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INTELLECTUAL DISABILITY AND INFORMATION TECHNOLOGIES IN SECONDARY SCHOOL LEVEL – RESEARCH ANALYSIS DATA[i]

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Abstract:
Teaching intellectually disabled students is challenging enough, not to speak about teaching them specific school subjects, such as Information Technologies (IT). In this paper, we present some of the data we gathered during our research analysis and the insights we were able to observe in our students after implementing our teaching goals. This text presents data analyses as well as a summary of the results.

Keywords: intellectual disability, information technologies, secondary school level

Анотация:
Обучението на ученици с умствена изостаналост е достатъчно предизвикателно и трудно, а това е в сила още повече, когато става дума за обучение по отделните учебни предмети, като например информационни технологии (ИТ). В настоящия доклад представяме част от данните, получени при провеждането на нашето изследване и явленията, които наблюдавахме сред нашите участници с умствена изостаналост, обучавани в гимназиална степен. Текстът включва анализ на данни и обобщение на получените резултати.

Ключови думи: умствена изостаналост, информационни технологии, гимназиална степен

1. Review of Related Literature

Information technologies as – as everything – a risky and sometimes dangerous phenomenon. As Konsbruck Robert Lee (2017) states, "*The ongoing computing and communications revolution has numerous economic and social impacts on modern society and requires serious social science investigation in order to manage its risks and dangers. Such work*

[i] УМСТВЕНА ИЗОСТАНАЛОСТ И ИНФОРМАЦИОННИ ТЕХНОЛОГИИ В ГИМНАЗИАЛНА УЧИЛИЩНА СТЕПЕН – АНАЛИЗ НА РЕЗУЛТАТИ ОТ ИЗСЛЕДВАНЕ
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would be valuable for both social policy and technology design. Decisions have to be taken carefully. Many choices being made now will be costly or difficult to modify in the future". As this author continues, "*increasing representation of a wide variety of content in digital form results in easier and cheap Information technology is: "the use of computers to store, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise. IT is considered to be a subset of information and communications technology (ICT).*", according to the source Information technology (2018).

As Hamidi et al. (2011) declare "*today knowledge and information are the main keys of obtaining the productivity, competition, wealth and comfort. So, countries have concentrated on approaches for increasing the gaining of better-quality education. In order to develop the human capital, it is necessary to look at our schools and education and see if our education is progressing in step with the world that is changing and developing quickly. The problem is that if we compare the modern world with the last-century, we are confronted with dazzling developments of sciences, business, medical services, communications and many other fields. But visiting the schools there is no difference between the contemporary classrooms and the last-century ones; students sitting in rows, holding pencil and paper, noting down hurriedly what the teacher is saying and writing so that they know them by heart and give them back at the time of test quickly. This is while many matters have been changed through the sciences and technical development, but education and the students' learning methods and the teachers. Teaching methods have remained unchanged.*" (Hamidi et al., 2011).

According to Blanchard (2017), there is difference between a computer science and information technology as well as in the degree there is. three fields are typically associated with the study of computers at the college level. Computer engineering, information technology and computer science are all disciplines within the same realm of study. However, each specialty focuses on specific aspects of the field, and careers within the three areas vary greatly.

To begin with, computer science – "*computer scientists are, in fact, scientists. They are focused on the theory of computational applications. That means they understand the "why" behind computer programs. Using algorithms and advanced mathematics, computer scientists invent new ways to manipulate and transfer information. Computer scientists are generally concerned with software, operating systems and implementation. Computer scientists can see and make sense of code. Computer science students will learn the fundamentals of different programming languages, linear and discrete mathematics, and software design and development. Computer scientists study the machine itself and understand how and why various computer processes operate the way they do. Computer scientists can "talk" to computers. The field is based in mathematics—the language of computers*". Computer scientists understand why computers work and can create a program or operating system that does what you want it to do (Blanchard, 2017).

