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New technologies and students with learning difficulties

Abstract

New Technologies have become a part of the wider lifestyle and over the years, in the future, they will probably continue to be an important part of our lives. The use of computers and the Internet appears to be able to improve people's daily lives, the quality of their work, their market prospects, while facilitating communications and access to information (National Research Council 1999). Also, using computers may help students gain experience with technology. Many questions have arisen in relation to the use of New Technologies in learning. Much research focuses on investigating the impact of ICT on student achievement while few have focused on children with special learning needs.

The purpose of the research is to investigate whether and to what extent students with special learning difficulties perform better with the use of new technologies compared to the traditional learning method. The results of the research, which was carried out on a sample of 232 Kindergarten and First Primary students, showed that children with special learning difficulties adapt easily to this new learning environment and that they perform better compared to the traditional teaching method.

Keywords: new technologies, learning disabilities, traditional methods

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Abbreviations: ICT, information communication technologies; LD, learning disabilities

Introduction

In the modern society of technological developments the various means of technology are increasingly entering both everyday life and education. In this context, ICT plays an important role in the school. They are a valuable assistant in the pedagogical and teaching work of all teachers and in achieving the cognitive and social goals, which determined during the planning of teaching.[1,2] In education, ICT can support all subjects and contribute to exploratory and collaborative learning, communication and in the development of students' critical thinking and creativity. All students, especially students with learning disabilities, are likely to benefit in such a teaching context, where personalized - adapted is promoted teaching at each student's ability level and in a work environment pleasant and creative.

The lesson becomes interesting as the students interact with software and develop creativity and criticism them thinking by discovering knowledge through information seeking also they actively participate in work groups, without feeling disadvantaged against them their classmates, depending on their individual abilities and skill level.[3,4] The aim of this study is to examine if with the use of new technologies children with learning disabilities perform better than with traditional teaching.

Literature review

According to Adam and Tatnall,[5] the use of I.C.T has a beneficial effect on the education of children with learning difficulties. It achieves this both by improving children's self-esteem, by providing the means by which they can achieve something they consider worthwhile, and by facilitating the acquisition of useful life skills. The I.C.T proved to help pedagogically, and create a pathway for the transition from school to work or further studies for students with learning difficulties.[6] With the use of New Technologies, the nature of the teaching subject does not change, but it has the ability to integrate and enrich several areas from the field of study or the curriculum. Blackhurst[7] described "how concepts related to the use of technology in education have evolved with particular emphasis on their implications for people with learning disabilities (LD)" (p. 175).

Henniger[8] described computers as important tools in the teaching and learning of everyday subject areas. Ryba, Sleby and Nolan[9] pointed out that providing 'relevant learning technology' actually showed respect for the personal needs, wishes and interests of children with special needs. The computer can be used as a learning tool that improves their quality of life. However, doing so requires adaptations to minimize these children's difficulties in working on computer tasks. Ryba, Sleby and Nolan[9] stated that "adaptations that allow full access to computers (for example, laser scanning, alternative keyboards, and voice recognition) allow students with special needs to demonstrate their potential" (p. 82).

Some of the benefits of using New Technologies include promoting academic success for students with learning disabilities in the areas of writing, mathematics, spelling, reading and comprehension, enhancing their organizational skills, and, most importantly, encouraging them in their social inclusion in society.[10] Students with learning disabilities, using visual tools, find new means to express language and represent their thinking in words.[11]

Therefore, the use of New Technologies helps to achieve the fundamental goals of co-education, such as fostering a sense of belonging to the group, sharing activities with exclusive results and providing a balanced education experience.[12] Technology helps increase the regularity of successful task completion, and plays an important role in improving the motivation of students with learning disabilities.[13]

Research methodology

The target population of the research was children from Kindegarten and Primary full day schools, from the region of Eastern Macedonia and Trace in Greece. The students that were enrolled in kindergarten were 104 and from Primary school were 128. Furthermore, primary school students that had two classes of first grade were chosen to participate in this research. The first group was control group , and the second was the experimental group. As control group it is called the group that uses traditional methods first and

