ISSN: 2465-7212 Vol. 6 (2), pp. 145-154, July, 2018

http://www.globalscienceresearchjournals.org/

Global Journal of Special Education and Services

Full Length Research Paper

Students with ADHD: The impact of Information and Communication Technologies and their mothers' occupational status on their writing skills

***[1]Asimina Riga and [2]Georgia Andreou**

[1,2]Department of Special Education, University of Thessaly
*Corresponding author. E**mail**: mina_riga@yahoo.gr

Accepted 30 July, 2018

The aim of the present study was to investigate to what extent Information and Communication Technologies (ICTs) improve the writing skills of secondary school students identified with Attention Deficit. Complementarily, another basic objective of the study is to shed light on whether and how seriously maternal employment is associated with children's academic performance. The sampl e in this study consisted of 66 (N=66) students who were assessed for attention ability. Student assessment was based on a combination of tools, namely a demographic questionnaire, a questionnaire for teachers following the Greek Evaluation Scale (ADHD), the Stroop Test and the Trail Making Test. The students were then divided into two groups consisting of 32 and 34 students respectively and were taught the same subject matter, with one essential difference though; the first group by incorporating ICT's tools while the second one without implementing them. Then, both groups were assessed on the ground of their ability to write essays. The results demonstrated that essay performance was higher in the ICT group than in the non-ICT group. Furthermore, the results of the study showed that ADHD students whose mother's were civil servants, performed better than those whose mothers, belonged to a different working class. The importance of these research findings with specific reference to ICTs lies in the fact that it may contribute to reshaping the teaching and learning of students with ADHD and provides strategic opportunities to develop quality learning opportunities within inclusive classrooms. Additionally, the second strand of this paper concludes to associations of mothers' profession with their children academic performance which are likely to result in redefining the importance of maternal social status.

Keywords: Attention Deficit; writing performance; Information and Communication Technologies (ICTs); mother's working status

INTRODUCTION

Implementing ICTs with a view to linguistically educating ADHD children is indeed a great advantage for teachers, as they are substantially authorised to apply innovative teaching methods within classroom. ICT learning tools, which are defined as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (Scherer, 2002) help students with ADHD to compensate for their difficulty.

Information and Communication Technologies offer access to a large number of thrilling and enchanting images that captivate even young children's interest and attention and thus they can be used creatively so as to raise students' interest, facilitate reading comprehension and develop reading and writing skills (Vosniadou, 2006). Moreover, they help students to interact with verbal and virtual representations while presenting verbal and visual information on a time and spatial level (Mayer & Moreno, 2003). They also provide opportunities

for the communication of ideas and information, interaction, active participation and collaborative learning (Reed, 2007). In addition, they provide personalized knowledge to each student by allowing them to deal with it at their own learning pace and finally they alter control by permitting them to process the information provided at their desired frequency.

The use of computer technology in education offers also a wide variety of opportunities for educational intervention in the field of Learning Difficulties, given that applying new technologies to education limits Learning Difficulties and creates an environment for pupils in which their weaknesses fade out (Raptis & Raptis, 1999; Parette & Peterson-Karlan, 2007). In such a controlled environment, students make comparisons, check, review, make use of the data and, given that they receive much encouragement for their every correct answer, their self-esteem is greatly enhanced (Reed, 2007). Xu, Reid & Steckelberg (2002) research showed that computer use in the learning procedure has a positive impact on students with attention deficit, since computers provoke their attention and their interest.

How well students achieve in different sectors of their life is a process that can be influenced by many complex factors. However, only through longitudinal studies is it possible for researchers to analyze data in statistical detail and thus to further isolate and deeply examine solely the correlation of maternal employment with children's progress. In particular, students with ADHD need their parents' engagement in the learning procedure. Research shows that a range of constructivist tasks at home brought about by mothers, seems to create successful learners. Such tasks entail discussions about school progress, encouragement of children to read for a range of purposes, cultural activities such as visiting libraries, museums and historic sites and finally students' reinforcement so as to use online material for school purposes and their hobbies.

As a conclusion, while there is extensive research about ICTs and special education, the main focus has been on assistive technologies and how they compensate for the impairments of the students (Manduchi & Kurniawan, 2012), support their academic skills (Burgstahler, 2003), and help them learn autonomously (Dias, 2010). However, empirical research on the role of ICTs such as constructivist learning tools from the perspective of ADHD students is still insufficient. Furthermore, it is worth investigating whether the mother's working status is considered to influence their children's standard of educational attainment.

This article is primarily preoccupied with this current research gap and brings into discussion the key role played by both ICTs and mother's professional status in the writing skills of students with attention deficit.

Theoretical Background

Attention is a complex behavioural and cognitive process which directs resources to a subset of available information. According to the information processing theory, attention plays an important role in both the conception of a stimulus and its transfer to memory (Korkman & Pesonen, 1994; Schunk, 1996). Precisely, the stimulus is conceived by the receptors of the sensor organs and is transferred to the short-term memory. After a very short period of time, it will be either transferred to the long term memory for further encoding or even storing or it will be discarded from the cognitive system (Atkinson & Siffrin, 1968). Therefore, attention is connected with memory ability and they both affect students' performance in the cognitive task (Hayes, 1996). Indeed, some researchers claim that attention is necessary for perception (Mack & Rock, 1998) and can also be defined as the mental process of selectively concentrating on one aspect of the environment while ignoring other things.