As this author states, the next area is computer engineering – "*computer engineers make computer parts work together. Computer engineers are responsible for the research, design and development of computer equipment like circuit boards, microchips, routers, video cards, etc. Some universities may treat this discipline as an off-shoot of electrical engineering. It is beneficial* *for computer engineers to have a grasp of computer science. Computer engineers often deal with hardware-to-software integration, meaning they have to design and build processors and hardware that can support a given program. As technology advances and our devices become smaller and smaller, the main goal of computer engineers is to create microchips and microprocessors that work economically and efficiently. Computer engineering students will study concepts in computer science, engineering and mathematics. By combining these three fields, computer engineers are able to solve hardware problems and create state-of-the-art machines that can handle the many tasks computers perform."*

And the third field – which actually interests us – is information technology. It "*may adopt the monikers information systems or systems administration. IT professionals are the users of technology. IT utilizes existing operating systems, software and applications in tandem to create a larger system that solves a specific business problem. IT constructs a network from established building blocks to carry out a task, such as an automated supply ordering service. Due to the nature of the work, IT professionals are more likely to interact with clients and co-workers outside of their department. They may help explain to a client how to solve technology problems or work with executives and business owners to construct a technology plan that will meet their business needs. IT students will study network and database design in depth, and receive an introduction to basic theory and applied mathematics. Successful IT candidates will possess strong critical thinking skills; IT professionals are tasked with resourcefully and cost-effectively applying the tools*" at their disposal (Blanchard, 2017).

2. Research Results and Data Analysis

In the framework of the IT course, the pupils of EEEK aim to acquire basic skills in computer use. Skills that will work in an auxiliary way in their later life. More specifically:

- They learn to identify, designate, and describe the operation of the main physical units of a typical computer system (central unit, keyboard, mouse, monitor, speakers, printer) and the computer as a single system.
- They know the correct ergonomics and use of the computer.
- They acquire basic knowledge and develop skills in operating systems, general-purpose software (e.g., painting, word processing software, etc.) and Internet service software.
- They acquire skills to use and exploit the PC to meet their needs and desires.
- They demystify the computer and use it as a tool of discovery, creation, and expression, but also as a mental tool and tool for developing thought.
- They use multimedia educational content and conquer concepts such as navigation and interaction.
- They use the computer as a means of communication (e.g., e-mail).
- They develop activities in the context of a variety of individual or group-related tasks.
- They acquire basic knowledge about computer networks as well as the benefits of using them.

- They are sensitized and judged the impact of new technologies on the various areas of human activity.
- Sensitive to issues of copyright protection, information security, Internet behavior, etc.

The pupils of EEEK have a fully equipped computer lab with 7 workstations, internet access via the Pan-Hellenic school network as well as printers, scanners and other peripheral devices (e.g., speakers, microphones, cameras, etc.).

It is important to note that in many cases, the IT workshop is also used in the context of co-teaching, for the needs of other courses (language, social and vocational education, etc.) and innovative programs implemented at school (website creation, environmental education, etc.).

In this paper, we are going to present the results from the observation method we used during our research. We conducted a systematic observation of our participants before our experimental program, and during and after it. We describe our participants in the table below (see Table 1). In Greece, the abbreviation of "EEEK" refers to the special educational vocational training schools with the age range 12 – 18, where our research took place.

Table 1: Participants in the research

Experimental group Special schools group A		**Control group Special schools group B**	
Class	**Number of ID students**	**Class**	**Number of ID students**
5th grade	17 (9 male, 8 female) Age 12 year-old	5th grade	14 (9 male, 5 female) Age 12 year-old
6th grade	15 (12 male, 3 female) Age 13 year-old	6th grade	12 (7 male, 5 female) Age 13 year-old
7th grade	22 (14 male, 8 female) Age 14 year-old	7th grade	23 (17 male, 6 female) Age 14 year-old
8th grade	14 (6 male, 8 female) Age 15 year-old	8th grade	13 (8 male, 5 female) Age 15 year-old
9th grade	7 (4 male, 3 female) Age 16 years-old	9th grade	13 (7 male, 6 female) Age 16 years-old
Total number of ID students from Experimental group: 75		Total number of ID students from Control group: 75	
Total number of participants in the experiment: 150			