proceeds to new technology methods, whereas experimental groups are vice versa. In order to be able to apply this research, the researcher had to obtain the consent of the Ministry of Education, the children's parents and the principals of the kindergarten schools. The researcher administrated the book form of the CPM to each child individually, following the standard administration procedure that was prescribed by Raven, Raven and Court[14] without setting time limit.[14,15] The children's personal data were kept anonymous by the researcher. Prior to administrating the book form of CPM, the kindergarten and Primary school teachers were asked to provide the researcher the names in alphabetic order, reversing the order of the code in order for no one to be able to know the personal characteristics of the children that participated in the research. The second step concerned kindergarten teachers and school units chosen by the researcher based on the curriculum of the kindergarten. The subject that was chosen and implemented in all the kindergartens was traffic education. As far as the primary school is concerned the subject that was taught to the students was subtraction and the children were divided in two classes of first grade. After the completion of the first week, the researcher gave the teachers a form that had three columns. The first column was the codes that the researcher had given to the students, the second was the grades that the teachers would give to the children based on their performance using the traditional teaching method. The rates were from 1 to 10 (where one was the lowest and 10 the highest). The children had to answer correctly to the five questions that he/she had been asked. The third column was the grades given to the children using new technology methods (the highest grade was 10).

On the other hand for primary school children after the completion of traditional teaching took a test about subtraction were 1 was the lowest grade and 5 was the highest. In order to examine their performance in new technologies the children took a test on the computer concerning subtraction. The researcher had given the teachers software created by the Ministry of Education, allowing all the teachers to download and use the web site that the Ministry had implemented in order to make their lesson more interesting.

Results

Learning disabilities

The sample of 553 children of the first grade of A1 class in primary school, shows that 13.0% of students have learning difficulties, from the 532 students of A2 10.6% of the students have learning difficulties while from the total sample of 1183 kindergarten students only the 8.8% presents some kind of learning difficulty (Table 1).

Table 1 Percentage of learning disabilities

	Learning disabilities %
A1 Grade	13.00%
A2 Grade	10.6
Kindrgarten	8.80%

The most frequent problem presented by primary school children of groups A1 and A2 is dyslexia (62.5%), followed by distraction (25.0%) and, finally, speech problems (12.5%) (Table 2).

Table 2 Learning disabilities

Category	Percentage %
Dyslexia	6250.00%
Dissociation of attention	25
Speech problem	1250.00%

The most frequent problem of kindergarten children is distraction (29.8%), followed by autism (20.2%), speech disorders and immaturity (17.3%), and mental retardation (7.7%) (Table 3).

Table 3 Learning disabilities

Category	Percentage %
Distraction	2980.00%
Immaturity	17.3
Autism	2020.00%

ICT and learning difficulties in class A1 of primary school

The learning difficulties of A1 Primary students appear with small differences in boys and girls. Thus, girls show a higher percentage in dyslexia, while boys in distraction, with speech problems being equally distributed (Table 4).

Table 4 Class and gender for primary A1

Gender	Dyslexia	Distraction	Speech problem	Total
Boy	60.00%	27.50%	12.50%	100.00%
Girl	65.60%	22.00%	12.40%	100.00%

The largest percentage of students with learning disabilities belong to the category of "normal intelligence", while in the categories of "low intelligence" and "high intelligence", the proportion is about the same (Table 5).

Table 5 Intelligence for A1 of primary school

Intelligence	Percentage` %
Low	23.6
Normal	54.2
High	22.2
Total	100

No significant difference is observed in the ratio of boys and girls with regard to the different levels of intelligence, which is also documented by the $\chi 2$ test of independence, where the value of the statistic $\chi 2=0.262$ is not statistically significant (sig=0.877> 0.05), and therefore the gender and intelligence group variables are independent (Tables 6&7).

Table 6 χ^2test for class A1of primary school

			Low intelligence	Normal intelligence	High intelligence	Total
Gender	Boy	Frequency	10	21	8	39
		% line	25.60%	53.80%	20.50%	100.00%
		% column	58.80%	53.80%	50.00%	54.20%
		% Total	13.90%	29.20%	11.10%	54.20%
	Girl	Frequncy	7	18	8	33
		% line	21.20%	54.50%	24.20%	100.00%
		% Column	41.20%	46.20%	50.00%	45.80%

Table Continued.....

		Low intelligence	Normal intelligence	High intelligence	Total
	% Total	9.70%	25.00%	11.10%	45.80%
Total	Frequence	17	39	16	72
	% line	23.60%	54.20%	22.20%	100.00%
	% Column	100.00%	100.00%	100.00%	100.00%
	% Total	23.60%	54.20%	22.20%	100.00%

Table 7 χ^2test for gender and intelligence categories – class A1of primary school

	Value	df	Sig
Pearson Chi-Square	0.262a	2	0.877
Likelihood ratio	0.263	2	0.877
N of Valid cases	72		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.33.

