for younger people. Teaching experience ranges from 1 to 33 years. The use of ICT in education is also related to age, as the five who do not use ICT are aged between 46 and 53, while the youngest, aged 26 to 37, use technologies in their teaching. An exception is a 52-year-old participant using ICT. The majority of participants (14) have some certification in the use of computers. The preferred tools for participants using ICT are personal computers. For the rest, their tool of choice would also be the personal computer. The reasons why the use of ICT in the educational process is avoided vary, the main ones being the lack of adequate equipment or poor maintenance of an existing one and the lack of motivation by teachers as they are not adequately remunerated (Katsarou, 2020).

Objectives

This research aims to investigate teachers' views on using ICT in the educational process, as well as their role and effectiveness in educating students with special needs. At the international level, the exploitation of ICT and its potential, as mentioned above, is of utmost importance. Therefore, research on the subject is fascinating (Georgaki, 2019).

Research Questions

In the context of this study, the following questions that are considered to lead to these conclusions will be explored.

1. What is the effect of demographic characteristics of Special Education Needs and Disabilities teachers (SEND) teachers on their trust in ICT in the educational process?
2. What is the effect of demographic characteristics of SEND teachers on their views on the attractiveness of using ICT in the educational process?
3. Do teachers use new technologies to conduct the educational process?
4. Can teachers manage to conduct the educational process with the use of new technologies?
5. What are the views of SEND teachers on the support they receive from the state to use ICT in the educational process?
6. What model does the factorial analysis (Exploratory Factor Analysis: EFA & Confirmatory Factor Analysis: CFA) confirm in the case of SEND teachers' views on ICT?

Methodology

Design

The purpose of this study is to investigate the views of special education teachers on the use of ICT in the education of children with special needs and disabilities, as well as the factors that have a decisive effect. In order to investigate this issue and collect the survey data, which will lead to conclusions, it was considered more appropriate to carry out a quantitative investigation.

Quantitative research is based on data collection that can be expressed in percentages and the data given in numbers will be analyzed statistically and compared with other means of descriptive and inferential statistical analysis (Athanasiou, 2007).

The decisive contribution of quantitative methodology to the investigation of conditions is undeniable, as it acts as a reinforcement in the comparison and generalization of information in research data. Moreover, the correlation between variables is more objective and is not influenced by the researcher since the data are collected through measurement tools and the analysis is based on statistical techniques (Cohen et al., 2007; Papanastasiou & Papanastasiou, 2016).

In conclusion, the quantitative method of research is characterized by a number of positive characteristics that will help to carry out the result. Among other advantages, it ensures a clear description of the object under investigation and clearly defines independent and dependent variables. Moreover, as monitoring objectives are clear and unambiguous, the results are objective and the possibility of subjective judgments in the conduct of results is eliminated. From the above, the quantitative approach method was considered the best possible choice for the implementation of this research and the testing of research hypotheses.

Sampling

One of the first steps in research, in order to answer research questions, is to determine the population that will be concerned by the results of the research. Then, since it is not possible to survey the whole population, once the population has been determined, it is necessary to define a sample that is representative of the population. Finally, it is necessary for the researcher to select the appropriate sampling technique (Taherdoost, 2016).

In this case, the sample of the population to be investigated concerns 114 special education teachers from the wider social and friendly environment of the researcher. 'Convenience sampling' is to be used as a sampling technique for data collection. In this sampling method, the sampling units are selected from the population on the basis of convenience, with the main advantages being the simplicity and ease of conducting the survey. Typically, convenience sampling tends to be a favored sampling technique, as it helps to overcome many barriers related to research (Papageorgiou, 2015; Taherdoost, 2016).

Research Tools

A questionnaire can either be designed by the same researcher or an already constructed questionnaire can be used as such or adapted to the needs of each survey (Papanastasiou & Papanastasiou, 2016). To collect the data, the questionnaires were distributed both electronically and printed. Data were collected from two hundred (200) questionnaires completed by teachers working in special education. More specifically, the questionnaire has been drawn from the literature (Barakos, 2008) questionnaire with a Cronbach alpha coefficient of .85. This questionnaire includes seven demographic questions and 43 closed-ended Likert scales (1 = *strongly disagree* to 5 = *strongly agree*).