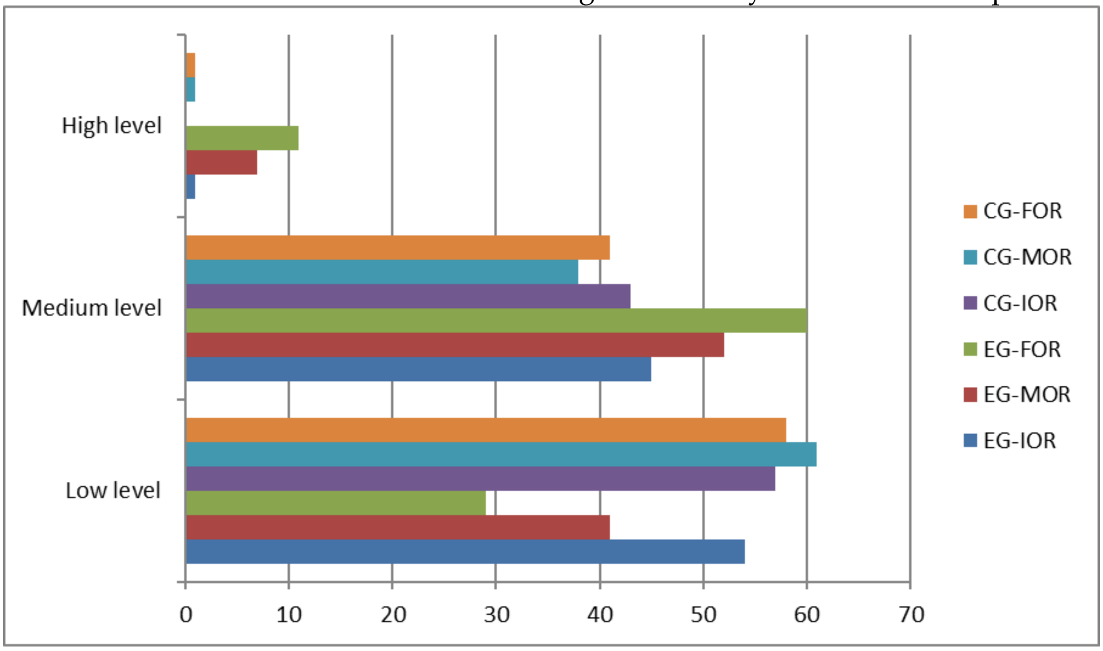
Observation items that we are presenting the results from here are the following:

- ID students are skilled in working with the keyboard of the computer (low level, medium level, high level);
- ID students can start and turn off the computer by themselves (yes, no);
- ID students are familiar with basic operations on the computer (yes, partially, no);
- ID students can operate adequately with their computer (yes, partially, no);

- ID students use the computer, mouse and keyboard according to their functions (yes, partially, no).