It is argued that ICTs help students to have control over their learning by promoting independence and enhancing their academic performance (Kelly & Smith, 2011). However, many students with learning difficulties struggle with disorders of attention, and teachers routinely blame failures on a lack of attention. As a result, they develop with delay and to a lower degree in relation to the general typical population, their selective attention; that is, the ability to select from the many factors or stimuli and focus on their cognitive task while they ignore symptomatically secondary and irrelevant stimuli (Conte, 1998). So, these students appear unable to focus their interest on the text they are dealing with or the information they are hearing. As a result, the information they acquire cannot be adequately transferred to the memory for further processing, and something which prevents them from fully comprehending the topic (Padeliadou, 2004).

According to Korkman & Personen (1994) the cognitive functions of memory, of attention and of concentration play an important role in the development of both language functions and language understanding. Many researchers (Cantwell, 1996; Redmond, 2004) claim that a child with attention deficit faces difficulties in language development and at the same time he/she might have lower performance in language tasks than those without attention deficit (Redmond, 2004; Mathers, 2006), or he/she might even have difficulties in both the organization and the reading comprehension (Zentall, Hall & Lee, 1998). As Gopher (1993) aptly points out, "setting priorities is a common human experience; the question is how competent we are in establishing attention strategies and allocating processing efforts among concurrently changing task elements".

It is very crucial for students with attention deficit to be taught language skills by special intervention programmes which help them focus and sustain their attention. These programmes mainly regard the use of multi-sensory educational tools, since they improve children's self-efficacy (Zavlanos, 2003). Such a supportive multi-sensory educational tool is the Concept

Mapping Software which assists students with learning difficulties in improving their text content and structure (Schumaker & Deshler, 2003). The Concept Mapping Software gives emphasis on the main parts of the learning object as well as the connections amongst them and thus they have an enhancing impact on the whole procedure which becomes more exciting and interesting. In addition, the visual presentation of the information makes its storage in memory easier (Richards, 2008). Indeed, comparative research regarding students with learning difficulties and the implementation of three teaching methods (i.e. without concept map, with hand-written concept map and finally with concept mapping software) proved that the third method has contributed to the students' better performance (Sturm & Rankin, 2002).

It is very crucial for educational software designed on the basis of cognitive learning theories, to encourage a number of processes and support the creation of learning situations with the following characteristics (Drouzas, 2012): assist and promote knowledge consolidation by the learners themselves as well as encourage pupils' personal expression and engagement. They also need to provide multiple representations of the concepts, the relationships and the entities under discussion in each subject as well as to support the process of socio-cognitive conflict, in which the actual facts or arguments arisen by other students, correct any possible student's misconceptions.

Studies by Paivio and Lambert (1981) further prove that by choosing appropriate presentation tools on the one hand and taking advantage of the double coding ability on the other, educators have more chances of improving the learning outcomes. More specifically, any piece of information that is presented verbally and at the same time is accompanied by a related illustration is more likely to become better understood than any information provided only by text or by sound. Verbal communication results in learning by heart only a small amount of information for a short period of time in comparison to a text. Therefore, writing is of greater importance for storing more information in the brain. However, when visual presentation is preferred, verbal presentation of words is more appropriate rather than a text, as it is considered a form of visual presentation (Kargopoulos et al., 2003).

Another equally interesting issue under discussion here concerns the association of parents' working status and particularly that of mothers, with their children's academic achievement (Szumski & Karwowski, 2012; Li et al., 2014). Researches explicitly show that the parental models linked to school achievement are those dedicating enough time on their children and focusing on general supervision of their children's learning activities (Castro et al., 2015). According to literature, mothers even if they are highly educated and have a job, often do more parenting work than fathers and consequently are more often confronted with their children's school issues and general life concerns (Allmendinger, 2009). It is plausible that parenting labour, including communication about children's education in general, is by far undertaken by mothers and consequently affects children's school issues and satisfaction with life more than fathers do (Crede et al., 2015).

It is of high importance to mention that existing research draws correlations between parental working conditions and children achievements. According to Levin-Epstein (2006), there is a strong correlation between children's success at school and their parents' work time schedules. That is, children are nearly three times more likely to face cognitive and behavioural problems at school if their parents work at night. They are also more likely to score in the bottom quartile on achievement tests the more hours their parents work after school and evening hours (Heymann et al. 2002). For every hour a parent works between 6 p.m. and 9 p.m., his or her child is 16 percent more likely to score in the bottom quartile on math tests. Among parents with children with such scores in academic performance, over half do not have any kind of paid leave and nearly three-fourths did not have assurances of flexible scheduling at work (Heymann, 2003).

Therefore, the main purpose of this research is to explore and delineate the impact of the Concept Mapping Software on the standard of educational achievements by ADHD students. In particular, this paper involves the research question whether the overall performance of the ICT students group will be substantially improved in comparison to the performance of the non-ICT students group who will be taught exactly the same educational subject matters without the use of ICT's, though. Another equally basic research question posed by this study brings in the foreground the way in which a mother's occupational status is combined with her children's academic progress.