Data Analysis

The data was analyzed with the SPSS AMOS software program. Exploratory Factor Analysis (EFA) was used in this study since it can be descriptive and suitable for finding and grouping observed factors. To check whether there is a statistically significant difference between the sheet and the scales, the non-parametric statistical criterion Mann-Whitney U was chosen. It was also examined whether there is a statistically significant correlation with marital status, position of service, and training for all six scales, with the statistical criterion Kruskal-Wallis H, which is non-parametric and equivalent to unidirectional variance analysis. Finally, it was checked whether there is a relationship between age and experience of all six scales using the non-parametric criterion of Spearman's Rho.

Limitations of Study

This research was conducted in the midst of a pandemic and under unexpected circumstances. Therefore, the sample, although

expected to be 200 special education teachers, was limited to 114, and the data was collected through an online questionnaire. Perhaps under different circumstances, the results would have been different if the survey had been conducted either before or after the given time or with the physical presence of the researcher when completing the questionnaires

Ethical Statement

The questionnaires are kept completely anonymous and completed in the absence of the investigator. An information letter and a consent form were provided to accompany the questionnaire. All personal data collected from the questionnaires will be used solely for the conduct of the survey and will not be disclosed to third parties without first obtaining your consent.

Results and Discussion

Table 1

Demographic Characteristics

Demography	<i>n</i>	%
Sex		
Man	26	22.8
Woman	88	77.2
Age		
21-30	49	43.0
31-40	33	29.0
41-50	13	11.4
51-60	16	14.0
61<	3	2.6
Marital status		
Unmarried	57	50.0
Married	41	36.0
Divorced	11	9.6
Widower	5	4.4
Experience (Years)		
0-10	72	63.2
11-20	21	18.4
21-30	15	13.2
30+	6	5.3
Service position		
Deputy	52	45.6
Permanent	29	25.4
Hourly wage	16	14.0
Other	17	14.9
ICT training		
Special educators	39	34.2
training		
No training	29	25.4
Short seminars	27	23.7
Quarterly/Semi-annual	13	11.4
Other	6	5.3

The survey was conducted in February-March 2023 and involved 114 special educators of all educational levels from various prefectures of Greece. However, the largest part was concentrated in Attica, with a percentage of 62.5% ($n = 71$). Table 1 represents the demographical information of the participants, namely their gender, age, marital status, qualification, experience, designation, and training. The participants were mostly women ($n = 88$, 77.2%), with lower participation of men ($n = 26$; 22.8%). The most extensive age range of respondents was from 21 to 40 years ($n = 82$, 72.0%). Next came the age group of 41 to 60 years ($n = 29$, 25.4%), with only three participants over the age of 61 (2.6%). Regarding their marital status, the participants were unmarried ($n = 57$, 50%), married participants were ($n = 41$, 36%), divorced ($n = 11$, 9.6%), and widowed participants were ($n = 5$, 4.4%). In experience, distribution was justly spread out, with 0-10 years of experience ($n = 72$, 63.2%), 11-20 years of experience with ($n = 21$, 18.4%), 21-30 years of experience participants were ($n = 15$, 13.2), and finally more than 30 years ($n = 6$, 5.3%). In terms of service positions, deputy participants were ($n = 52$, 45.6%)

permanent participants were ($n = 29$; 25.4%). Subsequently, ($n = 16$, 14%) are covered by hourly employees and declared the option "other" with justification for private sector, retirement, and unemployment ($n = 17$, 14.9%). Finally, regarding the ICT training of the examined special educators ($n = 39$, 34.2%) replied that they have no relevant training ($n = 29$, 25.4%) have short-term seminars, ($n = 27$, 23.7%) have seminars of quarterly or semi-annual duration ($n = 13$, 11.4%) have an annual specialization, while ($n = 6$, 5.3%) completed the option "other."

Table 2
Cronbach's Reliability Index

Scales	Cronbach's α	M	Fluctuation	SD	Number of questions
scale 1	0.88	38.17	34.10	5.84	9
scale 2	0.81	36.54	44.34	6.66	10
scale 3	0.73	14.54	12.04	3.47	4
scale 4	0.66	10.55	6.51	2.55	3
scale 5	0.81	16.56	13.03	3.61	4
scale 6	0.50	15.11	13.22	3.64	6

First research question: What is the effect of demographic characteristics of SEND teachers on their trust in ICT in the educational process?