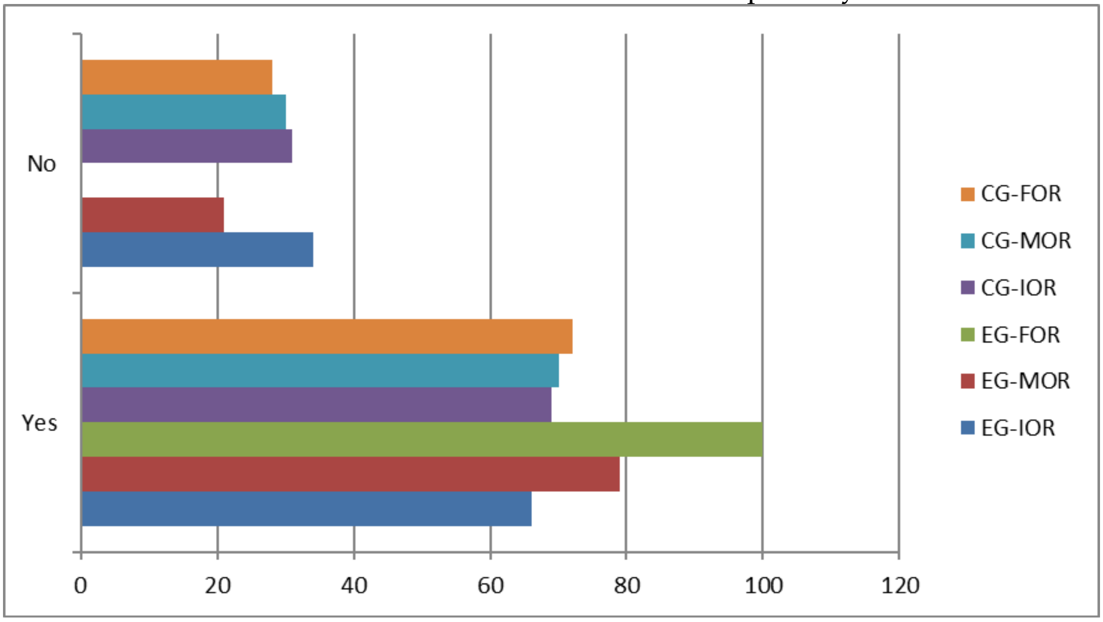
The results are shown on the charts below (see Charts 1, 2, 3, 4, & 5). Abbreviations used in the charts:
EG – experimental group;
CG – control group;
IOR – initial observation results;
MOR – middle observation results;
FOR – final observation results.

Chart 1: ID students are skilled in working with the key board of the computer



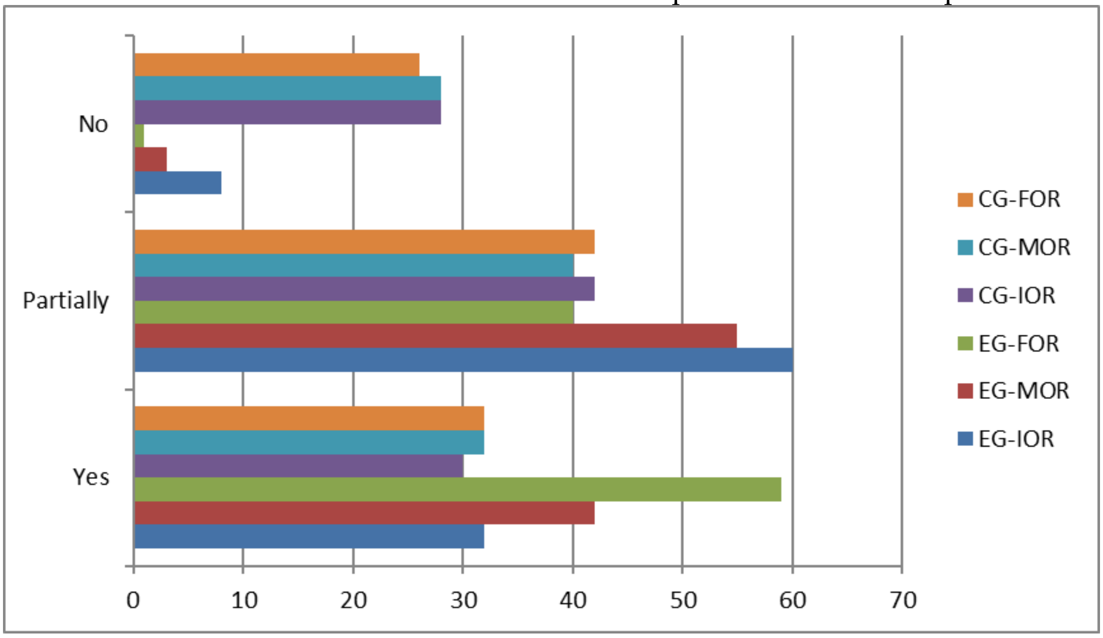
We can see that there is progress in the experimental group participants – their skills progress from the initial assessment, through the middle and eventual with the final results. The percentage of "low level" started minimizing, the "medium level" started gathering more participants and the "high level" scores are more in the final results. This situation is different for the participants from the experimental group – they have kept their results in all of the three levels: they are almost identical in the three times of assessment: the low scores, the mediums results and the high ones are almost the same. This refers to the effectiveness our program has on the skills of the students participating in our experimental group.