MATERIALS AND METHODS

Research questions

Based on implementing ICTs when teaching writing skills and, more specifically, descriptive essays to students with attention deficit, the questions posed in this research are:

a) whether the overall writing performance (in language, structure, content) by the students of the ICT student's group will be substantially better in comparison to the non ICT student's group performance who will be taught exactly the same subject matter without the use of ICTs.

b) whether mothers' profession is connected to students' writing performance.

The design of the particular intervention

This research took place in schools of secondary level of education within the prefecture of Drama, in Greece.

Initially, the teachers of these schools filled in the questionnaire (addressed to teachers) following the Greek Evaluation Scale for ADHD (Kalatzi-Azizi, Aggeli & Eustathiou, 2012), aiming to identify students with attention deficit on the basis of DSM IV (Diagnostic and Statistical Manual IV, American Psychiatric Association, 2001). Afterwards, the students with attention deficit, in accordance with the specific Scale, participated in the color and word Stroop test (Spreen & Strauss, 1998) and the visual-brain Trail Making test (Spreen & Strauss, 1998). The Greek Trail Making Test (Vlahou & Kosmidis, 2002) , which evaluate the students' ability to maintain their attention focused on the cognitive task (Arnett, James, Seth & Labovitz, 1995). The Stroop test is considered to be able to distinguish students with attention deficit disorder from the ordinary students (Sergeant, Geurts & Oosterlaan, 2002; Zalonis, et al, 2009). Also, the Trail Making test is widely used for the evaluation of attention abilities, visual-kinetic speed, information processing, cognitive flexibility and attention and inattentive thought (Spreen & Strauss, 1991; Lezak, et al., 2004). To protect the participants' identity, pseudonyms have been used throughout the research.

Participants

The participants in this study were 66 students with ADHD, separated into two groups consisted of 32 (ICT group) and 34 (non ICT group) students respectively. All of the participants were at the age of 13 or 14, in the first grade of secondary education and they willingly participated in this study as volunteers. To ensure student equality in terms of writing performance, researchers included in the sample only those students whose grades in the first semester ranged between 11 and 12.

Data collection and analysis

After the sample selection with the aforementioned criteria, all students involved were asked to fill in a questionnaire which examined the demographic characteristics of the population such as: gender, average grade, parents' profession, parents' highest rank of education, presence of a computer in their house, the chance of having access to the Internet at home, the amount of hours they used the PC per day and their knowledge of operating programs. Data collection conducted by the researcher, so as to ascertain the homogeneity of students regarding the level of education, urban or non-urban residence and equivalent computer use and competence.

Afterwards, the researcher carried out the sample distribution into two equally numbered groups. The ICT group, consisting of 32 students, engaged in learning related to descriptive writing and to Greek culture, by the use of concept mapping software, the interactive board, the word-processor and the Internet. The second, non-ICT group, consisting of 34 students, was involved in exactly the same task, but used only paper and pencil. The students of both groups of three or four members, worked in teams of three or four members for two teaching hours. After the teaching procedure, the students were evaluated on descriptive writing. The assessment task based on the performance criteria that were included in an analytic rubric in order to make the whole assessment procedure more objective (Rezaei & Lovorn, 2010) and more reliable (Jonsson & Svingby, 2007; Silvestri & Oescher, 2006;). The researcher-teacher constructed the particular analytic rubric by using the criteria which exist in the Greek Language teacher's book for the first grade of Secondary education and on websites that teachers can easily access when creating their own rubrics. By doing so, teachers meet the particular standards they think are important for writing tasks in a specific genre (Aggelakos, Katsarou & Magana, 2008; Teacher resources, 2008; Andreou, Riga & Papayiannis, 2013; Andreou & Riga, 2013).

Cmap tools

The IHMC Cmap Tools program allows users to design and easily create concept maps so as to express various ideas graphically. Additionally, Cmap Tools is a free of charge software that allows everyone to create concept maps using networks resources, adjust files or links to other websites. Should students use Cmap Tools, they will be able to find the concept maps created by other users and to share, or place their own concept maps at the disposal of all the users. Thus, CmapTools allows students to work collaboratively and offers them the opportunity to host and share their work (Cañas & Novak, 2008).

ICT Group

A short text was presented on the screen of an interactive board for the A group; the students could also read it on their own computer screen. They were asked to answer the following questions-exercises using the facilities of the Word Software (e.g. marking the word with the mouse and making it bold): 1) "What kind of text is the following?" 2) "Spot the adjectives". 3) "Spot the verbs, then identify their tense and find which of them are called auxiliary". 4) "Which linking words are used in the text?" 5) "Find the topic sentence, the main part, and the conclusion". 6) "Which is the communicative frame of the text?" 7) "What is the objective of the text?"