Which concerns the impact of the demographic characteristics of SEND teachers on their trust in ICT in the educational process. The results are as follows: Initially, the relationship between demographics and scale three was examined, which includes questions about teachers' confidence and confidence in the use of

The present questionnaire has been drawn from the literature (Barakos. 2008) and has a Cronbach coefficient $\alpha = 0.85$. In addition to the demographics in the first part of the questionnaire. The second part includes 43 questions where the Cronbach index was calculated separately for those that were feasible and related to the research questions. Table 2 lists the Cronbach indices for each scale, in addition. The mean, variance, and standard deviation are included. Finally, the number of questions on each scale is included.

ICT. Based on the results. There appears to be no statistically significant correlation with gender ($p = 0.49 > 0.05$), marital status ($p = 0.14 > 0.05$) or position of service ($p = 0.19 > 0.05$) nor with age ($r = -0.15$, $p = 0.104$). However, it was found that there is a statistically significant correlation between years of experience ($r = -0.27$, $p = 0.00$) and training of special educators ($p = 0.03 < 0.05$). The above results are also collected in Table 3 (for a complete table, see Appendix A and Tables A1 to A6).

Table 3
Trust and ICT

	Gender	Age	Marital status	Experience	Service position	ICT training
p -value	0.49	0.10	0.14	0.00	0.19	0.03

Second research question: What is the effect of demographic characteristics of SEND teachers on their views on the attractiveness of using ICT in the educational process?

This concern concerns the influence of the demographic characteristics of SEND teachers on their views on the attractiveness of using ICT in the educational process. The necessary statistical analyses were carried out, correlating scale 5, whose questions concern this. Initially, while research shows that the use of ICT in education is age-related (Katsarou, 2020), the results of this study showed that gender, age, marital status,

and service position do not seem to have a significant statistical correlation. Years of experience and training, however, once again seem to be related. Specifically, looking at years of experience in relation to attractiveness for ICT, it is observed that there is a negatively significant correlation and the r index is low, negative, and statistically significant at a significance level of 0.05 ($r = -0.22$, $p = 0.02 < 0.05$), so the more years of service, the less attractive ICT. A significant statistical correlation is also observed for ICT use and training ($p = 0.02 < 0.05$) (Table 4).

Table 4
ICT Attractiveness

	Gender	Age	Marital status	Experience	Service position	ICT training
p -value	0.61	0.09	0.13	0.02	0.45	0.02
r				-0.22		

Third research question: Do teachers use new technologies to conduct the educational process?

Continuing to the next research question and trying to determine whether teachers use new technologies to conduct the educational process, the questions of the first two scales concerning the acceptance of the use of ICT and the use of ICT in new modern environments are tested.

Trying to provide an answer to this research question and checking the issue multifaceted, analyzing the percentage of responses of the sample, it would be possible to say that special education teachers certainly consider computers and the use of ICT to be not only important in which respondents *agree* or *strongly agree* (85.9%). The study found participants (66.6%) to *agree* that computers can be used in all courses without exception. According to the above, special education teachers seem to consider ICT very important for the conduct of the teaching process.

Additionally, continuing the analysis of the questions and considering the percentages, it is observed that there are large

percentages that agree (overall "*agree*" and "*strongly agree*") that the use of ICT and/or more specifically computers, enhances students' self-motivation (70.5%), motivates students (86.9%), responds to their needs and interests (82.5%), enhances students' cooperation (63.2%) and their communication skills (69.3%). Still, agree that using computers in the classroom provides information 989.4%). In the question of whether the use of computers helps the social inclusion of people with disabilities, *agree* or *strongly agree* (69.3%), *neither agree or disagree* (20.2%), while *disagree* (10%) with this.

Looking at the negative consequences of ICT use, such as whether the learning outcomes of using computers in class are disappointing, *disagree* and *strongly disagree* (73.7%). Whether they make learning difficult, (91.2%) *disagree* or *strongly disagree* and only *agree* (3.6%). It is evident that the largest percentages of responses are found to disagree or disagree outright. According to the above, it seems that the views of the examined special educators generally tend to agree that the use of ICT favors and is useful for the organization and conduct of the educational process and generally contributes positively to learning outcomes.

Fourth research question: Can teachers manage to conduct the educational process with the use of new technologies?

