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ABSTRACT for a DISSERTATION

on the topic:

READING DISORDERS IN STUDENTS WITH MILD MENTAL RETARDATION

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INTRODUCTION

Mental retardation (intellectual developmental disorder) is a pathological phenomenon, the recognition of which has a long history and for its description important definitions have been formulated, which have points in which they differ but also converge. According to the American Association on Intellectual and Developmental Disabilities (2009), mental retardation occurs during the developmental period of the individual, i.e. before the age of 18 (some define the end of the developmental period at the age of 21 years) and is characterized by deficits in intellect and adaptive behavior. The older definitions of this company, although referring to the development period, did not determine the individual's age (Stasinis, 2013).

Levels of intellectual developmental disorder are classified and are based on the individual's degree of adaptability and IQ. These factors must be linked to the clinical evaluation and the standardized tests measurement of the intelligence of the students being evaluated. People with an IQ of 85 to 115 have normal intelligence, people with an IQ above 115 are considered intelligent and people with an IQ below 85 are classified into the following levels of mental potential: Borderline intelligence (IQ: 85 - 70) or residual intelligence or at the lower limits of normal. Borderline intelligence is not yet considered mental retardation and individuals at this level of intelligence can attend regular schools, with modifications to the curriculum and teaching methods by the teacher. Also, they can be helped by having parallel support or attend an integration section. Mild mental retardation (IQ: 50 - 69) or slight residual intelligence. Students at this level belong to the group of educable individuals and are characterized by good communication and social skills up to the age of 5 - 6 years. At school age they can attend special schools or integration classes. It is very important, that they learn to take care of themselves and to be as high functioning as possible, throughout their lives. They usually need supervision or assistance in the rest of their lives, and often do quite well in their social integration and dealings. Moderate mental retardation (IQ: 35 - 49), severe mental retardation (IQ: 20 - 34) and profound mental retardation (IQ: < 20) (Stasinis, 2013).

People with mental retardation present significant limitations in their mental function, as well as in their adaptive behavior regarding the expression of their perceptual, practical and social abilities (Stasinis, 2013). Consequently, according to Paraskevopoulos (1980), there are no sudden changes in their skills and adaptation, in

contrast to mental illnesses, where the normal development of the individual is abruptly interrupted by pathological symptoms. In fact, the mentally retarded people are characterized by a lack of acquisition of new knowledge, but are friendly to those around them trying to gain their attention and cooperation. Any deviations in their behavior arise from feelings of anxiety, rejection and contempt from other people.

The teaching of students with mental retardation and, by extension, all students with special educational needs is a perennial issue that concerns specialists. In the Warnock Report, prepared by the British Education Commission in 1978 and chaired by the distinguished scientist Baroness Mary Warnock, the issue of individuals with special educational needs was studied. This report was instrumental in changing the way people with special educational needs were approached and influenced developments in this field in the UK, Europe and around the world.

The Warnock Report, the Declaration of Salamanca by UNESCO in 1994 and the declarations of the United Nations Organization, on the rights of children, are the most important texts of the 20th century, for the child and the human being and were accepted and incorporated into the legislation of most civilized states of the world. These three historical movements for the social inclusion and education of persons with disabilities are based on the philosophy of the concept of “inclusion”. The concept of integration includes the equal co-education of children and young people with and without special educational needs and is based on important assumptions of the science of pedagogy and psychology and is an inalienable right of all people living and act in modern and democratic social structures.

PART 1: THEORETICAL FRAMEWORK

CAPITAL 1: THEORETICAL AND DIAGNOSTIC PROBLEMS OF THE CONDITION “MENTAL RETARDATION”

According to DSM-5-TR intellectual disability or intellectual development disorder shows on during the development period of the person and includes deficits in intellectual and adaptive functions in social, practical and conceptual sectors of everyday life. Specifically, these disorders must be met in intellectual procedures.

Especially, mental retardation is classified in four levels of severity, mild, moderate, severe and profound that is based on a child’s IQ and degree of social adjustment. Some of the characteristics of mild mental retarded people are that they

need more time to learn full oral speech and skills for self-care independence. They, also, have serious problems with reading, writing and arithmetic, with the formation of skills in a social context and difficulties in taking responsibility in marriage and parenting. They need specialized training programs and their IQ ranges from 50 to 69 (Baroff, 1999).

1.1. Etiology of mental retardation

The etiology of mental retardation may be due to biological factors. These genetic causes of mental retardation are related differently problems that arise before the creation of the zygote and are pre-existing in the ovum or sperm or in both of them, or shortly after that against the first cells' divisions. These biological factors may cause some abnormalities in a chromosome of a gamete (chromosomal abnormalities) or in a single gene (monogenic diseases) (Loukopoulou, 2010). Also, there is a great risk of mental retardation due to possible aggravating conditions or medical errors during the perinatal period of the child's life. Some of the genetic causes associated with mental retardation are Down syndrome, Klinefelter syndrome, fragile X syndrome, Prader- Willi syndrome, Turner syndrome, metabolic disorders and environmental factors.

