SOFIA UNIVERSITY
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FACULTY OF EDUCATIONAL STUDIES AND THE ARTS

DEPARTMENT OF SPECIAL EDUCATION

PhD Program in Special Education (in English)

Information and communication technologies in education of pupils with ADHD in the Greek language subject

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Sofia
2021

ABSTRACT

The review of the literature shows that it is a fact that the existence of children with ADHD problems at school concerns teachers, both due to the significant incidence of the disorder in students attending regular school and due to the severity of their problems, such as referred to the relevant section of the theoretical part. It also seems that the computer as a means of teaching and learning of children with learning disabilities is a very important tool in the hands of teachers and children, due to the diversity of its capabilities and functions. The purpose of this study is to investigate whether ICT and specifically a specific software helps students with ADHD to improve their performance in the language course and their behavior. Specifically, we will study how a specific software helps students with ADHD to improve their reading, comprehension, spelling and grammar, but also their behavior. The general purpose of the research concerns the use of ICT to improve the language and behavioral performance of students with ADHD. The special purpose concerns the use of the specific software for the improvement of the linguistic and behavioral performance of the students with ADHD. The statistical analysis resulted that in the second measurement compared to the first due to the implementation of the ICT method children with ADHD syndrome presented improved spelling compared to children without ADHD. The same was true in the case of understanding and reading. These results confirm the first research hypothesis "ICT helps students with ADHD in the language lesson to perform better". Furthermore, the results confirmed the second hypothesis that the students with ADHD improve their behaviour after the implementation of the software. Regarding the third hypothesis, it is proven that the use of the ICT clearly enhances the performance of students with ADHD while students without ADHD perform the same or even better compared to the previous way of examination. In addition, the ICT implementation improved significantly children with a ADHD syndrome compared to children without ADHD syndrome regarding their attention and their behavior. Finally, the forth hypothesis which is as follows wasn't proven to be true: « Students with ADHD neither improve their performance (reading, comprehension, grammar - spelling) in the language lesson nor their behaviour after the implementation of the software compared to the students without ADHD (control team) »

Concluding this dissertation I would like to express a huge thank you to my professor for her cooperation, advice and comments in order to successfully complete this dissertation. Finally a big thank you to my family for their support all these years of my studies.

Contents

INTRODUCTION

The purpose of this study is to investigate whether ICT and specifically a specific software helps students with ADHD to improve their performance in the language course and their behavior. Specifically, we will study how a specific software helps students with ADHD to improve their reading, comprehension, spelling and grammar, but also their behavior. The general purpose of the research concerns the use of ICT to improve the language and behavioral performance of students with ADHD. The special purpose concerns the use of the specific software for the improvement of the linguistic and behavioral performance of the students with ADHD. Finally, a comparison will be made between students with ADHD and formal development .

The reason they decided to conduct this research is due to the fact that in Greece in the last five years no similar research has been conducted. At the same time, the number of students diagnosed with ADHD is constantly increasing, so teachers must be aware of how they can help these students. The method followed is the experiment. The experiment is the basis of what is called the scientific method, as hypotheses are studied through carefully designed and tested experiments. An experiment is characterized by any practical test or application of theory to practice or study and in general any control (measurable) of theoretical knowledge. In the present research the theory was applied in practice in order to prove it. In particular, an experiment is the methodical reproduction of a phenomenon by man in order to ascertain its nature, the causes that cause it and the laws by which this phenomenon is governed. In general, the experiment is a method of scientific research, hence the so-called experimental method. The researcher conducting an experiment is called an experimenter, but also an experimenter. Experiment as well as observation are the two research methods of the so-called Empirical Sciences (Odom et al., 2005).

The experiment complements the observation and provides cognitive material with which the researcher-scientist at least has the opportunity to observe aspects of the phenomenon that may be impossible in nature. The experiment, apart from its obvious necessity, as a research tool, also shows the following important advantages, especially in scientific research (Brantlinger et al., 2005):

- The phenomena caused by experiments are subject to the desired time and not that of nature.

- The right of repetition is granted at will and whenever deemed necessary.
- They provide time to draw conclusions.
- They provide a possibility of separation of phenomena that is not provided in Nature
- It is often possible to change the speed of a phenomenon that occurs in nature.
- The possibility of more accurate measurements is provided and
- In addition, the possibility of graphing this phenomenon is provided.

Experiments are generally performed under controlled conditions, just like those of Laboratories. During these, various measurements are made, ie correspondences of natural quantities to specific numbers (numerical values) after comparing them with standard quantities of the same quantities, which have been accepted as units. However, in all the measurements, errors coexist, which constitute the relevant inaccuracies of the measurements. These errors come from three factors that can coexist, instrument error, observer error, and environmental conditions. In the behavioral sciences in particular, the experimental method occupies a particularly important place with generalized use. It is widely used by psychologists and psychoanalysts, sociologists, criminologists, etc. as well as in the fields of experimental pedagogy and psychosociology. In fact, it is considered as the only method, verification or not observation, firmly establishing the psychological science, as well as the general promotion of behavioral sciences, creating and forging units of related social branches (Brantlinger et al., 2005).

Experimental research can therefore be considered as a way of organizing data collection that would allow conclusions to be drawn about the reasonableness of a hypothesis. This hypothesis is checked by conducting an experiment.

The purpose of experimental research is therefore to find causal relationships between phenomena. The central idea behind experimental research is control. If X is given, then Y will occur. If X is not given, then Y will not occur. Experimental research attempts to determine a cause-and-effect relationship between two or more variables. In experimental research we influence some variables and then measure the effect of this manipulation.

In detail, the specific experiment conducted by the researcher is divided into three stages. In the first stage, the researcher distributed the exercise sheets (Appendix 1) to all the children, who were asked to complete them. The researcher corrected them and calculated the score. Then, in the second stage of the research, the researcher applied the software, which is presented in the section “Research Tools” only to the children of the experiment group. Finally, in the third stage, the same sheets were distributed to all the students again.

This experiment stage was applied to the students of the first grades of primary school (A and B) in May-August 2020 and to the rest of the students (C, D, E and F) in September - November 2020

The innovative element of the research concerns that the use of ICT in children with learning disabilities and specifically in children with ADHD should be further utilized. The construction of software that contains the content of their courses and presents it based on the needs of children, based on their difficulty offers many benefits in the learning of children with ADHD.

THEORETICAL PART

Attention Deficit Hyperactivity Disorder (ADHD) -definition, causes and language acquisition

Attention Deficit Hyperactivity Disorder (ADHD) is a chronic disorder affecting 3% to 5% of children in school age according to the American Psychiatric Association (1994). Diagnostic criteria and measurements that determine the disorder vary and so it is difficult to generalize the data. Other factors influencing the generalization of results include diffusion criteria, informants (trainers, parents and child), use of rating scales versus clinical interviews and subsequent findings (Faraone et al., 2003).

Children with attention deficit disorder persistently and unrelated to age develop developmental symptoms of hyperactivity and disintegration that place them in what are called "at risk" groups of pupils in relation to the

chances of developing problems of adaptation, excessive anxiety, academic failure (Hoseinifar et al., 2011).

ADHD may also cause a low self-esteem that usually follows them until adolescence, while in adulthood it has been observed that the incidence of symptoms decreases. According to Hoseinifar et al. (2011), ADHD is divided into three subgroups:

- ✓ Low concentration.
- ✓ Hyperactivity - Progression.
- ✓ Combination of the two above.

Pupils with ADHD usually suffer from social skills and are often asked to cope with social problems arising from their relationship with their classmates. They are often socially isolated, while adolescents are at increased risk of having problems with adaptation and depression (Hoseinifar et al., 2011).

According to the Diagnostic and Statistical Manual of Mental Disorders (DSMIV) of the American Psychiatric Association (1994) there are three patterns of behavior suggestive of ADHD. The diagnosis of children with ADHD is associated with the combination of attention, hyperactivity and impulse disintegration. Their behavior is characterized by frequent movement from their place in the classroom, deviation from the activities of the rest of the class, not following the instructor's instructions, speaking without being in turn or shouting, aggression, easy distraction, annoyance their classmates, easily forget, lose or forget their things (Shuenn & Cheung, 2008).

In order to diagnose a child with ADHD, these symptoms should be manifested in behavior before the age of seven and persist for more than six months at school and at home (American Psychiatric Association 1994).

Definition and epidemiology of ADHD

People suffering from attention deficit hyperactivity disorder (ADHD) exhibit disturbance of attention and hyperactivity or impulsivity to a greater extent than those in the same developmental period (Cucurus, 2001). This

disorder may occur in children and adults, but usually the first appearance occurs in infancy, continues to be more intense during school age, and in many cases, it continues to have the same intensity at the duration of puberty (Cucurus, 2001).