Every time the students answered correctly, the right answer appeared in bright colors on the screen of the interactive board, according to the sequence of questions-answers. Afterwards, the concept map appeared, filled in step by step until it was eventually completed, and included the main characteristics of descriptive writing. Then a semi-completed concept map with the following questions was shown on the screen of the interactive board, as well as on the students' PC screen: 1) "Where is the town of Drama?" 2) "What is the

town of Drama famous for?" 3) "What activities can somebody do in the town of Drama?" 4) "What are the most important monuments in the town of Drama?" Finally, the students were asked to fill in on their computers the specific concept map on the basis of the information they had heard and seen in a three-minute video that was shown to them twice. They could fill in the specific concept map by clicking on a hyperlink on the town of Drama.

During the second teaching hour, students were evaluated on writing descriptive essay, while the teacher provided them with a relevant survey questionnaire. The assignment asked students to describe in a paragraph, with the aid of four given pictures, the town of Kavala in such a way as to attract the readers' attention. This paragraph was written only with paper and pencil.

The assessment criteria in terms of organization were the following: 1) The paragraph includes a topic sentence, a main part and a conclusion, which must be relevant to the topic. 2) The description begins from the general and proceeds to the specific. 3) The description of the paragraph is defined by the writer's point of view. 4) Smooth transition from one idea to the other on the basis of meaning. 5) Use of linking words/phrases for the connection of sentences.

Second, the assessment criteria referring to the content were the following: 1). The paragraph begins with an interesting title sentence, which introduces the readers to the topic of the description. 2) Every sentence relates to the topic or to the main idea. 3) The details of the main part are sufficient, clear and concrete. 4) They present the topic of the description in an adequate and understandable way.

Finally, the assessment criteria concerning language were the following: 1) Use of appropriate and various adjectives. 2) The present tense is more frequently used. 3) Use of continuous verbs. 4) Frequent use of auxiliary verbs. 5) Correct use of adverbs. 6) Appropriate writing style. The grading scale was Likert-type with 5 points: 0, 1, 2, 3, 4 and the coding used was the following: 0-inadequate, 1-below the average, 2-average, 3-adequate, 4-exceptional. The students' performance in each assessed sector was scaled to one hundred percent regardless of the number of characteristics in any particular category. A similar procedure was followed for the overall performance. The importance ascribed to each category is equal and it is described below:

Organization 33.33%, Language 33.33% and Content 33.33%

The students' essays were evaluated by the researcher of the present study, who is a teacher of Greek literature, and who used the above criteria (based on five levels of qualitative characteristics) to assess the students' final performance in an objective way. In an attempt to achieve credibility of results, a second teacher of literature and experienced researcher also evaluated the students' essays.

Non ICT Group

The students of group B were provided with the same descriptive text, but in printed form. They were asked to do exactly the same tasks but using paper and pencil only. They were handed out a task sheet with the above tasks with the ICT group.

Finally, the students were provided with the same task sheet as group A and were assessed on writing descriptive essay. The task evaluation was based on the same assessment criteria. The assessment results of all students' task sheets were scaled to one hundred percent and were statistically compared.

Appropriate normality tests of the two samples were initially carried out. After confirming normality, the t-test was administered to both samples mentioned above, in order to compare the students' average performance in the final evaluation procedure) in two groups of independent observations (with and without ICT) (Shirley, Stantley & Daniel, 2004).

Statistical Analysis

To compare the students' performance of the two groups in the specific assessed attributes, the Kolmogorov-Smirnov and Shapiro-Wilk tests made clear that the students' specific grades in relation to the text structure they had followed as well as to the language they had used, followed normal separation. So, in this case, the t-test was used. On the other hand, the students' grading in terms of text content deviated from normality in group A, so the non-parametrical Mann-Whitney test was used. The comparison of the students' performance of the two groups concerning content was carried out with the aid of the Mann-Whitney non-parametrical test.

The Levene test demonstrates the ANOVA prerequisite with reference to the equality of variances ($p = 0.238 > 0.05$). The ANOVA process presents whether both ICTs implementation and the mother's profession play a major role in the students' overall performance.

RESULTS

The t-test results regarding the comparison of the specific grading related to structure and language are presented in the table below (Table 1.).

Table 1: Mean scores of structure and content grades (%) in ICT and non-ICT groups

	ICT students	Non-ICT students	t	P
Stucture	62,64	59,26	2,998	0,004
Language	48,71	47,14	3,504	0,001

The results concerning content showed the average score of the students taught with the ICT approach was 59,26% while that of the students taught without it was 47,14%. The importance of the test is very small (almost zero) in terms of significance a=5% and, consequently, it becomes obvious that there is a statistically important difference in the students' performance.

The ANOVA process, whose results are presented in the following table, proves that both ICTs implementation ($p = 0.017 < 0.05$) and the mother's profession ($p = 0.024 < 0.05$) play a major role in the students' overall performance. On the other hand, the interaction of the two aforementioned factors is not regarded as statistically significant ($p = 0.786$).

In this case, given the various categories of the mother's occupation variable, it is necessary for the researchers to study in greater detail those categories in which this variable is combined with a significant differentiation of pupils' overall performance. For this reason, multiple comparisons were carried out, the significance of which was examined by the Bonferroni control procedure. The results of these multiple comparisons are outlined in the following table which very clear illustrates that:

1) There is a noteworthy difference in the performance of students whose mothers work as private employees in relation to those students whose mothers are civil servants. In other words, students whose mothers are civil servants perform better at school by a difference of 21% compared to students whose mothers work in the private sector (Table 2).