The average performance of all the children of section A1, using ICT is very satisfactory (4.62) and the variability is 18.55%. Specifically, typically developing children have an average score of 4.67, and children with learning disabilities have an average score of 4.28 (Table 8).

Table 8 Performance of students A1class of primary school

	Total of students	Typical development	Learning difficulties
Average	4.62	4.67	4.28
Median	5	5	5
Mode	5	5	5
Standard deviation	0.857	0.847	0.922

In a test carried out to determine whether the performance of students with software differs by gender, no statistically significant differences emerged, as the value of the F statistic is non-significant (sig=0.329>0.05) (Table 9). In particular, in performance with software, girls (mean value 4.39) are ahead of boys (mean value 4.18).

Table 9 Analysis of variance by gender and performance – class A1

Methods	F	Sig
New Technologies	0.965	0.329

Children with dyslexia (mean value 4.49), followed by those with speech problems (mean value 4.11), and, finally, children with distraction (mean value 3.83) show the highest performance in the use of New Technologies (Table 10).

Table 10 Performances in ICT by Category – class A1

Category	Mean	Standard deviation
Dyslexia	4.49	0.726
Distraction	3.83	1.248
Speech problem	4.11	0.781

ICT and learning difficulties class A2 of primary school

In A2 Elementary students, dyslexia and distraction appear as more frequent problems in boys, while a higher percentage is observed in girls with a speech problem (Table 11).

Table 11 Category and gender for class A2 of primary school

Gender	Dyslexia	Distraction	Speech problem	Total
Boy	67.60%	26.50%	5.90%	100.00%
Girl	54.50%	22.70%	22.70%	100.00%

The largest percentage of students with learning difficulties belongs to the category of "normal intelligence", while the category of "low intelligence" lags significantly behind the corresponding "high intelligence" (Table 12).

Table 12 Intelligence for A2 class

Intelligence	Percentage%
Low	12.5
Normal	58.9
High	28.6
Total	100

No significant difference is observed in the ratio of boys and girls with regard to the different levels of intelligence which is also documented by the x2 test of independence, where the value of the statistic x2=5.091 is not statistically significant (sig=0.078>0.05), and , therefore, the gender and intelligence group variables are independent, however, the results are not particularly reliable as 33.3% (>20%) of the cells have an expected frequency of less than 5 (Tables 13&14).

Table 13 χ^2test for class A2

			Level of intelligence			
			Low intelligence	Normal intelligence	High intelligence	Total
Gender	Boy	Frequency	7	18	10	35
		% line	20.00%	51.40%	28.60%	100.00%
		% Column	100.00%	54.50%	62.50%	62.50%
		% Total	12.50%	32.10%	17.90%	62.50%
	Girl	Frequency	0	15	6	21
		% line	0.00%	71.40%	28.60%	100.00%
		% Column	0.00%	45.50%	37.50%	37.50%
		% Total	0.00%	26.80%	10.70%	37.50%
	Total	Frequency	7	33	16	56
		% line	12.50%	58.90%	28.60%	100.00%
		% Column	100.00%	100.00%	100.00%	100.00%
		% Total	12.50%	58.90%	28.60%	100.00%

Table 14 χ^2test gender and level of intelligence – class A2 of primary school

	Value	df	Sig
PearsonChi-Square	5.091a	2	0.078
Likelihood ratio	7.45	2	0.024
N of Valid cases	56		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.63.

The performance of all the children in section A2 is very satisfactory (4.92), and the variability is about 8%. In particular, children with typical development have an average performance of 4.94, and children with learning difficulties have an average performance of 4.57 (Table 15).

Table 15 Student performances for A2 class of primary school

	Students in total	Normal development	Learning disabilities
Mean	4.92	4.94	4.57
Median	5	5	5
Mode	5	5	5
Standard deviation	0.39	0.294	0.805

In a test that was carried out to determine whether the performance of students with software differs in terms of gender, no statistically significant differences emerged, as the value of the F statistic is non-significant (sig=0.498>0.05) (Table 16). In particular, in performance with software, girls (mean value 4.67) are ahead of boys (mean value 4.51).

Table 16 Analysis of variation in terms of gender and performance – class A2 of primary school

Methods	F	Sig
New technologies	0.465	0.498

Children with dyslexia (mean value 4.63), followed by children with speech problems (mean value 4.57), and children with distraction (mean value 4.43) show the highest performance in the use of New Technologies (Table 17).