In 2011, 6.4 million children aged 4-17, about 11% were diagnosed with ADHD by the official health care providers. This demonstrates the large increase in the phenomenonby 33% between 1997 and 2008 (Visser et al., 2015). But there is also a 2-4% in adults. Adult men are twice as likely as women to be affected by it. However, in adults and adolescents, the symptoms are not as severe as in children (Volkow & Swanson, 2013).

Children with this disorder have great difficulty concentrating and controlling their impulses. It is also thought that there is the possibility of getting bored quite easily and quickly as well as making nervous movements and turning around constantly. This kind of behavior is very easy to dispel everything in whatever environment and if these children are. This makes it extremely difficult to engage in activities in the sense that they can break them down (Stern, 2001).

According to research findings, children with ADHD are also experiencing other problems and to a considerable extent. In fact, the phenomenon is so frequent that more than 50% of children with ADHD, ie about 2/3, attending elementary school have another disorder (Airaksinen et al., 2004).

The main syncytial disorders commonly present in ADHD are language and communication disorders, learning disorder, treatment disorder, provocative anxiety disorder, anxiety disorders and Tourette disorder (Tannock, 1998; Wu et al., 2006).

Syndrome disorders should be evaluated and treated with the same severity and attention that will be assessed and dealt with by ADHD (Cantwell, 1996). In more specialized surveys of school children such as those of Kadesjo and Gillberg (2001) that studied 7-year-olds in Sweden, it was found that 87% of ADHD suffered from at least one or more concurrent

disorders, while 67 % of the sample had at least two. Of these disorders, the most common disorders were reading disorder and disorder of written expression.

In the last twenty years, in the Scandinavian countries instead of the ADHD-term, the term "Deficits in Attention, Motor Control and Perception" (DAMP) is used. This term in essence suggests the existence of ADHD but also the existence of the developmental coordination disorder but without severe learning disability or cerebral palsy.

Children who suffer from DAMP are about half the children of the total incidence of ADHD. Also, children suffering from DAMP have a large percentage of problems and speech disorders (Gillberg, 2003).

The diagnosis of the disorder is complex and depends to a great extent on the symptoms, ie how long it is and how long it lasts, as well as what the problem is about the functioning of the patient. However, the person who has the disorder is subjected to physical examination, but information from other persons in his / her environment is also collected in order to take into account and to define precisely the causes that caused it. According to the "Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)", the criteria for diagnosing the disorder state that:

• For at least 6 months, there must be six of the symptoms in each class but their appearance is more severe than in other people.

• Some of the symptoms have occurred before the age of seven.

• Some symptoms occur both at home and at school.

• There is evidence that these symptoms do not allow the child to be functional in his daily routine (Dopfner et al.,2008).

There are diagnostic criteria for ADHD according to DSM-IV-TR (APA, 2000). It is required the presence of at least six of the following symptoms of carelessness or hyperactivity-impulsivity in the last 6 months to a degree malpractice and unexpected by the developmental level of the

child. These symptoms should be present before the age of 7 years. The symptoms are:

Symptoms of carelessness

Careleness

Frequently fails to focus attention on details or makes inaccurate mistakes in school work, workplace or other activities.

Often difficult to keep his attention to his duties or to the game.

Often he does not seem to hear when they talk to him.

Often he does not follow to the end, and fails to complete schoolwork, assignments or tasks in the workplace (without being due to anti-behavioral or incompetent behavior).

Frequently loses items necessary for work or activities (eg toys or toys), pencils, books, homework).

Frequently his attention is easily broken by external stimuli.

He often forgets everyday activities.

Symptoms of hyperactivity-impulsivity

Hyperactivity

Often moves his arms or legs or turns around in his place.

Often leaves his / her place in the classroom or in other circumstances where he / she is expected to remain seated.

Often runs here and there and climbs excessively in circumstances that are not suitable for such activities (adolescents and adults may be limited to subjective feelings of kinetic anxiety).

Often has difficulty playing or participating in leisure activities quietly.

Frequently it is constantly on the move and often either apply as if "driven by motor".

Often talks excessively impulsivity.

Often responds rashly before completion of the question often has difficulty awaiting turn.

Often interrupts or disturbs the presence of someone.

The language development of children with ADHD

In the child's early age there are major changes in the language field. From the end of the 2nd year the child combines more than one word, creating suggestions. These proposals are "telegraphic", that is, they contain words that state: the names of things (in essence), the actions of things (verbs), the fixed attributes of things (adjectives). These proposals systematically lack articles, ancillary verbs, links, pronouns, intentions and other linguistic elements (Paraskevopoulos, 1985).

Language in infancy is growing too fast. More specifically, the articulation, and in particular the pronunciation of speech, grow very quickly and are completed. At the age of two, the child pronounces 32% of the sounds, at the age of three it has the most progress, and at eight, the articulation has gained its mature shape. Something similar is also happening with the vocabulary. From the age of three to five, the child adds more than 50 words per month, or about 600 words a year (Paraskevopoulos, 1985).

Linguistic disturbances are a common phenomenon of children with childhood psychiatric problems. In a survey conducted in 1998 by Cohen et al. in 380 children aged between 7 and 14 years, 40% of the sample had language difficulties or disorders for which there was no suspicion or even no obvious symptom before their discovery. Most of the children experiencing language disorders were diagnosed with ADHD, and both their

parents and their teachers felt that they should be given special attention due to the problems they presented.

ADHD with language disorders seems to be very relevant. Indeed, it is argued that language disorders may indicate mental disorders that a child may have. Both pediatricians and speech therapists when they detect a language disorder begin to look at the child for some psychiatric disorder due to their high co-morbidity. Linguistic disturbances that imply psychiatric disorders do not exist in phonology, but usually in grammar, semantics, and theology (Toppelberg & Shapiro, 2000).

According to epidemiological investigations, 30 to 50% of children with ADHD have expressive and perceived difficulties in language. This proportion increases in preschool children, as it is estimated that about 60% of children of this age have language and speech disorders, and also have criteria to suffer from ADHD (Tannock, 2005).

Children diagnosed with HIV-R have speech and speech disorders in the proportion of 20 to 60%. Greater relation to ADHD is due to language disorders, while speech disorders appear to be less pronounced. Also, 20% of children with ADHD have learning difficulties in the language (Javorsky, 1996; Oram et al., 1999).

According to research done, children with ADHD have difficulties in language development, listening and understanding of speech, organizing and monitoring language productions or narratives, poor performance in language tests, speech limitations, communication difficulties and in social communication through language, difficulties in language learning and writing (Redmond, 2004; Bruce et al., 2006; Purvis & Tannock, 1997; Mathers, 2006).

In addition, less research has shown that children with ADHD suffer from stuttering symptoms, but it is not clear whether it is a coincidence or not (Healey & Reid, 2003; Breznitz, 2003).

Children who have ADHD and develop language difficulties are mainlyfactual. This means that the clinical findings that exist mainly with regard to ADHD detect deficits in the real language field. This means that children suffering from ADHD cannot use language in order to achieve communication in a functional and communicative manner. Apart from the use of language by the children themselves, however, the way they listen to others' speech is also important. A child with ADHD, if he does not focus his attention on speech, both on his own and on others, does not have the basic skills required to develop communication through linguistic acts between two people, as well as someone else (Camarata & Camp; Gibson, 1999).

This means that the approaches that will be developed to cure the problem of a child with ADHD should focus both on the child's speech and on listening to the speech of others in order to allow two-way communication. Otherwise, the child will face major problems, especially at school, as will be shown below.

The reason is a very important feature of the institutionalized teaching process and is used as a means of communication. The reason is what will contribute to the accomplishment of the two main actors of pedagogical teaching, namely teaching and interpersonal relations. So it can be easily understood what problems a child with ADHD who does not have these skills can face.

The school uses speech and language to convey during the teaching situations and events that pupils are temporarily and geographically unable to know otherwise. Of course, facts and situations are transmitted to pupils according to the way they perceive the person who uses the language. With this form of communication, simple information changes into knowledge (Matsangouras, 2002).

But beyond this process, language is used in the school community and for interpersonal communication and consequently the development of interpersonal relationships. The language serves as a means and instrument for those involved in interpersonal communication to define the social

context of this communication, to define the roles each person undertakes, as well as to interpret, communicate, describe and evaluate social activities, demarcate the concepts to be acceptable in communication and to identify any problems that exist (Matsangouras, 2002).

In this way, learning is no longer an event occurring in human life, but transforms itself into a social event and at the same time sets the foundations for the "upcoming development zone". In order for this zone to be activated and to be developed it is necessary to communicate verbally with the pupils who are more advanced than them as well as with their teacher. Of course the great importance of using speech also poses risks. If the reason is used only to convey to children verbal depictions that do not involve personal experiences and experiences, then it is very likely that both the facts and the relationships they contain are not understood by the children (Matsangouras, 2002) .