The study found that the percentages are somewhat shared regarding the confidence they have in conducting teaching using ICT. More specifically, more than half of the participants (55.3%) fear that many contingencies will arise during the course with the use of ICT. However, almost *agree* (49.1%) that it is easy for the teacher to use computers in the classroom and *disagree* or *strongly disagree* (64.9%) with the proposal that it is difficult for the teacher to use computers in teaching. For the statement that it is easy for the teacher to find ways to use computers in the teaching work, *agreed* participants (48.3%). In addition, in the statement "I am not good with computers," about half of the participants *strongly disagree* (49.1%), *disagree* (21.9%), and *neither agree or disagree* (20.2%), while *agree* or *strongly agree* (8.8%). Finally, most *agree* (60.5%) with the statement that they are very confident when it comes to using a computer, *neither agree or disagree* (25.4%), and a total percentage *strongly disagree* or *disagree* (14%). According to the above, it is concluded that teachers are divided about the ability to manage new technologies in the educational process.

Fifth research question: Do the views of SEND teachers on the support they receive from the state in order to use ICT in the educational process?

The 5th question explores the SEND teachers regarding the support they receive from the state for integrating ICT into the educational process. Findings indicate that 43% of participants *disagree* that teachers are quickly informed about new research data, while 21.1% are *neither agree or disagree*, and 36% *agree*. Additionally, 50.9% *agree* that teachers' access and participation in relevant technological training is limited, and 64.1% *agree* that coordination of educational work from available sources of support, information and counseling is incomplete. Teachers' beliefs have been identified as an obstacle to integrating ICT into teaching and learning. Barriers are not only focused on the teacher himself but also include lack of resources, time, access, and technical support (European Union, 2013). In addition, regarding the logistical infrastructure, 71.9% consider that the specifications and usability of classrooms are not sufficient. Moreover, it seems that a large percentage (47.4%) believe that the existing educational material does not allow the use of computers, in contrast to 16.7% who state that they *disagree* or *completely disagree* with it. Finally, an equally respectable percentage of 62.3% believe that technical problems arising from the use of computers interrupt the flow of the lesson. In general, it is understood that the largest percentage of respondents do not seem particularly satisfied with their support from the state and the logistical infrastructure provided to them.

Table 5

Frequency Distribution, Mean, and Standard Deviation of responses on ICT Use in Special Education

Question	SD (%)	D (%)	NA/D (%)	A (%)	SA (%)	M	SD
B1	28.9	36.0	17.5	14.9	2.6	2.26	1.113
B2	12.3	30.7	21.1	27.2	8.8	2.89	1.193
B3	28.1	30.7	21.9	16.7	2.6	2.35	1.137
B4	36%	25.4	12.3	17.5	8.8	2.38	1.359
B5	3.5	5.3	21.1	40.4	29.8	3.88	1.014
B6	4.2	4.5	11.3	37.5	42.6	4.21	0.857
B7	41.2	33.3	14.0	8.8	2.6	1.98	1.072
B8	25.4	31.6	24.6	15.8	2.6	2.39	1.109
B9	23.7	31.6	17.5	19.3	7.9	2.56	1.262
B10	1.8	7.9	17.5	47.4	25.4	3.87	0.946
B11	7.9	18.4	27.2	33.3	13.2	3.25	1.143
B12	5.3	14.0	14.0	33.3	33.3	3.75	1.209
B13	3.5	7.9	34.2	31.6	22.8	3.62	1.034
B14	50.9	21.9	14.9	7.0	5.3	1.94	1.192
B15	11.4	14.9	22.8	35.1	15.8	3.29	1.232
B16	2.6	2.6	7.9	32.5	54.4	4.33	0.928
B17	2.6	8.8	25.4	32.5	30.7	3.80	1.057
B18	41.2	32.5	21.1	4.4	0.9	1.91	0.937
B19	65.8	21.9	4.4	5.3	2.6	1.57	0.986
B20	2.6	8.8	24.6	39.5	24.6	3.75	1.012
B21	14.0	15.8	26.3	29.8	14	3.14	1.254
B22	0.9	9.6	20.2	39.5	29.8	3.88	0.979
B23	42.1	28.1	16.7	10.5	2.6	2.04	1.120
B24	55.3	26.3	12.3	3.5	2.6	1.72	0.991
B25	6.1	12.3	32.5	35.1	14	3.39	1.069
B26	35.1	36.8	14.0	7.0	7.0	2.14	1.182
B27	29.8	27.2	22.8	11.4	8.8	2.42	1.268
B28	1.8	7.9	7.0	36.0	47.4	4.19	0.994
B29	62.3	28.9	5.3	1.8	1.8	1.52	0.823
B30	6.1	16.7	29.8	38.6	8.8	3.27	1.041
B31	49.1	21.9	20.2	5.3	3.5	1.92	1.106
B32	14.0	11.4	35.1	27.2	12.3	3.12	1.198
B33	64.9	22.8	7.0	2.6	2.6	1.55	0.932
B34	4.4	9.6	25.4	26.3	34.2	3.76	1.154
B35	1.8	3.5	17.5	41.2	36.0	4.06	0.915
B36	29.8	44.7	14.9	6.1	4.4	2.11	1.042
B37	5.3	6.1	19.3	45.6	23.7	3.76	1.050
B38	5.3	14.9	31.6	28.1	20.2	3.43	1.129
B39	0.9	2.6	10.5	41.2	44.7	4.26	0.821
B40	5.3	11.4	21.1	41.2	21.1	3.61	1.101
B41	0.9	2.6	10.5	41.2	44.7	4.25	0.868
B42	26.3	35.1	22.8	13.2	2.6	2.31	1.082
B43	0.9	2.7	6.9	36.8	52.6	4.40	0.737