2) It is also worth mentioning that there is a great difference in the performance of students whose mothers are civil servants compared to those whose mothers are freelancers. More specifically, the former category has a better school performance by about 18% difference in comparison to the latter one (Table 3).

Table 2: Results of the effects among the subjects

Source of dispersion	F	F Significance (p)
ICTs	6.050	0.017
Mother's profession	3.350	0.024
Mother's occupation_ICTs	0.354	0.786

Table 3: Results of the comparisons concerning the categories of mother's profession

(I) Mother profession	(J) Mother profession	Significance (p)
Private Employee	Public servant	0.001
Public servant	Freelance	0.006

It is therefore obvious that the significant differentiation of students' school performance in relation to their mother's profession makes sense because of the better performance of those students whose mothers work as civil servants.

DISCUSSION

The results highlighted that the students' performance in the two separate groups is statistically important and, more precisely, the ICT students had statistically better performance than the non-ICT students. Furthermore, the research confirmed the second hypothesis claiming that a mother's working status affects her children's attainment and school progress.

The ICTs exploitation and especially that of the Concept Mapping Software as an organizing and mnemonic tool, has helped the students with attention deficit to improve and develop their ideas in a more well-structured way (Antoniou, 2000). More specifically, the step by step teaching procedure and finally the complete presentation of the characteristics of descriptive essay through the implementation of the Concept Mapping Software has contributed to the better assimilation of the subject matter by the students. So, they eventually presented a descriptive essay which was much more complete than the students who had been taught the same subject-matter in the traditional way. Furthermore, the video use and the fill in of the semi-complete concept map by the students themselves helped them to boost their text content and to enrich their vocabulary.

Consequently, Concept Mapping software supports visual learning techniques which, in turn, make the subject matter more conceivable by the students with attention deficit. Moreover, this software works as a valuable tool during the pre-writing stage (Novak & Cañas, 2006), as it provides students with all necessary information for the specific text style (description), its features and the way to organize it (Obukowicz, Stindt, Rozanski & Gierach, 2009).

The outcomes of the present study are in accordance with the findings of previous studies (Sturm & Rankin-Erickson, 2002; Xu, Reid & Steckelberg, 2002) which argue that the establishment of educational environments focused on the abilities of students with attention problems, is fundamental. More particularly, it has been disclosed that ADHD students mend their educational ways especially when their teaching procedure includes the use of multimedia environments which have a short-duration movie and include narration, pictures and short texts. In this way, according to the constructivism learning theory, students develop the ability of self-motivation and active interaction with the environment, so that they can keep their interest and attention on the teaching unit (Garagouni- Araiou & Solomonidou, 2004; Zaid, 2011; Webb & Cox, 2004**)**. Indeed, studies have revealed that the use of the concept map along with the use of multimedia such as the video has a significant contribution to the improvement of students' writing compared to the traditional teaching method (Zaid, 2011).

As far as the parents' profession is concerned, it has become obvious that a mother's occupation draws relations with her children's educational development. In particular, this survey pinpoints a distinct difference clearly observed in the performance of those students whose mothers are both private employees and freelancers in relation to those whose mothers work as civil servants. It is also possible that the differentiation of students' performance in relation to their mother's profession arises from the better school results of those students whose mothers are civil servants. This is the case because civil servants follow a steady and clearly set time schedule every week; that is, their working hours, which last from early in the morning until late at noon, coincide with their children's school hours. In short, mothers have the invaluable chance to be present at home during all the afternoons as well as at weekends and thus actively engage in their children's progress much longer compared to the other two maternal working classes. Indeed, previous researches reveal that children's cognitive development, have been correlated with parents working irregular, non-traditional work shift times (Boots, 2004; Boushey & Mitukiewicz 2014; Li et al. 2014).

Additionally, relevant researches show that parents are a major influence on a child's success in life (Szumski & Karwowski, 2012; Harris & Goodall, 2008). We should therefore not be taken aback on accepting that parents do have an influential role in their children's education. Parental engagement in the educational development of their children reinforces a child's progress more than any other single factor. In fact, parents can essentially help their child most when regular and meaningful conversations between the two parts take place or even by setting high aspirations or demonstrating their own interest in and support of learning at home and at school. Whether or not parents choose to engage in supporting their children's school effort, depends on a number of factors including of course the nature of their working status (Harris & Goodall, 2008)

This result can further be interpreted by taking into consideration all the prerequisites that females need to meet as well as the qualifications imposed by the Greek legislation, for her appointment in the Greek public sector. For example, the majority of the younger mothers who work as civil servants are obliged to be computer literate. In this way, they, in turn, encourage their children to be more engaged in learning processes that involve online educational software. In other words, mothers urge their children to relate school experience to work practices and consequently create economic viability for their future (Yusuf, 2005).