Verbal communication is considered to be the most important means for the educator to carry out his work, and 90% of his teaching time is covered through it. With the oral speech, the teacher can provide information to his pupils, guide them, control them and evaluate them, raise concerns, make descriptions, create interpersonal relationships and as a whole perform most of the roles they need to have. Something similar happens with the pupils (Matsagouras, 2002).

Through the research focusing on verbal communication, the following important issues emerged:

• The ratio of speech among teachers and pupils. This is a particularly important issue because in this it can be revealed whether the communication is two-way or one-way, ie whether it is only on the part of the teacher or whether the pupils are also involved. It goes without saying that more effective teaching is considered to be two-way, since it demonstrates a greater understanding of the pupils (Matsagouras, 2002).

• Another important issue is the relationship between the teacher's direct and indirect speech. The direct reason is the one that starts at the teacher's

initiative, while the indirect one is the one responding to the pupils' speech. However, it is considered that communication on the part of pupils is necessary because otherwise the relationship between pupils and teachers is composed of negative elements such as authoritarianism, oppression and passivity (Matsangouras, 2002).

The knowledge and role of teachers

Although children with ADHD require special education, they do not belong to the category of children with disabilities. For this reason, it is not considered necessary to receive specific training (Shuenn & Cheung, 2008) and should therefore be included in the normal class. The ideal "inclusive education" is an idea that children with disabilities are treated as equal participants in learning. In order for the inclusive class to be effective, cooperative efforts, organizational and specific skills of trainers, well-developed and adaptable course design are necessary. However, according to Knight (1999, in Shuenn & Cheung, 2008), there are unpredictable factors that can make the inclusive class look like an exclusion class and stigmatize children with ADHD.

Children with ADHD are not antisocial but simply non-social. They want to be included in a group, but they do not know how to get into a social circle (Shuenn & Cheung, 2008). According to Haring (1991), the acceptance of peers is crucial to the quality of the school life of people with disabilities.

Collaborative work improves the social status of children with special needs, especially when assigned roles within the group, and helps them to gain respect for their classmates. It is important for ADHD children to have the opportunity to participate and interact with their more social classmates and thus to learn socially acceptable behavior (Shuenn & Cheung, 2008). In addition, they are a way to get a responsible attitude towards the team they work with.

Over the last thirty years, ADHD has employed scientists from various fields of knowledge and has produced a wealth of research into the

investigation of causes, description of symptoms, evaluation of intervention methods and attitudes, views and knowledge of teachers (Cormier, 2008; Sciutto & Eisenberg, 2007; Cantwell, 1996; Merrell & Tymms, 2001).

The first researches that attempted to capture teachers' knowledge of ADHD are identified in the 1990s. The aim of these investigations is not only to investigate the degree of informing teachers on issues related to symptomatology, etiology, and especially the ways of educating pupils with ADHD (Jerome et al., 1994; 1999; Kos et al., 2004; Beckle, 2004;Sciutto et al., 2000; West et al., 2005) but also the influence of teachers' (Bussing et al., 2002; Vereb & DiPerna, 2004; Snider et al., 2003) and the role of teachers' (Pfiffner & Barkley, 1998; Ohan et al., 2008; Stormont & Stebbins, 2005;).

Kos et al. (2006) highlighted three key points in a critical review of the past decade: First, the average rate of correct answers to questionnaires assessing the degree of information on ADHD issues in various surveys (West et al., 2005; Sciutto et al., 2000; Jerome et al., 1999; Kos et al., 2004;Beckle, 2004) differ significantly from 47.8% to 83%.

The categories in which teachers are best qualified are symptomatology and diagnosis (Ohan et al., 2008; Jerome et al., 1994), while for the accusations of how to treat ADHD and the etiology (genetic, (Beckle, 2004; Jerome et al., 1994; 1999; Sciutto et al., 2000). Secondly, in some research, teaching experience and prior contact with a child with ADHD seems to be positively related to the level of knowledge about ADHD (Beckle, 2004; Jerome et al., 1994; Kos et al., 2004; Sciutto et al. 2000). Thirdly, surveys show that teachers educating on ADHD-related subjects who have taught pupils with ADHD have more knowledge than pupils in pedagogical departments with no practical experience (Jerome et al. 1999; Beckle, 2004). Regarding the teachers' mistakes on issues related to the ADHD motivation, very often misunderstandings about the role of nutrition in the ADHD manifestation are identified.

In particular, several teachers mistakenly believe that sugar and food additives may cause the disorder (Beckle, 2004; Sciutto et al., 2000;Jerome et al., 1994). Another misleading information from teachers about the description and definition of the disorder relates to the duration of symptoms in the course of human life. Very often, research shows that teachers maintain the misconception that ADHD is overcome by adulthood and does not follow the pupil in adulthood (Sciutto et al., 2000; Jerome et al., 1994).

Many studies aiming at highlighting the role of teaching experience in supporting pupils with ADHD, compare the knowledge of teachers and pupils. The results agree with each other that teachers generally have more objective knowledge about ADHD, even those who have not been trained, compared to pupils who usually declare that they have learned about ADHD during their studies. In addition, according to the findings of these surveys, teachers who have taught children with ADHD have a better score in the knowledge scales for ADHD than those of pupils whose knowledge about ADHD is mainly theoretical (Beckle, 2004; Sciutto et al., 2000; Kos et al., 2004).

As already mentioned, the ADHD is distinguished in three types: Depression and Lack of Concentration, Bipolar and Hyperactivity, and the Combined Press. The first type, may show some or all of the following symptoms: it is easily detached from irrelevant stimuli, does not listen, does not make sense, often makes mistakes of carelessness, avoids doing tasks that require continuous he forgets to read about the school and do his work, he has difficulty in following instructions and losing his stuff. In relation to the second type of impulsivity, the child usually presents such as: inability to sit in his position for a long time, he turns around in his chair and dangles constantly, disturbs himself around, gets up without being allowed and throws himself constantly, runs a lot and climbs too much, does not think before reacting and he does not hear anyone while he has a great difficulty in following the rules (Rappley, 2003). Finally, the combined type is a combination of some of the above symptoms. However, it is worthy of

clarification that there are always variations of children with ADHD, which is why every case should be approached with great care.

The first symptoms that betray ADHD occur already since the child's early childhood (Rappley, 2003). A primary school teacher is one of the first to identify ADHD symptoms and refer the child for further diagnosis and then for treatment (Vereb & DiPerna, 2004). For this reason, experts emphasize the importance of generating sufficient resources and educating teachers to have the ability and ability to treat ADHD pupils in an appropriate way to maintain harmony in the classroom between pupils (Barkley, 2006).

The role of the teacher in dealing with incidents caused by pupils with ADHD is of paramount importance. Social adaptation and poor performance at school are often associated with ADHD symptoms in Primary children (Kawabata et al., 2012; Frick et al., 1991). When teachers were asked to evaluate the academic performance of their pupils, they stated that it is related to social dysfunction, including difficulties in establishing relationships with pupils (Kawabata et al., 2012). Thus, if the appropriate measures are taken, fewer pupils will become adults who face social problems and other psychological problems such as depression (Craig, 1998), school dropout and drug use (e.g. Parker & Asher, 1987).

Before analyzing the ways in which the teacher can cope with ADHD pupils and ensure that they are assimilated into the room and become socially acceptable, it is important to mention the weaknesses and problems faced by children diagnosed with this disorder. Weak relations between peers are a common phenomenon between children with ADHD and those without (Mikami, 2013). Children without ADHD often become hostile and negative, even excluding and sacrificing what children dislike (Penny, Kisel & Perry, 1988). This exclusion may be due to the stigma and to the labels that children carry, the peer group may be premeditated and the inclusion of children with ADHD discouraged, and this may contribute to the lack of kissing and hence the rejection by these individuals (Mikami, 2013).

It is therefore obvious that children with ADHD face enormous difficulties in their social relationships (Hinshaw, 2002; Landau & Moore, 1991), many of which are research that proves that people with ADHD tend to experience more exclusion from their social environment, than those who do not suffer from a disorder (Hinshaw & Melnick, 1995). In addition, according to Heyer, ADHD pupils have difficulty talking about themselves, while constantly changing subjects, making it harder to communicate with their classmates and facilitating on the other hand their exclusion. Another difficulty for pupils with ADHD is their poor performance in school subjects, while research results (DuPaul et al., 2004) show(McConaughy et al., 2011). In addition, they have a significant impact on the social and academic level. (McConaughy et al., 2011), and in the United States.