Table 17 Performances of ICT by category – class of A2

Category	Mean	Standard deviation
Dyslexia	4.63	0.77
Distraction	4.43	0.937
Speech problem	4.57	0.786

A fairly significant difference is observed in the performance of children with learning difficulties in section A2 (mean value 4.57) compared to children in section A1 (mean value 4.28), while it is noteworthy that the variability in both sections is quite significant (17.6% in section A2 and 21.5% in section A1).

ICT and learning disabilities in Kindergarten students

In toddlers, the most common problem is distraction (29.8%), followed by autism (20.2%), speech disorders and immaturity (17.3%), and mental retardation (7.7%) (Table 18).

Table 18 Learning disabilities of kindergarten students

Category	Frequence	Percentage %
Distraction	31	29.8
Immaturity	18	17.3
Autism	21	20.2
Mental dysfunction	8	7.7
Speech disorders	18	17.3
Psychomotor immaturity	2	1.9
Pervasive development	2	1.9
Language problem	4	3.8
Total	104	100

Attention deficit disorder is about equally common in boys and girls (29.3% vs. 30.4%), immaturity is more common in boys (30.7%) than girls (13.0%), and autism (22.4%) against 17.4%), while on the contrary mental retardation in girls is more frequent (8.7%) compared to boys (6.9%). The same happens with speech disorders, where girls present more often (23.9%) than boys (12.1%) (Table 19).

Table 19 Category and gender of Kindergarten

Category	Boy%	Girl %	Total%
Distraction	29.3	30.4	29.8
Immaturity	20.7	13	17.3
Autism	22.4	17.4	20.2
Mental dysfunction	6.9	8.7	7.7
Speech disorders	12.1	23.9	17.3
Psychomotor immaturity	3.4	0	1.9
Diffuse growth	3.4	0	1.9
Language problem	1.7	6.5	3.8
Total	100	100	100.00%

The largest percentage of kindergarten students with learning difficulties belongs to the category of "normal intelligence", while in the category of "low intelligence" a slight superiority is observed in relation to "high intelligence" (Table 20).

Table 20 Intelligence of kindergarten students

Intelligence	Percentage %
Low	20.8
Normal	63.2
High	16
Total	100

No significant difference is observed in the ratio of boys and girls regarding the different levels of intelligence, which is also documented by the $\chi 2$ test of independence, where the value of the $\chi 2$=0.201 statistic is not statistically significant (sig=0.904> 0.05), and therefore the variables gender and intelligence groups are independent (Tables 21&22).

Table 21 χ^2 test for kindergarten students

			Level of intelligence			
			Low Intelligence	**Normal Intelligence**	**High Intelligence**	**Total**
Gender	Boy	Frequency	12	39	9	60
		% line	20.00%	65.00%	15.00%	100.00%
		% Column	54.50%	58.20%	52.90%	56.60%
		% Total	11.30%	36.80%	8.50%	56.60%
	Girl	Frequency	10	28	8	46
		% line	21.70%	60.90%	17.40%	100.00%
		% Column	45.50%	41.80%	47.10%	43.40%
		% Total	9.40%	26.40%	7.50%	43.40%
	Total	Frequency	22	67	17	106
		% line	20.80%	63.20%	16.00%	100.00%
		% Column	100.00%	100.00%	100.00%	100.00%
		% Total	20.80%	63.20%	16.00%	100.00%

Table 22 χ^2test gender and intelligence level – kindergarten students

	df	**Sig**
PearsonChi-Square	2	0.904
Likelihood ratio	2	0.905
N of Valid cases		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.38.

The performance of all kindergarten students with the use of software is satisfactory (mean value 8.30) and slightly better than the corresponding one without software (mean value 8.13) (Table 23). This difference is statistically significant, as the t-test for equality of means of the two dependent samples gave a value of t=4.198 with sig=0.000<0.01.

Table 23 Performance of kindergarten students

	With ICT	**Without ICT**
Mean	8.3	8.13
Median	9	8
Mode	10	10
Standard deviation	1.56	1.77

There is a positive, statistically significant and quite satisfactory correlation between the performances with software and without software (r=0.616 sig=0.000<0.01). The variability of performance using software is 18.79% in the case of typically developing infants, and 21.77% in the case of infants with learning disabilities.

In a test that was carried out to determine whether the performance of toddlers with software differs by gender, no statistically significant differences emerged, as the value of the F statistic is non-significant (sig=0.091>0.05) (Table 24). In particular, boys lead with an average value of 7.15 compared to an average value of 6.52 for girls.