Note. Data collected by the author on the 2024.

SD = *strongly disagree*, D = *disagree*, NA/D = *neither agree or disagree*, A = *agree*, SA = *strongly agree*.

Sixth research question: Which model is confirmed by the factorial analysis (EFA) in the case of SEND teachers' views on ICT?

The last question answers which model the factorial analysis (EFA) confirms in the case of SEND teachers' views on ICT. Factor Analysis belongs to the broader group of multivariate statistical methods. It is a widespread technique with applications both in psychometrics and social sciences in general. It has as its primary objective the determination of the basic structure of the correlations of a large set of variables and the creation of subsets of interrelated variables called factors that gather the most significant possible information about the whole. This process aims to maximize the understanding of the data and interpret them in the best possible way (Mantzoukis & Papantoniou, 2014).

Therefore, reducing and simultaneously grouping variables into a number of factors more minor than the initial one took place. The analysis revealed the factors related to the views of special educators on the use of ICT in special education.

The Keiser – Meyer – Olkin index was used, which evaluates the sample with values of the K-M-O index (above 0.50) and values between 0 and 1 as a comparison of the sizes of the observed correlation coefficients with the partial correlation coefficients, indicating that the method of factorial analysis of variables is

accepted as a technique for data analysis. If the KMO values are large, around 0.8, they are considered good enough to proceed.

Another suitability test of the factorial analysis is Bartlett's test of sphericity, the results of which are presented in Table 6. In this, it is checked that the sample of the factorial analysis is suitable. Therefore, he checks the homogeneity and whether the correlations differ significantly from zero. The Bartlett p -value test of sphericity (< 0.05) hypothesis must be rejected. In this case, the statistical significance (Sig.) of the index is less than 0.05, and the hypostudy of no significant correlations at a significance level of 5% is rejected. By being statistically significant, in combination with the NGO index and the determinant of the relevance table, the sufficient relevance and, therefore, appropriateness of the sample data is concluded.

In the present case, it was found that the statistical criterion Kaiser – Meyer – Olkin is significant (0.84), and the correlations between the survey data are quite satisfactory. Bartlett's sphericity test rejects the null hypothesis that the correlation matrix is a unit (2846.72, $df = 903$, p -value = 0.00, therefore $p < 0.05$) and that there are no significant correlations. All these data confirm the suitability of the data for factorial analysis EFA (Exploratory Factor Analysis).

Table 6

KMO and Bartlett's Test Result

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.84
Bartlett's Test of Sphericity	Approx. Chi-Square	2846.72
	df	903
	p	0.00

Note. Author own compilation.