Teachers should take measures to help children with ADHD to be admitted by their peers. Initially, with their behavior, teachers themselves should have a positive attitude towards ADHD pupils because whether they are hot or negative give the rest of the pupils evidence of behavior that is acceptable and appropriate on their part (Chang, 2003). According to surveys when teachers accept pupils with ADHD in practice, weakening of fragmentary behavior and social rejection has been observed (Mikami, Griggs, Reuland & Gregory, 2012).

Below we will talk about some measures that the teacher could take to eliminate the main symptoms of ADHD and then prevent social rejection and create opportunities for creating friendly ties between children with ADHD and without ADHD.

First, the teacher must take care of the anger that is often born in the explosive personalities of children with ADHD. Deficient relationships with peers lead to aggressive behavior because, as expected, children with ADHD, as they cannot create good relationships with their surroundings, are annoyed and annoyed (Marcus & Mattico, 2003). Thus inappropriate behavior creates a vicious circle, which leads to rejection and reduced chances of acceptance by peers (Landau, Milich, Diener, 1998; New Comb, Bukowski & Patte, 1993).

Furthermore, it is very important to ensure that children with ADHD will have the opportunity to get exhausted during intercourse and physical education lessons (Onnord, 2000). According to many researchers, children who are not adequately spared and do not play as they should have an increased chance of developing ADHD symptoms (Sepp, 1998), while symptoms are more pronounced in ADHD children on non-intermittent days (Ridgway , 2003), than the days they are doing a normal break, seemingly less upset and more concentrated (Jared et al., 1998).

In addition, the contribution of the inclusion of communication and information technologies to the social performance of pupils with ADHD seems great (Solomonidou et al., 2004). They seem to be more concentrated and better performing than pupils who, instead of teaching material traditionally, use multimedia. Their performance is increased when watching videos or listening to narratives, but they have difficulty reading large texts. Interestingly, although pupils with the disorder perform better on their own rather than in collaboration with other pupils, only their improved academic performance has a positive impact on both their self-confidence and their chances of accepting them from their social, school environment .

Another way for teachers to smooth out relationships between ADHD and non-ADHD pupils is to follow Game Therapy (Ray, Schottelcorb, & Tsai, 2007). Therapeutic play sessions, in specially equipped halls, with specific games, covering a wide range of expressions, will identify behaviors, reflect content, build relationships, and build confidence. This will result in fewer problems of emotional instability and stress.

Finally, research has shown that the better the sporting performance of a child with ADHD, the more likely he is to become liked by his peer group (Williams et al., 2005). A child with ADHD that performs well in sports, with less negative and more positive behavior, is more likely to be accepted by his classmates and want to gain closer friendship with him. On the contrary, children with ADHD who have poor sports performance have a reduced chance of creating close links in school. So if the teacher finds

children with ADHDs who are capable of doing some sports, they could include it during a physical education break or lesson.

All of the above are measures that a primary education teacher can take and develop to help his pupils with ADHD diagnosed are not less socially preferable than other children, have fewer friends, not discarded. It will also help them become more functional in their relationships with their peers (Hoza et al., 2005).

The measures to be taken by the teacher will aim at a positive climate among peers and the social relief of pupils with ADHD. It is important to note that besides the willingness of a teacher to make changes to regulate and maintain order in his room, he must be confident and self-confident because these are elements that seem to affect positively the choices we make, how much we insist on overcoming obstacles and how much we strive for progress (Bandura, 1995). On the other hand, teachers with low self-confidence have a negative impact on the performance of their pupils (Gibson & Dembo, 1981). Furthermore, behaviors that are associated with ADHD appear to cause significantly more stress to the teachers than those who do not have children with this disorder in their class (Green et al., 2002). Stress can negatively affect the relationships between pupils who suffer with others (Ray, Schottelkorb & Tsai, 2007).

Let us not forget, of course, that educational intervention alone is not enough and must be combined with medication (Abramowitz & O'Leary, 1991; DuPaul & Eckert, 1997). The combination of medication strategies, educational support with changes in both the classroom and the home of each child diagnosed with Disturbance of Attention Deficit and Hyperactivity Disorder, has increased gravity in more serious cases (Ohan et al., 2008).

According to Demaray & Eliot (2011), supportive behavior is very important. Social support is associated with positive psychological and physical outcomes (Cohen & Willis, 1985), and it is important, as many researchers emphasize, to intervene in the social wake-up of children with

ADHD, as their incompetence patterns (Hoza et al., 2005). However, in the first instance, It is also worth noting that a teacher who fails to identify the problem or chooses to ignore it and not even mention it to the pupil's guardians, let alone support measures, discourages them from seeking help for their child, making them believe that there is no problem, or even, even if this is not serious. This has many consequences, one of which is the difficulty of parents or guardians to accept that the child suffers from a serious disorder that is not overcome with time and will cause problems in his later social life (Ohan et al, 2008).

In conclusion, ADHD is a very serious disorder, which requires a team to work effectively and to make primary school teachers more able to use the help of others (The MTA Cooperative Group).

The subject of the above was to analyze the role of the teacher in coping with the difficulties experienced by a class attended by a disciple devoted to ADHD. The difficulties that exist exist because of the inability of the pupils to function normally in their behavior and performance in the lessons. The rest of the pupils in the room, unaware that their children are not blamed for their weakness, are irritated by their allegiance, thus avoiding them, rejecting them and, in extreme cases, victimizing them. This creates a vicious cycle of perpetuation of annoyance and anxiety.

For this reason, the role of the teacher is very important. The teacher through activities must highlight the positive aspects of the character of children with ADHD and at the same time help to present their symptoms less strongly so that no irritation is caused and the course is conducted normally.

Some of the measures presented and analyzed above are the fight against anger, which will have the effect of reducing negative emotions from all sides. In addition, the emphasis on the importance of the child's disintegration in the disruption and physical education course, which will reduce the anxiety and symptoms of hyperactivity. The inclusion of information and communication technologies, which stimulates self-

confidence and therefore the sociability of children suffering from the disorder. Another measure is the game, which is appropriate all the way, it works therapeutically and helps the pupil to be quieter and relieves him of stress. Finally, it is proven that children with ADHD, who have a good performance in sports, are easier to accept than their peers. All the above measures are taken by the teacher in order to relieve both ADHD and non-ADHD pupils in order to bring out their personalities and bring them closer. In this way, pupils are better acquainted with each other and make friendships easier, and the positive climate in the room is a natural result. All this can happen only after proper teacher training and through the collaboration of experts, in such disruptions with the educational and family environment of pupils with ADHD.

New educational technologies and pupils with ADHD

Technology has been established as an integral part of special education. According to Roblyer & Edwards (2000), technology works as a means of balancing between pupils with and without special needs. The achievements of pupils with learning difficulties such as ADHD in computer classes include higher performance, self-esteem and interaction with peers (Shuenn & Cheung, 2008).

It has been observed that pupils at risk who do not usually have class acceptance, interact better with their classmates in group work (Shuenn & Cheung, 2008), while others argue that computer use improves the collaboration of pupils and promotes their correct communication and interaction (Shuenn & Cheung, 2008).

It should be stressed that the greatest advantages of computer teaching are direct feedback, individual mobilization, interaction, hyper-media (texts, images, sounds, etc.) and the possibility of personalized learning and teaching. The use of the computer can improve a child's neurochemistry,

which is essential for brain development, and this in turn improves behavioral chemistry (Shuenn & Cheung, 2008).

Of course, just like any other case, the right choice of software is vital and for children with ADHD the most suitable software is considered adventure games. PC collaborative work also offers a way of "overseeing" that is necessary for children with ADHD that, as mentioned above, have limited ability to concentrate. With this oversight, it is possible for children with ADHD to develop better co-operation and acceptance relationships from their peers. It was also noticed that during the collaborative work of a small group of pupils with the help of the trainer, social dialogue and participation of children with ADHD improved (Shuenn & Cheung, 2008).

The right choice of work to make them meaningful and fun and interesting is another important contributing factor to the observation of positive results. Surveys by Shuenn & Cheung (2008) have shown that computer-based teamwork, even without any other intervention, such as medication, works effectively in children with ADHD, both in demonstrating acceptable social behavior and in interacting with their classmates. Also, the role of the computer as a facilitator, which includes skills, object understanding, and content relevance, is a key factor in ensuring productive and imagined interactions and collaboration between children participating in computer-based workgroups.

The same research reports the improvement of the societality of children with ADHD after the end of collaborative computer work. The basic prerequisite is the careful selection of the people who constitute the working group within an inclusive classroom and the facilitation by an instructor who can transform simple team work with a computer into a didactic intervention for the pupil with ADHD. The trainer should be aware of the communicative difficulties and difficulties of socializing pupils with ADHD and be able to modify the way of support.

Another type of computing application that can be used to teach pupils with ADHD is "Virtual Reality - VR" and in particular the use of

virtual reality games. Virtual reality can be used in various fields to teach children with special learning needs. Riva et al. (2004) report that knowledge acquired in virtual reality can also be transferred to the real environment. Pupils who were taught cognitive fields that focused on focusing on virtual reality had a better score than those who used traditional teaching methods.