Table 24 Analysis of variance by gender and performance – kindergarten students

Methods	**F**	**Sig**
New technologies	2.911	0.091

Comparing the performances of children with typical development and children with learning difficulties, the result show significant differences, both in the case of using software and in the case of not using software. In particular, the average performance of children with typical development using the software is 8.45, compared to an average performance of 6.87 for children with learning difficulties. In the case of children's performance without the use of software, typically developing children were evaluated with an average performance of 8.30 and children with learning difficulties with an average performance of 6.28. In both cases the test for equality of means gave statistically significant results at the 1% significance level (Table 25).

Table 25 Performance of kindergarten students with and without learning disabilities

	With ICT	**Without ICT**
Normal development	8.45	8.3
With learning disabilities	6.87	6.28
F	106.759	137.251
Sig	0	0

Conclusion

The results of the research come in full agreement with research by Adam and Tatnall,[5] where it was found that the I.C.T they improve learning and equip children with sufficient skills to enable them to enter the workforce or go on to further studies. Also, it is mentioned that the adoption of I.C.T in the classroom significantly facilitates children with learning difficulties, both in the development of skills and academic knowledge. The literature also provides examples of the performance of students with learning disabilities who perform poorly in courses not supported by New Technologies. Research on the use of ICT with students with learning difficulties, have been carried out by Blackmore et al, Florian and Hegarty, Williams, Jamali and Nicholas, Adam and Tatnall,[5] and others. In any case, these studies found that the use of I.C.T with students with learning disabilities have had varying beneficial effects. In addition except improving their grades, the children also gained interest in their studies and confidence in their abilities. The use of technology promotes a sense of belonging, and encourages interactive participation in regular education classes for students with learning disabilities.

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Conflicts of interest

The author declares that they have no direct or indirect conflicts.

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References

1. Kerckaert S, Vanderlinde R, Braak J. The role of ICT in early childhood education: Scale development and research on ICT use and influencing factors. *European Early Childhood Education Research Journal*. 2015;23(2):183–199.
2. Lang C, Craig A, Casey GA. A pedagogy for outreach activities in ICT: Promoting peer to peer learning, creativity and experimentation. *British Journal of Educational Technology*. 2017;48(6):1419–1501.
3. Lim CP, Oakley G. Information and Communication Technologies (ICT) in Primary Education. In LY Tay & CP Lim, editors. Creating Holistic Technology – Enhanced Learning Experiences. Netherlands (Rotterdam): Sense Publishers; 2013;1–18.
4. Starcic AI, Bagon S. ICT – supported learning for inclusion of people with special needs: Review of educational technology journals 1970-2011. *British Journal of Educational Technology*. 2014;45(2):202–230.
5. Adam T, Tatnall A. *The* Impact of ICT in Educating Students with Learning Disabilities in Australian Schools – an ANT Approach. Technological Advancements and the Impact of Actor Network Theory. 2014.
6. Stendal K. How do people with disability use and experience virtual worlds and ICT: A Literature Review. *Journal of Virtual Worlds Research*. 2012;5(1):1–17.
7. Blackhurst E. Perspectives on applications of technology in the field of learning disabilities. *Learning Disability Quarterly*. 2005;28:175–178.
8. Henniger ML. The teaching experience: An introduction to reflective practice. 2004.
9. Ryba K, Sleby L, Nolan P. Computers empower students with special needs. *EL*. 1995;53(2):82–84.
10. Quenneville J. Tech tools for students with learning disabilities: Infusion into inclusive classrooms. *Assistive Technology*. 2015.
11. Rose D, Meyer A. Teaching every student in the digital age: Universal design for learning. Alexandria; 2002.
12. Alghazo A, Al Otaibi BE. Using Technology to Promote Academic Success for Students with Learning Disabilities. *Journal of Studies in Education*. 2016;6(3):62–80.
13. Bahr CM, Nelson NW, VanMeter AM. The effects of text-based and graphics-based software tools on planning and organizing of stories. *J Learn Disabil*. 1996;29(4):355–370.
14. Raven J, Raven JC, Court JH. Manual for Raven's Progressive Matrices and Vocabulary Scales. Section 1. General Overview. Intoducing Parallel Version of the CPM and SPM together with a more powerful Version of the SPM (SPM Plus). Oxford: Oxford Psychologists Press; 1998.
15. Raven JC, Court JH, Raven J. Section 2: Coloured Progressive Matrices. In Manual for the Raven's Progressive Matrices and Vocabulary Scales. 1990 Oxford: Oxford Psychologist Press; 1990.