Figure 1

Scree Plot for Factor Retention in Exploratory Factor Analysis

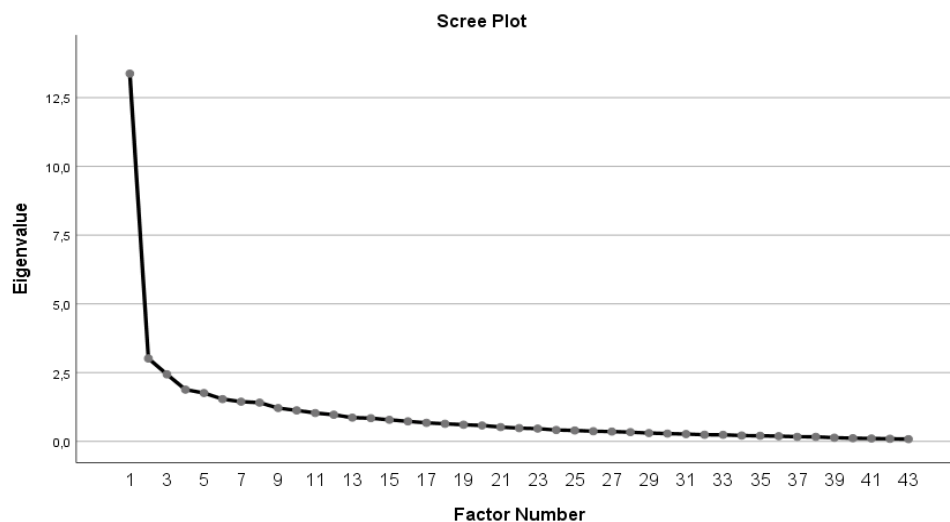


Table 7 demonstrates the factor method by Maximum Probability analysis to determine common factors. The procedure computes correlation coefficients between all pairs of variables and determines the number of significant factors. Factors with eigenvalues greater than one are considered.

The key features here are 'Initial Eigenvalues,' 'Extraction Sums of Squared Loadings,' and 'Rotation Sums of Squared Loadings.' The total variance for the 43 variables is 43. Each factor's

eigenvalue is the percentage of this total variance that the factor explains. Each eigenvalue divided by 43 is each factor's contribution to the total variance.

Factorial analysis testifies to the existence of three significant factors, which together explain 43.782% of the variance. More specifically, the first factor explains 31.1%, the second 38.1%, and the third 43.78% of the total variance.

Table 7*Factor Approach Table: Total Variance Explained*

Factor	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.37	31.10	31.102	12.85	29.89	29.89	7.85	18.25	18.25
2	3.01	7.01	38.11	2.45	5.71	35.60	5.49	12.77	31.02
3	2.44	5.67	43.78	1.86	4.32	39.92	3.83	8.90	39.92
4	1.88	4.38	48.16						
5	1.76	4.08	52.24						
6	1.53	3.57	55.81						
7	1.44	3.35	59.17						
8	1.41	3.27	62.44						
9	1.21	2.81	65.25						
10	1.12	2.62	67.87						
11	1.03	2.40	70.27						
12	0.96	2.25	72.52						
13	0.86	2.01	74.52						
14	0.83	1.96	76.48						
15	0.78	1.82	78.30						
16	0.73	1.69	80.00						
17	0.67	1.56	81.56						
18	0.64	1.49	83.05						
19	0.60	1.40	84.45						
20	0.58	1.34	85.79						
21	0.52	1.20	87.00						
22	0.48	1.12	88.12						
23	0.46	1.08	89.19						
24	0.41	0.96	90.15						
25	0.40	0.92	91.07						
26	0.37	0.85	91.93						
27	0.35	0.83	92.76						
28	0.33	0.78	93.53						
29	0.30	0.70	94.234						
30	0.28	0.66	94.893						
31	0.26	0.62	95.51						
32	0.24	0.56	96.07						
33	0.24	0.55	96.62						
34	0.21	0.49	97.11						
35	0.20	0.47	97.58						
36	0.19	0.44	98.02						
37	0.17	0.38	98.40						
38	0.16	0.38	98.78						
39	0.13	0.31	99.09						
40	0.11	0.26	99.35						
41	0.10	0.24	99.60						
42	0.09	0.21	99.81						
43	0.08	0.19	100.00						

Note. Extraction Method: Principal Axis Factoring.

Table 8 gives the rotation of factors. The breakdown of questions into three factors is shown. The first factor includes questions related to the use of ICT and includes questions: B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B13, B14, B15, B16, B17 and

B32. The second factor includes questions B12, B19, B20, B21, B22, B23, B24, B25, B26, B27, B28, B29, B30, B31 and B33. Finally, questions B29, B34, B35, B36, B37, B38, B39, B40, B41, B42 and B43 are included in the third factor.