Virtual reality games can playfully teach children with ADHD and offer direct interaction. Their purpose is to improve work memory, which appears to be a basic cognitive impairment of ADHD children. By improving working memory, it is possible to reduce some of the symptoms associated with their behavioral problems. Additionally, memorandum strategies could be used to encode the information, not to memorize it directly. Virtual reality games targeting children with ADHD use a linear narrative to ensure that all pupils experience the same decision-making positions. It should be emphasized that if the virtual reality game is used for psychological evaluation it must definitely be appreciated by the special psychologists (Gongsook, 2012).

CONCLUSIONS OF THE LITERATURE REVIEW PART

A child suffering from ADHD has to face a number of problems and usually over this syndrome, it has to deal with other disorders that coexist with it. ADHD is a syndrome that presents problems in several areas, including linguistic. The main problem in the linguistic behavior of children suffering from the syndrome is in factual skills, that is, the way in which language skills are used for communication. This means that a child suffering from ADHD cannot use language and speech in such a way that he / she can communicate with other people. This extends to the way he hears the speech of others, ie he does not understand what they want to tell him so that he can respond appropriately and develop a communicative relationship. The problem in the facial area of the language is also confirmed by the symptoms of the syndrome. Especially in the field of communication, one of the symptoms is the child's incessant speech. This means that he does not focus his attention to listen to what others say and monologues in essence, without also being interested and listening. The inability to focus the child's attention on the speech of others to understand what they say and

respond appropriately is also confirmed by another symptom, the one in which the child is hurrying to answer before even finishing a question. It is clear from this symptom that a child with ADHD responds before they even know what they are asking for, and speech and hearing are therefore not communication tools due to the lack of focus. There are a variety of approaches to solving this problem. The child's attention can be recovered with proper training. Thus, through appropriate techniques and procedures that will be imposed on the classroom, the teacher can help the child with ADHD use his / her communication language with him / herself as well as with the other pupils. It should be noted, however, that the citation of such a technique does not have the same effect in all cases due to the complexity of the disorder and co-morbidity that exists. This makes every case of a child with ADHD unique and requires individualized intervention in any case that may consist of more than one approach such as pharmacological, psychotherapeutic and educational. This makes it especially important to correctly diagnose a child based on his symptoms and behavior by conducting special examinations to precisely delineate his problem and to select the appropriate approach or a combination of them. The complexity of the disorder by case also illustrates the different therapeutic approaches that exist.

The review of the literature shows that it is a fact that the existence of children with ADHD problems at school concerns teachers, both due to the significant incidence of the disorder in students attending regular school and due to the severity of their problems, such as referred to the relevant section of the theoretical part. It also seems that the computer as a means of teaching and learning of children with learning disabilities is a very important tool in the hands of teachers and children, due to the diversity of its capabilities and functions.

However, the review of the literature shows the need to investigate the issue of using the computer as a teaching tool for children with ADHD problems. Although some studies have examined some aspects of the effect of the computer on the behavior of children with ADHD, there are still many questions that need to be investigated. More specifically, there is no research data on the appropriate educational software environments, which should be used by children with ADHD problems so that their attention is distracted as little as possible and thus achieve better learning outcomes. In general, in the few surveys that have been conducted, there are several gaps in the investigation of important factors related to the general context of the introduction of ICT in the education of students with ADHD.

All this, combined with the fact that ADHD is the most common disorder in school-age children constitute the general context in which this study is included.

METHODOLOGY OF RESEARCH

The Hypotheses are:

1.ICT helps students with ADHD in the language lesson to perform better.

2.ICT helps students with ADHD to improve their behavior.

3.Students with ADHD improve their performance (reading, comprehension, grammar - spelling) in the language lesson and their behaviour after the implementation of the software compared to the students without ADHD (control team).

4.Students with ADHD neither improve their performance (reading, comprehension, grammar - spelling) in the language lesson nor their behaviour after the implementation of the software compared to the students without ADHD (control team).

Independent variable in the present study is the software that was created and the dependent variable is the performance and behaviour of the students in the language lesson.

In order to examine these scientific hypotheses, empirical research aims to fulfill the following specific works:

1. Software was developed as a means of intervention on students' behaviour with ADHD and in the performance in spelling, grammar and comprehension of all grades.

2. The capabilities of the students in spelling, reading and comprehension skills with and without ADHD were studied.

3. A comparison was made in the performance of students with ADHD and formal development students.

4. The impact of progress on spelling, grammar and comprehension skills of students with ADHD compared to those without ADHD (intervention program wasn’t implemented in this group) after completing the exercises in the language lesson was studied.

Sample

The sample of the research consists of 100 students who attend primary schools in the prefectures of Northern Greece: Thessaloniki, Rodopi, Xanthi, Kavala and Serres. The sample of 100 students came from private educational institutions - studios, speech therapy centers, occupational therapy, KDAP, which agreed to cooperate and bring me in contact with the parents of the students with ADHD. More precisely from the speech therapy center of Kavala participated 8 students with ADHD, 10 students from the creative employment center for children of Xanthi, 15 students from the center of occupational therapy of Thessaloniki, 7 students from the creative employment center for children of Komotini and 10 students from the speech center of Serres .

The students were divided into two groups: the experimental group consisted of 50 students with ADHD and the control group of 50 students without ADHD.

Students were selected by the method of simple random sampling. Simple random sampling is a statistical method of sampling. This is the most common of the equal probability selection methods. Its purpose is to project the level of error observed in the sample to the entire population. The statistical unit of the sample is the transaction (or payment request). The units of the sample are selected randomly with equal probabilities. Simple random sampling is a general method that suits different population types, although, because it is not based on ancillary information, it usually requires larger sample sizes. Simple random sampling results in a representative sample and therefore its results are generalizable to the whole population (Meng, 2013).

Research Tools

Scratch Online – Google Site

For many decades, Computer Science and Programming has been one of the main courses that Greek students attend at school. Since 2014, all primary schools in Greece include Computer Science and Programming course in their weekly schedule. Since then, hundreds of teachers have been specialized in teaching Computer and Programming courses, as well as Robotics. Every year the Ministry of Education organizes an open contest for Robotics and Programming, in which thousands of students from schools all over the country send their projects. As a result, the school environment in Greece is familiar with Computer Programming issues.

One of the most popular software used both for programming and robotics in primary and high schools is Scratch. It is a block-based programming tool, programmer and user-friendly, very easy to learn. The exercises were developed in the online environment. A user profile was created (username: manarioti – password:manariotimail#1) and there were 4 projects developed:

Spelling Game

spelling game

Multiple choice game for grades 1-2

multiple choice

Multiple choice game for grades 3-4

multiple choice g-d

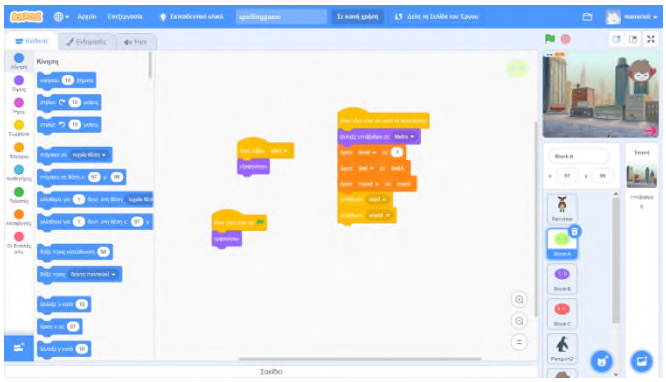
Multiple choice game for grades 5-6

multiple choice e-st

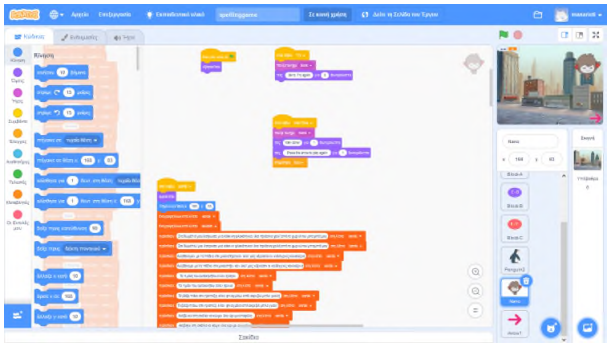
In the following screenshots, the code used inside the games is presented:

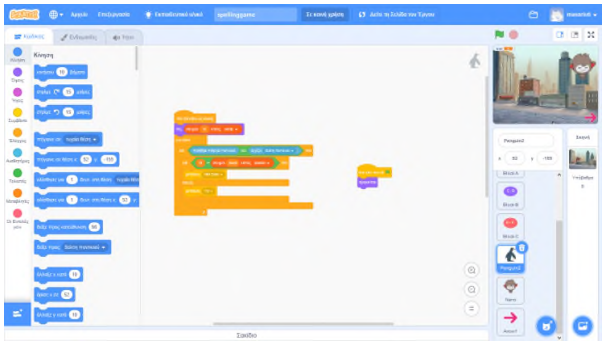
Spelling game

When a level is selected, a semaphore is sent in order for the whole project to be set to the specific level. The settings for grades 1-2 are different to the settings for grades 3-4 and to the settings for grades 5-6.