Chart 2: ID students can start and turn off the computer by themselves



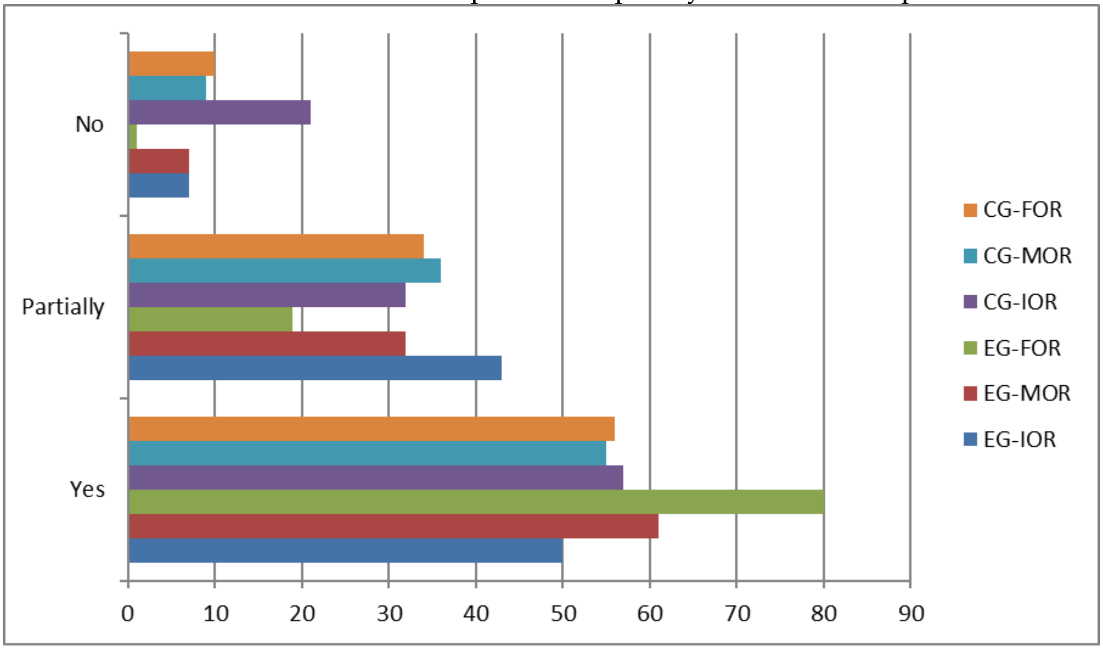
We registered that all of our participants from the experimental group can manage to operate the computer by starting it and turning it off by the end of our school year of education. We can see that the participants in the control group have a slight improvement in this skill by adding one or two percentage after each assessment. These results are related directly to the effectiveness our program has on the skills of the students participating in our experimental group by the end of the school year of our intensive work with them.