Table 8*Factor Rotation Table*

Rotated Factor Matrix ^a			
	1	2	3
B1	0.78		
B2	0.76		
B3	0.69		
B4	0.65		
B5	0.64		
B6	0.63		
B7	0.61		
B8	0.60		
B9	0.59		
B10	0.57		
B11	0.54		

Rotated Factor Matrix ^a			
	1	2	3
B12		-0.22	
B13	0.51		
B14	0.46		
B15	0.44		
B16	0.43		
B17	-0.22		
B18			
B19		0.76	
B20		0.68	
B21		0.64	
B22		0.62	
B23		0.62	
B24		0.59	
B25		0.55	
B26		0.53	
B27		0.50	
B28		0.50	
B29			-0.24
B30		0.41	
B31		0.33	
B32	0.30		
B33		0.29	
B34			0.55
B35			0.53
B36			0.53
B37			0.52
B38			0.51
B39			0.47
B40			0.44
B41			0.26
B42			0.25
B43			0.21

Note. Three factors extracted.

From the findings of the study in general, in relation to research questions, it was found that gender, age, and marital status are not related to Attractiveness and Confidence in the use of ICT, which is consistent with previous studies (Barakos, 2008). In addition, it seems that the years of experience as well as training of special educators affect their confidence and confidence regarding the use of ICT. This is more generally in line with studies on the subject which indicate that the more teachers are confident in the use of ICT, the more they participate in professional development and spend time on their training (Barakos 2008; European Union, 2013).

Years of experience and training, however, once again seem to be related. In particular, looking at years of experience in relation to attractiveness for ICT, it is observed that there is a negative significant correlation. Therefore, the more years of service, the less attractive ICT is. A significant statistical correlation is also observed for ICT use and training, which is confirmed by other surveys, as teachers who expressed greater familiarity with ICT were more confident in their use in the classroom (Prestridge, 2011). It may also depend to a large extent on their existing values, know-how and pedagogical experience (Masoumi, 2015).

In addition, looking at years of experience in relation to attractiveness to ICT, it can be observed that the more years of service, the less attractive ICT is. It was also observed that the more trained special educators are on the subject, the more attracted they are to ICT, which is confirmed by other studies (Barakos, 2008). Particularly interesting from the results of the survey is the fact that ICT seems to be considered an almost indispensable "tool," and the importance of their use and contribution to the creation of pedagogical learning environments is recognized. The above conclusion is confirmed by many studies on the subject (Barakos, 2008; Masoumi, 2015).

However, based on the results analyzed in more detail regarding support from the state, teachers do not have the appropriate infrastructure for the use of ICT in the educational process as they consider that they do not have sufficient support from the state at any level (see 5th research question).

Similar conclusions seem to be reached by other surveys in which it seems that most teachers are familiar with ICT for teaching and learning; however, they use it mainly to prepare their teaching or as a complement and not as an integral part of the curriculum (Masoumi, 2015). However, it is worth mentioning that the conclusions do not correspond to a survey conducted in the Czech Republic that showed that 59% of teachers replace traditional teaching materials with ICT, while in the absence of material, 85% use ICT. Therefore, teachers believe that some software can help students better understand the topic and motivate them, and 48% of respondents stated that they do not find disadvantages in using ICT (Gybas et al., 2019).

It is also interesting that based on the statistical analysis of the answers, it seems that most teachers seem to be confident in the use of ICT and consider that it is feasible to manage them in order to carry out the educational process in different teaching subjects and even with significant learning outcomes for the students. Therefore, they can manage the conduct of the educational process using ICT.

What is clearly understood is that for the most part, respondents do not seem particularly satisfied with their support from the state and the logistical infrastructure provided to them. The reasons why the use of ICT in the educational process is avoided vary, the main ones being the lack of adequate equipment or poor maintenance of an existing one and the lack of motivation by teachers as they are not adequately remunerated. Finally, it is noted that the tools preferred by those who use ICT are personal computers (Katsarou, 2020). Factor analysis (EFA) confirms the three-factor model in the case of SEND teachers' views on ICT.

Conclusion

Today, more than ever, the need for technological evolution and adaptation to a new era of data is almost essential. Technology in general and ICT have entered the life of the individual and have changed it to a great extent. Special education is an industry in which new technologies have many benefits to

offer. ICT can also be seen as a means of bridging different groups of people, such as people with special educational needs and disabilities. However, for them to be correctly utilized, the most important of all is to use them appropriately and to the maximum possible extent and this task is "assigned" to the educators.