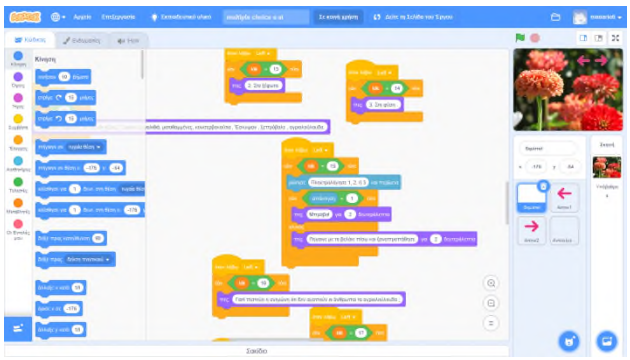
Depending on the level, there is a matrix of questions and answers. For each question there is a set of possible answers. There is also a matrix of correct answers corresponding to the questions. The program shows the questions using a loop and if the correct answer is selected, a proper message is displayed to the participant.





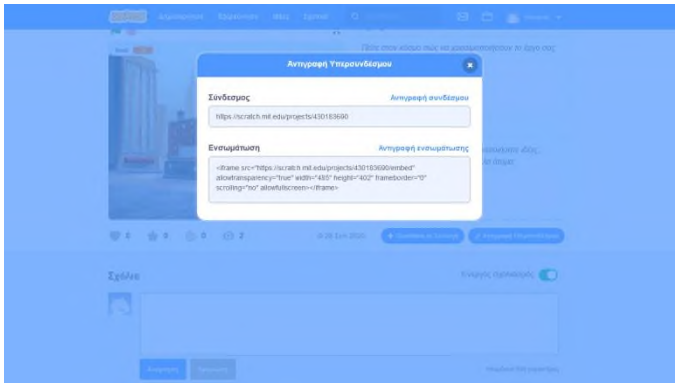
Multiple choice game

In multiple choice game a different mechanism is used. The texts are displayed sequentially one after the other by pressing the arrows. Each click leads to next text. At the end of the text there is a question displayed followed by the options for the participant. Then the player is prompted to type one of the options (1,2,3) and if his answer is correct, a proper message is displayed (“Congratulations”) otherwise he is prompted to try again (“Go back and try again”).

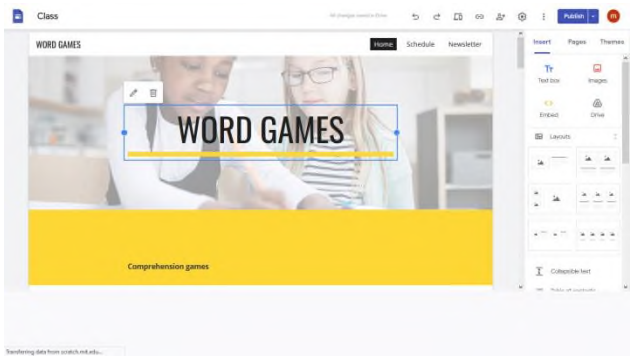


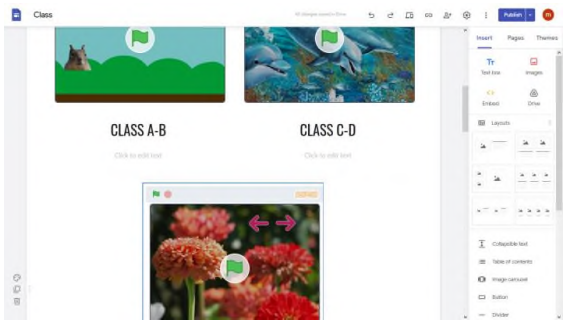
Website

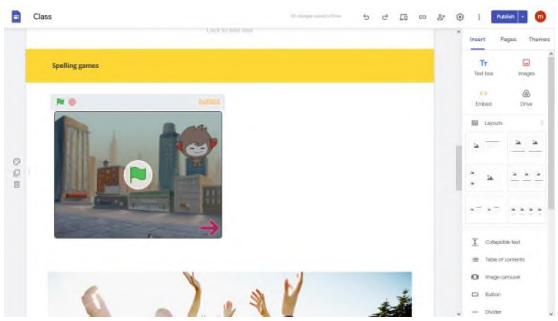
Scratch enables program writers to embed their program in any html file by copying the iframe code link and incorporating it in a web page.



In that way, a Google site (Word Games) was created using the account manariotimail@gmail.com and the password**,** in order to embed the links for the games. In that way, all the activities are accessible by any place online using a standard web browser.







RESULTS

Descriptive statistics

According to the results in both measurements the frequency and percentage of gender, region, class and ADHD children are the same which means that they were not missing values in this study. Also the frequency and percentage of gender, region and class is the same between children with and without ADHD syndrome. This means that a potential difference between the two measurements, first and second is more likely to have as a cause the implementation of ICT.

Inferential statistics

Spelling

Children with ADHD significantly improved their spelling in the second measurement compared with the first while children without ADHD syndrome remained stable. A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the percentage of right spelling in exercise 3. There was a significant main effect of time and interaction of time with ADHD. In figures 5 it can be seen that the line that corresponds to the children with ADHD is below but very close to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

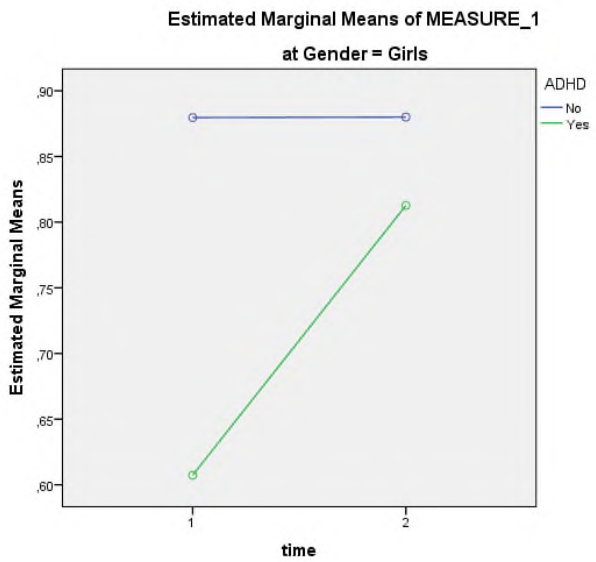


Figure 1. Percentage of right answers of exercise 3 (spelling) in relation to time of measurement and existence of ADHD syndrome (Girls)

A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the percentage of right spelling in exercise 5. There was a significant main effect of time and interaction of time with ADHD. In figure 9 it can be seen that the line that corresponds to the children with ADHD is below but very close to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

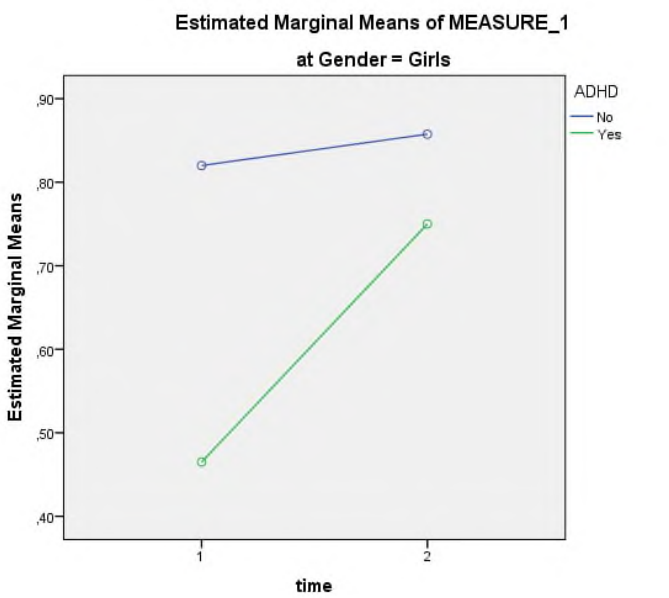


Figure 2. Percentage of right answers of exercise 5 (spelling) in relation to time of measurement and existence of ADHD syndrome (Girls)

Understanding

A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender (IVs) on the percentage of right understanding. In figure 11 it can be seen that the line that corresponds to the children with ADHD is above to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