Chart 3: ID students are familiar with basic operations on the computer



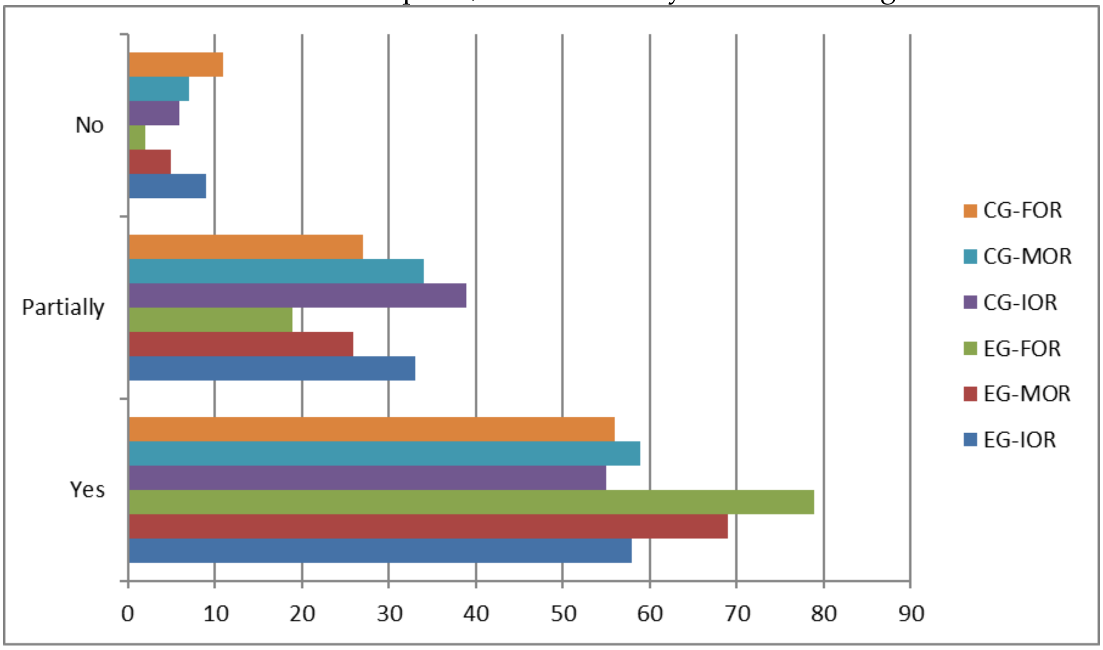
The chart shows how experimental group's students have better results with time while the control group participants are having more linear results.

Chart 4: ID students can operate adequately with their computer



Similarly, to previous results, we find that the control group participants' results are more static rather than the results of the experimental group students. They are more dynamic and show a tendency to the improvement of their operation skills in front of the computer.

Chart 5: ID students use the computer, mouse and keyboard according to their functions



It is the same tendency observed here as well. Below we show a summary of our findings so far.

3. Discussion and Conclusion

Based on the research results we can draw the following conclusions:

1. There is progress in the experimental group participants – their skills progress from the initial assessment, through the middle and eventual with the final results.
2. The percentage of "low level" started minimizing, the "medium level" started gathering more participants and the "high level" scores are more in the final results.
3. This situation is different for the participants from the experimental group – they have kept their results in all of the three levels: they are almost identical in the three times of assessment: the low scores, the mediums results and the high ones are almost the same.
4. This refers to the effectiveness our program has on the skills of the students participating in our experimental group.
5. All of our participants from the experimental group can manage to operate the computer by starting it and turning it off by the end of our school year of education.
6. We can see that the participants in the control group have a slight improvement in this skill by adding one or two percentage after each assessment.

We can summarize that these results are related directly to the effectiveness our program has on the skills of the students participating in our experimental group by the end of the school year of our intensive work with them.

Conflict of Interest Statement

The author declares no conflicts of interest.

About the Author

Alexandros P. Chatzoglou (PhD) is a special education teaching professional. He teaches independent living (social skills) to students with special educational needs. He holds a PhD in Special Education. He has 15 years of professional experience of research and teaching in the field of special education. He has published articles in international conferences about special education.

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