Therefore, the purpose of this study was to investigate the views of special education teachers on the use of ICT in the education of children with special needs and disabilities, as well as the factors that have a decisive effect. On this subject, initially, some important elements were mentioned for both special education and ICT at a more general level. Then, some important facts about ICT and the learning process were mentioned, but also about the use of ICT in special education. Subsequently, recent research data were reported regarding teachers' views on the effectiveness of ICT in education and Special Education, followed by research methodology and research.

By answering the research questions, an attempt was made to draw some conclusions about the above research proposal. In conclusion, the views and attitudes of special educators seem to be positive regarding the use of ICT in the educational process and seem to facilitate the work of teachers and favor students. They are increasingly seen as a tool to create independent learning environments, ensure access to the curriculum as well as enhance the social inclusion of all individuals. However, there are some inhibiting factors that do not favor their use and perhaps even prevent it. One of the main factors seems to be the lack of support, which, in general, affects their attitude and confidence in the use of ICT, both in the classroom. In conclusion, as shown by this survey, despite the importance of ICT and its rapid development in recent years, its use in education, especially special education, is not taken for granted by teachers.

In addition, the sample concerns all special education teachers of all levels. A comparative study on the use of ICT by special educators of different levels would be interesting. In addition, the existing questionnaire is more interesting about computer use. It would be interesting to study whether special educators are aware of the developments and possibilities offered by the ever-growing technology industry and how technology and, especially, assistive technologies can offer special education benefits that could lead to the inclusion of people with special and/or educational needs and disabilities. Opportunities for equality, inclusion, and upgrading the school into a true school for all. Finally, quantitative research combined with qualitative and more information, as well as a case study where teaching interventions would be implemented using ICT, would also be of particular interest.

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Appendix A

Table A1

Descriptive Statistics Across Gender

Scales	Men	Women	u	p-value
scale 1	49.79	59.78	943.5	0.17
scale 2	50.04	59.70	950	0.19
scale 3	61.38	56.35	1043	0.49
scale 4	58.90	57.09	1107.5	0.80
scale 5	54.60	58.36	1068.5	0.61
scale 6	52.69	58.92	1019	0.40

Table A2

Differences Across Age

Scales	r	p-value
scale 1	-.27	0.00
scale 2	-.19	0.04
scale 3	-0.15	0.10
scale 4	-0.07	0.47
scale 5	-0.16	0.09
scale 6	-0.06	0.52

Table A3

Descriptive Statistics Across Marital Status

Scales	Unmarried	Married	Divorced	Widower	p-value
scale 1	58.96	58.96	54.91	34.60	0.445
scale 2	59.71	57.29	54.14	41.40	0.668
scale 3	61.17	59.23	42.41	34.70	0.137
scale 4	61.38	53.95	43.27	73.70	0.206
scale 5	58.50	62.29	36.27	53.50	0.130
scale 6	56.38	60.83	57.59	42.80	0.686

Table A4

Differences Across Years of Experience

Scales	r	p-value
scale 1	-0.3	0.00
scale 2	-.277**	0.00
scale 3	-.269**	0.00
scale 4	-0.094	0.32
scale 5	-.224*	0.01
scale 6	-0.129	0.17

Table A5*Descriptive Statistics Across Service Positions*

Scales	Permanent	Deputy	Hourly wage	KWH	<i>p</i> -value
scale 1	40.84	49.94	60.72	5.29	0.07
scale 2	41.95	51.68	53.06	2.63	0.27
scale 3	43.66	53.83	43.00	3.33	0.19
scale 4	47.24	49.63	50.16	0.17	0.92
scale 5	43.60	50.90	52.59	1.59	0.45
scale 6	46.07	49.27	53.44	0.72	0.70

Table A6*Differences Across Training*

Scales	No	Short seminars	Quarterly/ Semi-annual	Annual specialization	<i>p</i> -value
scale 1	48.72	53.84	61.11	59.58	0.41
scale 2	49.45	49.98	62.52	63.08	0.22
scale 3	43.97	54.48	62.98	68.50	0.03
scale 4	52.60	51.98	58.28	57.96	0.83
scale 5	44.50	52.86	67.44	61.27	0.02
scale 6	44.55	53.22	65.37	64.62	0.03