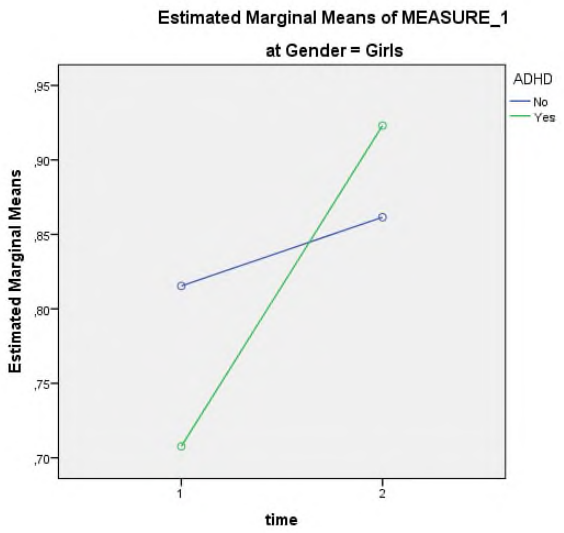


Figure 3. Percentage of right answers of exercise 1 (understanding) in relation to time of measurement and existence of ADHD syndrome (Girls)

Reading

Children with and without ADHD significantly reduced the percentage of their mistakes in reading and the time of reading in the second measurement compared with the first measurement. Also, children with ADHD significantly increased the percentage of their right answers in reading in the second measurement compared with the first measurement. A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the percentage of wrong answers in reading . There was a significant main effect of time and interaction of time with ADHD. This outcome depicts the beneficial effect of the software used in the reduction of mistakes in reading of children with ADHD since their performance not only has improved in the second measurement but it is identical to the level of reading mistakes of children without ADHD in the second measurement. In figure 13 it can be seen that the line that corresponds to the children with ADHD converge to the same point or is above but very close to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

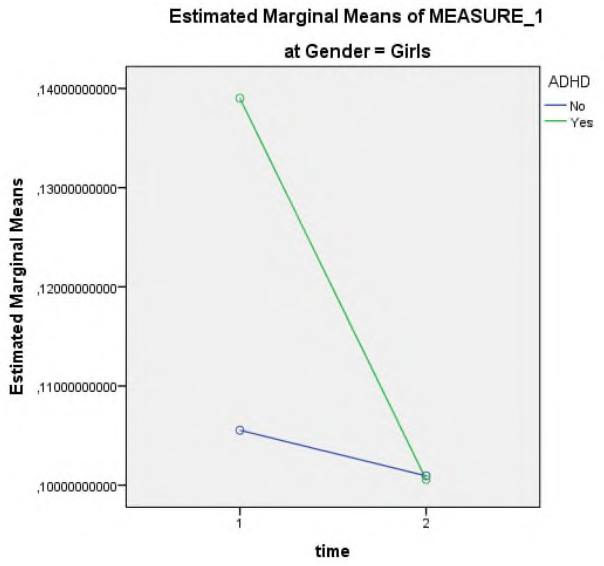


Figure 4. Percentage of wrong answers of reading in relation to time of measurement and existence of ADHD syndrome (Girls)

Evaluation of students' attention

Children with and without ADHD significantly improved their attention in the second measurement compared with the first measurement. A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the level of agreement of the first aspect of the evaluation of students' attention. There was a significant main effect of time and interaction of time with ADHD. In figure 20 it can be seen that the line that corresponds to the children with ADHD is above but very close to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

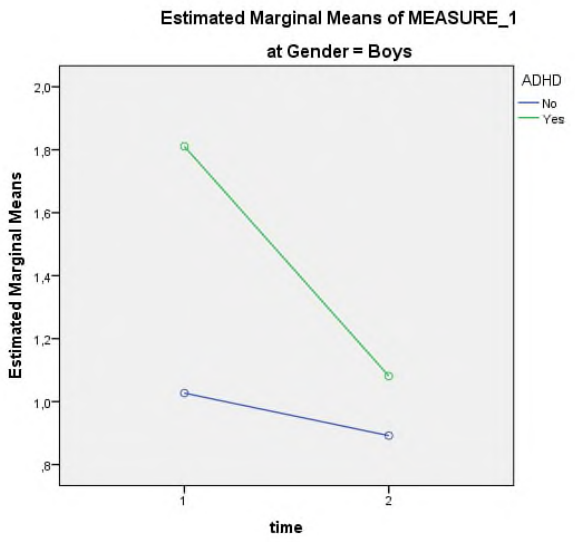


Figure 5. Evaluation of students' attention (first aspect) in relation to time of measurement and existence of ADHD syndrome (Boys)

A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the level of agreement of the fifth aspect of the evaluation of students' attention. There was a significant main effect of time and interaction of time with ADHD. In figure 27 it can be seen that the line that corresponds to the children with ADHD is above and very close to the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

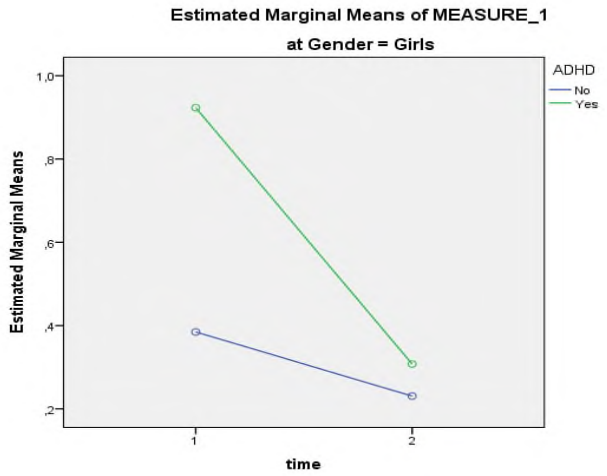


Figure 6. Evaluation of students' attention (fifth aspect) in relation to time of measurement and existence of ADHD syndrome (Girls)

Students' assessment of behavior (Hyperactivity – Impulsivity)

Children with and without ADHD significantly improved their behavior in almost every aspects in the second measurement compared with the first measurement. A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the level of agreement of the fifth aspect of the behavior. There was a significant main effect of time and interaction of time with ADHD. A three way repeated measures ANOVA was conducted to compare the effect of time, ADHD and gender on the level of agreement of the fifth aspect of the behavior. There was a significant main effect of time and interaction of time with ADHD. Children without ADHD presented similar improvement. This outcome depicts the beneficial effect of the software used in the improvement of children with ADHD regarding their behavior of talking a lot since their performance not only has improved in the second measurement but it is close to the level of the second measurement of children without ADHD regarding their behavior talking a lot. In figures 37 and 38 it can be seen that the line that corresponds to the children with ADHD is above or converges to the same point with the line that corresponds to the children without ADHD after the implementation of the software program (second time) compared to the first time.

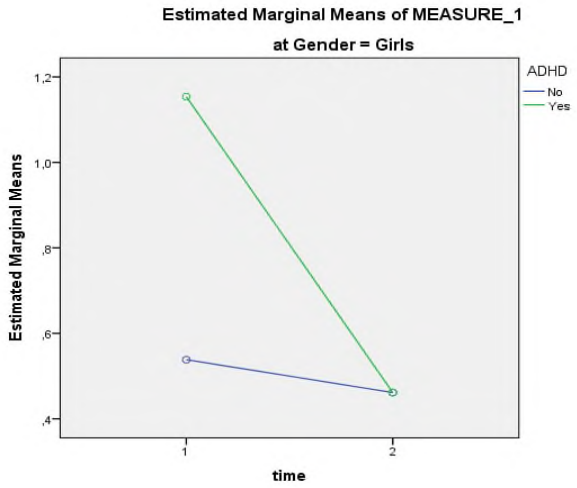


Figure 7. Students' assessment of behavior (fifth aspect) in relation to time of measurement and existence of ADHD syndrome (Girls)

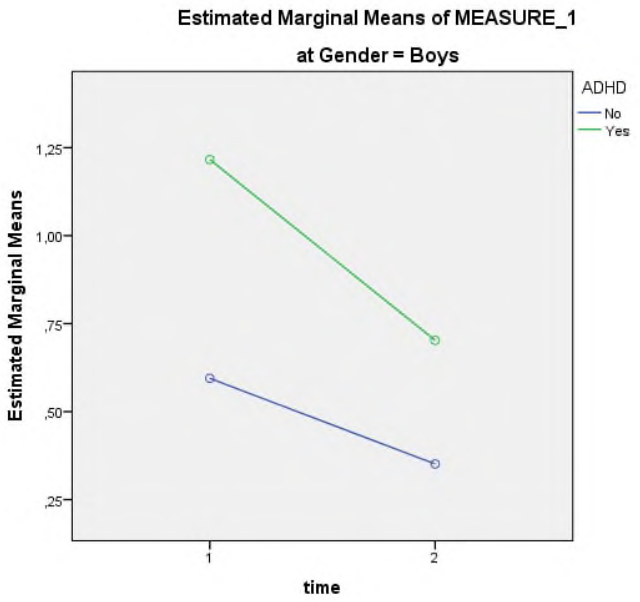


Figure 8. Students' assessment of behavior (fifth aspect) in relation to time of measurement and existence of ADHD syndrome (Boys)

CONCLUSION

The statistical analysis resulted that in the second measurement compared to the first due to the implementation of the ICT method children with ADHD syndrome presented improved spelling compared to children without ADHD. The same was true in the case of understanding and reading. These results confirm the first research hypothesis "ICT helps students with ADHD in the language lesson to perform better". Furthermore, the results confirmed the second hypothesis that the students with ADHD improve their behaviour after the implementation of the software. Regarding the third hypothesis, it is proven that the use of the ICT clearly enhances the performance of students with ADHD while students without ADHD perform the same or even better compared to the previous way of examination.