CONCLUSIONS AND RECOMMENDATIONS

However, the present findings should be addressed with caution because of their limited amount of attributes; that is, these findings exclusively rely upon a small number of students of a specific age, who have been assessed with specific criteria regarding the learning of the Greek Language. Therefore, further research, aiming at

incorporating a larger sample of different age students' groups who will be assessed with different criteria in more subjects, is absolutely necessary in order to confirm our findings and to support the view that the computer-based designing of concept map has a positive impact on learning procedures and thus teachers should take advantage of it in all of the school subjects.

Additionally, since the findings regarding maternal employment are confined to a small number of specific individuals with specific social and working backgrounds, further investigation is recommended in order to verify whether the certain proposals are equally applicable to other social environments and working classes. Such a future research may possibly solidify our findings and validate the argument that a mothers' profession is indeed a key factor in her students' performance and that both mothers' working hours and working environment seem to exert a great influence on her children's writing progress. Nevertheless, significant contributions could be made to the body of literature related to this field by conducting more studies on the needs of students, teachers, parents, and administrators for ICTs in special education, on the assessment of the existing needs and finally on the way how to meet them.

The importance of the present research lies in the fact that it may become the springboard for a future investigation in conjunction with the extent to which educational technology can boost both the teaching and learning process for ADHD students. ICTs can force teachers to reshape their practices, given a set of enabling conditions. The way teachers use ICTs in classroom is determined, to a certain extent, by their pedagogical practices and reasoning and this way influences students' achievement (Infodev, 2015). If ICTs are systematically and meaningfully integrated into high school education, they will certainly offer a unique opportunity for the greater inclusion of ADHD students into the educational process and learning environments and they will hopefully lead to their equivalent education. Additionally, it is of utmost importance for parents in general and more specifically for mothers to realize whether they can actually play an important role in relation to their children's school performance. Additionally the government should take action in order to amend the working conditions, increase the cost of social programs and our nation must be prepared to adapt to changes in our economy, in how we work, where we work, and how we balance our occupational status and family lives.

ACKNOWLEDGEMENTS

We would like to express our deep gratitude to the reviewers who have meticulously evaluated the present paper.

REFERENCES

Aggelakos, K., Katsarou, E. & Magana, A. (2008). New Greek Language Grade of Secondary School teacher's book. Athens: Teaching Books Publishing Organization.

Allmendinger, J. (2009). Women on the Move. How Young Women Want to Live their Lives Today. München: Pantheon.

American Psychiatric Association, (2001). Diagnostic and statistical manual of mental disorders, Fourth Edition (DSM-IV), Washington DC: American Psychiatric Association.

Andreou, G. & Riga, A. (2013). Taking advantage of the Concept Mapping Software in teaching descriptive writing to students with attention deficit, ICERI2013 Proceedings, 6127-6134, Seville, Spain. 18-20 November 2013.

Andreou, G., Riga, A. & Papayiannis, N. (2013). Teaching descriptive writing. Teaching proposal based on the Concept Mapping Software (Cmap Tools). International Scientific Conference, era-8, Piraeus, Greece.

Antoniou, F. (2000). Enhance of writing. In Padeliadou S. & Antoniou, F. Teaching Approaches for students with learning difficulties. Practices (pg. 49-56). Thessaloniki: Graphima.

Arnett, J. A., & Labovitz, S. S. (1995). Effect of physical layout in performance of the Trail Making Test. Psychological Assessment, 7(2), 220-221.
http://dx.doi.org/10.1037/1040-3590.7.2.220

Atkinson, R. C., Siffrin, R. M. (1968). Human memory: A proposed system and its control Processes. In W. K. Spence & J. T. Spence (Eds), The psychology of learning and motivation (Vol. 1, pp 89-195). New York: Academic Press.

Boots, S. (2004) The Way We Work: How Children and Their Families Fare in a 21st Century Workplace. Washington, DC: New America Foundation

Boushey, H. & Mitukiewicz, A. (2014). Job Quality Matters: How Our Future Economic Competitiveness Hinges on the Quality of Parents' Jobs. Washington Center for Equitable Growth.

Boyley, S. (1998). All rights reserved in all media, Retrieved April 24, 2008 from http://www.nlpmind.com/mind_mapping.htm

Burgstahler, S. E. (2003). The role of technology in preparing youth with disabilities for postsecondary education and employment. Journal of Special Education Technology, 18(4), 7-19.

Cantwell, D. P. (1996). Attention Deficit Disorder: A review of the Past 10 Years. Journal of the American Academy of Child and Adolescent Psychiatry, 35, 978-987.

Castro, M., Expósito-Casas, E., López-Martín, E., Lizasoain, L., Navarro, E., & Gaviria, J. L. (2015). Parental involvement on student academic achievement: a meta-analysis. Educational Research Review, 14, 33–46.

Conte, R. (1998). Attention disorders. Στο B. Y. L.Wong (Επιμ.) Learning about learning disabilities (2nd ed.), σελ. 67 – 106, New York, NJ: Academic Press.

Crede, J., Wirthwein, L., McElvany, N., & Steinmayr, R. (2015). Adolescents' academic achievement and life satisfaction: The role of parents' education. Frontiers in Psychology, 6 (52), 1-8.