In addition, the ICT implementation improved significantly children with a ADHD syndrome compared to children without ADHD syndrome regarding their attention and their behavior. Finally, the forth hypothesis which is as follows wasn't proven to be true: « Students with ADHD neither improve their performance (reading, comprehension, grammar - spelling) in the language lesson nor their behaviour after the implementation of the software compared to the students without ADHD (control team) »

The above research highlighted the significant benefits of using ICT in special education and specifically in students with ADHD. The use of technological means, support devices and the computer manned with the appropriate software, such as the one built in this dissertation, contributes decisively to the learning process, primarily enabling people with disabilities to acclimatize to the educational context and to function more easily despite their disadvantage in relation to the rest of the student population. The computer is the most established device in the educational field as it seems to contribute to the educational process by offering new experiences and the possibility of achieving an interesting and entertaining lesson. Numerous studies (Wilkinson-Tilbrook, 1995; Odlin & Hutchins, 1996; Mac Arthur, 1996; Tailor & Tailor, 2001; Lewis & Neil, 2001; Besio, 2005) confirm the assumption that the PC and its peripherals, the new technologies as a whole, contribute positively to the educational practice. Students with special educational needs, due to learning difficulties, can benefit from the application of New Technologies in the educational process as it provides them with physical, cognitive and supportive access to educational action (Tsikolatas, 2011). For children with ADHD, the use of computers in the educational process is an effective alternative educational strategy, on the one hand because children with ADHD show a skill in handling computers, on the other hand because symbols and images stimulate their interest. However, the use of electronic games is not indicated as they have been observed to increase their arousal. The computer is very useful in classrooms where children with ADHD study (Bender & Bender, 1996) as the computer has multiple functions. It serves as a cognitive object, source of information, supervisory and communication tool, but also as a cognitive tool (Tailor & Tailor, 2001). The teacher can use the computer to present the teaching material in a more enjoyable way for the children with the help of graphics, image and sound that gain their attention, to involve the students in simulation activities (Mikropoulos, 2000) that contribute to the construction of knowledge (Solomonidou, 2001). Research has also shown that computer work helps to increase the attention of children with ADHD symptoms and to improve impulse control and reduce hyperactivity (Carey & Sale, 1997; Slate, Meyer, Burns & Montgomery, 1998).

The future of ICT in Special Education

The review event of the World Summit on the Information Society (WSIS) in February 2013 focused on the "educational revolution" as a result of access to learning opportunities through new technologies. The European Commission has argued that "the potential benefits of the digital education revolution are manifold: individuals can easily seek and acquire knowledge from sources other than their teachers and institutions, often for free; new groups of students are accessible because learning is no longer limited to specific class schedules or methods and can be personalized in new training providers and teachers can easily share and create content with colleagues and students from different countries · and a much wider range of educational resources can be accessed. Open technologies allow all people to learn, anywhere, anytime, through any device, with the support of anyone ”(European Commission, 2013a: 3).

The above claims are not unfounded, as new technologies present challenges but also opportunities to expand participation in education (European Agency, 2013). Access to wider electronic resources, online information for students and teachers provides many opportunities (European Agency, 2013). The use of mobile technology in schools is a next step that will favor the teaching practice, after of course the proper preparation and training of special professionals and teachers. As well as the fact that each student has the staff of the computer. Typical of this position is the student remark that "the computer is the 'wheelchair of the mind.' As many people cannot share a wheelchair, it is wrong for many children to share the computer!" (Anterson-Inman, 1999).

The European Commission said in a statement: "Apart from expanding access to education, the wider use of new technologies and open educational resources can help reduce costs for educational institutions and for students, especially disadvantaged groups. This economic impact, however, requires continuous investment in education infrastructure and human resources ”(European Commission, 2013a: 3).

It is therefore necessary to plan the universal ICT program in education so that we can talk about open access educational resources, ie resources accessible to all students. In this context, in more and more European countries, schools have to follow

a wider public legislation. However, there is still a need for guidance in the field of information technology and education policies on the application of existing rules to the work of decision-makers, schools, teachers and professionals who support them (European Agency, 2012b).

The conclusions of the 2001 report of the European Agency for Development in Special Education on ICT in special education showed that there was a need for more data on the progress made by the policies implemented. This need still seems to exist and it is necessary to monitor ICT policies and practices in education. The European Commission Communication argues that countries need to "develop measurement tools and indicators to monitor more closely the integration of ICT in education and training institutions" (European Commission, 2013a: 13).

New technologies are an integral part of modern education, especially in the field of special education and an undeniably important learning tool. Of course, in order to secure the future of this program, it is necessary for education to monitor technological developments and then to utilize them. access to appropriate technologies can be a powerful tool to support educational integration (European Agency, 2001). However, it is still necessary today for the proper use of ICT to proceed with the following actions that will ensure the quality and results of ICT in special education:

- comparative reports of support structures for new technologies in special education with statistics and trends
- innovations and successful applications of ICT
- international resource exchanges, resource comparisons in Europe
- database that applies specific standards and offers evaluation of the quality of educational software
- research of psychological and pedagogical aspects of new technologies and children with special needs
- research and development programs on the impact of ICT on the learning process
- Systematic research for teacher training processing - distance education and support

- educational software designed with attention to the cultural, national, psychological, pedagogical environment
- systematic evaluation of the impact of ICT on special education policy design
- expanding international opportunities for teacher training
- creation of a platform for exchange of experiences and planning of joint initiatives (at national and international level)
- establishment of a European learning center, which will be responsible for developing and testing programs for students with disabilities
- development and use of individual equipment and software solutions for children with severe disabilities
- development of an international virtual information center with all the information related to the new technologies in special education.

CONTRIBUTIONS

1) Firstly, in this dissertation, it has been done a rich literature review and analysis of contemporary researches in the field of education of children with ADHD. Although there has been conducted some researches regarding the effect of the computer on the behaviour of children with ADHD, there are still several gaps in the introduction of ICT in the education of this group of students. So, this survey is considered to be very important because it focuses on the investigation of the effectiveness of the appropriate educational software for children with ADHD.
2) Furthermore, it has been created a significant tool which is an educational software used as an intervention method in the experimental part of the research. It is shown that the implementation of such software led to the improvement of the students' performance in the language course and their behaviour.
3) Specifically, through the experimental research this educational software has contributed to the improvement of children with ADHD in reading, comprehension, spelling and grammar but also in their behaviour in comparison with the children of formal development.

4) It could be considered an additional contribution of this survey the fact that this educational software can be used in the online education of children with learning difficulties especially, in this new era of changes where everything works remotely due to the pandemic.
5) Additionally, another contribution of this survey is that this specific software can be implemented to another group of children with learning difficulties in the language course. It helps students to bypass some problems and adopt things in a way that facilitates their learning.
6) The last contribution is that the sample of the research is representative because there has been a great number of students. More precisely, 100 pupils in total. So, the results of this survey can be generalized to the whole population. Therefore, the survey can contribute to the improvement of education of children with learning difficulties in combination with ICT.

PUBLICATIONS

1) Manarioti M. (2020). *Benefits of teaching language in pupils with learning difficulties (ADHD) with new technologies.* University of St. Kliment Ohridski. *FINE MAGAZINE 31-3-2020*

2) Manarioti M. (2020). *The knowledge and role of teachers for pupils with ADHD.* University of St. Kliment Ohridski *FINE MAGAZINE 31-3-2020*

3) Manarioti M. (2021). *The use of ICT to improve the behavioral difficulties of students with ADHD.* University of St. Kliment Ohridski *FINE MAGAZINE 19-6-2021*

4) Manarioti M. (2021). *The use of ICT in improving language ability and attention in students with ADHD.* University of St. Kliment Ohridski *FINE MAGAZINE 19-6-2021*