Dias, R. (2010). Concept map: a strategy for enhancing reading comprehension in English as L2. Concept maps: making learning meaningful proceeding of the fourth international conference on concept mapping.

Drouzas, P. (2012). Dynamic collection of teaching material and formation of teaching scenaria. Master's dissertation on Computing Maths and Computer Education Field. University of Patras.

Garagouni- Araiou, F. & Solomonidou, X. (2004). ICT and Children with Attention Deficit and Hyperactivity Disorder; Study of the effectiveness in the use of Computer in their conduct, Retrieved May 22, from http://www.etpe.gr/files/proceedings/filessyn/A47-256.pdf

Gopher, D. (1993). The skill of attention control: Acquisition and execution of attention strategies. In D. Meyer & S. Kornblum (Eds.), Attention and Performance XIV:Synergies in Experimental Psychology, Artificial Intelligence, and Cognitive Neuroscience, (pp. 299–322). Cambridge, MA: MIT Press.

Harris, A. & Goodall, J. (2008).Do parents know they matter? Engaging all parents in learning, Educational Research, Vol 50, No 3 277-289

Hatzisavidis, S., Kotopoulos, T. & Anagnostopoulou, E. (2008). Analytical programms Adjustments For the language lesson at

Secondary School, A΄Cross-Curricular Issue and lesson plans, Ministry of National Education and Religions, Pedagogical Institute.
Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In C. M. Levy & S. Ransdell (ed.), The science of writing: Theories, Methods, Individual Differences, and Applications (pp. 1-27). Mahwah, NJ: Lawrence Erlbaum Associates.
Heymann, J., Boynton-Jarrett, R., Carter, P., Bond, J.T. & Galinsky, E. (2002). Work- Family Issues and Low-Income Families. New York: Ford Foundatio.
Heymann, J. (2000). The Widening Gap: Why America's Working Families Are in Jeopardy and What Can Be Done About It. (p. 59). United States: Basic Books.
Infodev. (2015). "Teachers, Teaching and ICTs". Retrieved from http://www.infodev.org/articles/teachers-teaching-and-icts.
Jonassen, D. (2000). Revisiting activity theory as a framework for designing student-centered learning environments, In Jonassen & S. Land (Eds.). Theoretical foundations of Learning Environments, Lawrence Erlbaum Associates.
Jonsson, A. & Svingby, G. (2007). The use of scoring rubrics: Reliability, validity and educational consequences. Educational Research Review, 2(2), 130-144.doi:10.1016/j.edurev.2007.05.002
Kargopoulos, P., Bablekou, Z., Gonida, E., & Kiosseoglou, G. (2003). Effects of face and name presentation on memory for associated verbal descriptors. American Journal of Psychology, 116, 415–430
Korkman, M. & Pesonen, A.E. (1994). A comparison of neuropsychological test profiles of children with attention-deficit hyperactivity disorder and/or learning disorder. Journal of Learning Disabilities, 27, 383-392.

Lezak, M. D, Howieson, D. B. & Loring, D. W. (2004). Neuropsychological Assessment. 4th ed. New York: Oxford Uninersity Press.

Manduchi, R., & Kurniawan, S. (Eds.). (2012). Assistive technology for blindness and low vision. Boca Raton, Florida: CRC Press.
Mathers, M. E. (2006). Aspects of language in children with ADHD: Applying functional analyses to explore language use. Journal of Attention Disorders, 9(3), 523-533.
Mayer, R. E. & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist, 38, 43-52.
Obukowicz, M.,Stindt, K., Rozanski, D., & Gierach, J. (2009). Assistive Technology for Organization. Assessing Students' Needs for Assistive Technology (ASNAT) 5th Edition – complete version. J. Gierach (Ed.). (p.1- 38).
Panteliadou, S. (2004). The learning difficulties in the secondary level of education, Thessaloniki, Adaction A. E.
Parette, H. P., & Peterson-Karlan, G, R, (2007). Facilitating student achievement with assistive technology. Education and Training in Developmental Disabilities, 42(4), 387 - 397. Retrieved from http://www.daddcec.org/Portals/0/CEC/Autism_____Disabilities/Research/Publications/Education_Training_Development_Disabilities/2007_____v42_____Journals/ETDD_200712v42n4p387-97_Facilitating_Student_Achievement_With_____Assistive_Technology.pdf
Raptis, A., & Raptis, A. (1999). Information technology and education. A comprehensive approach. Athens: Telethrion.
Redmond, S. M. (2004). Conversational profiles of children with ADHD, SLI and typical development. Clinical Linguistics and Phonetics, 18, 107-125.
Reed, P. (2007). A resource guide for teachers and administrators about assistive technology, Wisconsin Assistive Technology Initiative. (p.1-22). Oshkosh.
Rezaei, A. R. & Lovorn, M. (2010). Reliability and validity of rubrics for assessment through writing. Assessing Writing, 15(1), 18–39. doi:10.1016/j.asw.2010.01.003
Richards, R. (2008). Making it stick: Memorable strategies to enhance learning, LD On line The world's leading website on learning disabilities and ADHD. Retrieved April 25, 2013, from http://www.ldonline.org/article/5602/
Scherer, M. J. (2002). The change in emphasis from people to person: Introduction to the special issue on Assistive Technology. Disability & Rehabilitation, 24(1-3), 1-4. doi: 10.1080/09638280110066262
Schumaker, J. B. & Deshler, D. D. (2003). Can students with LD become competent writers? Learning Disability Quarterly, 26(2), 129-141.
Schunk, D. H. (1996). Learning Theories (2nd ed.). Englewood Cliffs, New Jersey: Merrill, an imprint of Prentice Hall.
Sergeant, J. A., Geurts, H. & Oosterlaan, J. (2002). How specific is a deficit of executive functioning for Attention Deficit/Hyperactivity Disorder? Behavioural Brain Research, 130, 3-28.
Silvestri, L. & Oescher, J. (2006). Using Rubrics to Increase the Reliability of Assessment in Health Classes. International Electronic Journal of Health Education, 925-30.
Spreen, O. & Strauss, E. (1991). A compendium of neuropsychological tests (2nd Edition), 34. New York: Oxford University Press.
Szumski, G. & Karwowski, M. (2012). School achievement of children with intellectual disability: The role of socioeconomic status, placement and parents' engagement. Research in Developmental Disabilities, 33(5): 1615-1625
Tzouriadou, M. (2008). Analytical programs Adjustments for students with learning difficulties, Theoretical Frame, Athens, Ministry of National Education and Religions, Pedagogical Institute.
Kalatzi- Azizi, A., Aggeli K. & Eustathiou, G. (2012). Greek evaluation scale of ADHD, scale for parents-scale for teachers, Athens: Pedio.
Kelly, S. M., & Smith, D. W. (2011). The impact of assistive technology on the educational performance of students with visual impairments: A synthesis of the research. Journal of Visual Impairment & Blindness, 105(2), 73-83.
Korkman, M. & Pesonen, A.E. (1994). A comparison of neuropsychological test profiles of children with attention-deficit hyperactivity disorder and/or learning disorder. Journal of Learning Disabilities, 27, 383-392.
Levin-Epstein, J. (2006). Getting Punched: The Job and Family Clock: It's Time for Flexible Work for Workers of All Wages. Washington DC: Center for Law and Social Policy (CLASP).
Li, J., Johnson, S. E., Han, W.-J., Andrews, S., Kendall, G., Strazdins, L., Dockery, A.,
(2013). Parents' nonstandard work schedules and child well-being: A critical review of the literature, The Journal of Primary Prevention 35, 53–73.
Liao, Y. C. (1998). Effect of hypermedia versus traditional instruction on students' achievement: a meta-analysis. Journal of Research on Computing in Education, 30 (4), pp. 341–359.
Mack, A., & Rock, I. (1998). Inattentional Blindness. Cambridge, MA: MIT Press.
Novak J. D. & Cañas A. J. (2006a). The Theory Underlying Concept Maps and How to Construct Them (Technical Report No. IHMC CmapTools 2006-01). Pensacola, FL: Institute for Human and Machine Cognition.
Sturm, J. M. & Rankin-Erickson, J. L. (2002). Effects of hand-drawn and computer-generated concept mapping on the expository writing of middle school students with learning disabilities, Learning Disabilities Research & Practice, 17(2), 124-139.
Teacher resources. (2008). In writing assessment and evaluation rubrics. Retrieved from:http://www.glencoe.com/sites/common_assets/languageart/grade9/G9WAER.PDF
Tzouriadou, M. (2008). Analytical programs Adjustments for students with learning difficulties, Theoretical Frame, Athens, Ministry of National Education and Religions, Pedagogical Institute.
Vlahou, C. & Kosmidis, M. (2002). The Greek Trail Making Test: preliminary normative data for clinical and research use. Psychology Journal of the Hellenic Psychological Society; 9:336-352.
Vosniadou, S. (2006). Designing Contemporary ICT-assisted Learning Environments, Athens: GUTENBERG.
Webb, M., & Cox, M. (2004). Review of pedagogy related to information and communications technology. Technology, Pedagogy, and Education, 13, 235–286.
Xu, C., Reid, R. & Steckelberg, A. (2002). Technology applications for children with ADHD: 43. Assessing the empirical support. Education and Treatment of Children, 25, 224-248.
Yusuf, M.O. (2005). Information and communication education: Analyzing the Nigerian national policy for information technology. International Education Journal Vol. 6 No. (3), Pp; 316-321.
Zaid, M. A. (2011). Effectiveness of organized e-mail exchanges and online reading/writing on college students' literacy and their attitudes towards English, Asian EFL Journal, 13 (1), pp. 10–47.
Zaid, M. A. (2011). Effects of web-based pre-writing activities on college EFL students' writing performance and their writing

apprehension. Journal of King Saud University- Languages and Transition, 23 (2), pp. 77-85.
Zavlanos, M. (2003). Teaching and Assessment, Athens; Stamoulis.
Zentall, S. S., Hall, A. M. & Lee, D. L. (1998). Attentional focus of students with hyperactivity during a word-search task. Journal of Abnormal Child Psychology, 26, 335-343.