Also, metabolic disorders can cause severe deficits in mental functioning. Metabolic diseases are hereditary and monogenic, i.e. they are caused by mutations of a single gene. The three most well-known metabolic disorders associated with mental retardation are Phenylketonuria, Galactosemia and Tay Sachs. Moreover, environmental factors are not related to genetic causes but appear after conception of the embryo and have a negative effect on the mental development of the child. Depending on the moment they appear, these causes are divided into three categories, namely prenatal, perinatal and postnatal (Paraskevopoulos, 1980).

1.2. Classifications of mental retardation

According to the bibliographic objection, mental retardation has been classified by S. Kirk, the World Health Organization (WHO), the American Psychological Association and the American Association on Mental Retardation.

Kirk's (1972) classification of children with mental disabilities is based on their ability to learn and to be educated in order to refer them to the appropriate type of school for them. So, this classification includes four categories: the slow learners, the

educable mentally retarded, the trainable mentally retarded and the totally dependent or profoundly mentally retarded.

World Health Organization (WHO) classified the intellectual disability through the ICD-11 code range for disorder of intellectual development. The degrees of the disorder of the intellectual development are conventionally calculated through standardized intelligence tests. These tests can be combined with scales to measure and evaluate social adjustment in a structured environment. Specifically, these degrees are the following: mild disorder of intellectual development, moderate disorder of intellectual development, severe disorder of intellectual development, profound disorder of intellectual development, provisional disorder of intellectual development and unspecified disorder of intellectual development (World Health Organization, 2023).

American Psychological Association classified the intellectual developmental disorder through DSM-5-TR (2022). The main domains that people with intellectual developmental disorder have deficits are the conceptual, the social and the practical domain. The classification categories of people with intellectual developmental disorder are mild intellectual developmental disorder, moderate intellectual developmental disorder, severe intellectual developmental disorder and profound intellectual developmental disorder.

According to the 10th AAMR manual (2002), mental retardation is a disability that occurs in people, before the age of 18 years. This disability is characterized by significant limitations in mental skills and adaptive behavior as expressed in conceptual, social and practical adaptive skills. The diagnosis is made using standardized intelligence and adaptive behavior tests.

1.3. Diagnostic aspects of mental retardation

According to Stasinou (2013), there are three basic elements that must be taken into account when diagnosing mental retardation and are related to age, limitation of cognitive functionality and limitation in the development of children's adaptive skills.

More specifically, the age criterion is directly related to the period of development of the individual. Mental retardation becomes apparent before the individuals reach adulthood, i.e., before the age of 18 years. This age marks the completion of their developmental course, which implies the completion of their psychosocial and mental development.

The criterion of the limitation of cognitive functionality is related to the limitation of students' cognitive abilities, i.e., school performance. Their performance is measured through a standardized IQ scale and in the case of children with mental retardation, their performance has a standard deviation of two or more points compared to the average of their peers (APA, 2022).

The criterion of the limitation in the development of children's adaptive skills is related with the performance of children in relation to their perceptual, social and practical skills, which is scored through a scale of measurement of these skills. In the case of children with mental retardation, their performance deviates by two or more standard points compared to their typically developing classmates. Adaptive behavior of people is related to the age and the situations in which they are called to adapt and cope each time. Thus, at each age stage, the adaptive skills that the person must acquire change. The existence of mental retardation in a human being presupposes the existence of both of these limitations.

1.4. Diagnosis and assessment of mental retardation

It is very important, for students with mental retardation, to be educated from teachers with the necessary knowledge, so they can be able to identify the deficits and weaknesses they face and use the appropriate means to evaluate the cognitive level and the social skills of each student, in order to implement the appropriate educational intervention program, so that there is comprehensive support of them.

Panteliadou (2008) states that the teacher must collect some information from the child's parents through a questionnaire or interview, which are related to the family environment in which the child grows up and the way they interact with the other members of the family, the child's school history, their developmental history and their acquired reading skills. Then, the process of documenting the existence of learning needs follows, which is done by observing and evaluating the child with reference to performance criteria (Agaliotis, 2008). During the observation, the teacher monitors, either systematically or unsystematically, the child's learning progress in the classroom and gathers information about the methods which make them able to learn in a better way. The central axes on which the observation of the student's cognitive abilities should be based are organization, attention, oral expression and understanding, decoding and understanding of the written word, writing and thinking (Panteliadou, 2008).

Also, it is essential to make the differential diagnosis of mental retardation, by specialist scientists, from certain disorders, such as learning disorders, pervasive developmental disorders, dementia and borderline intellectual functioning (Manos, 1997). Moreover, it should be emphasized that mental retardation can coexist with other disorders, such as attention deficit hyperactivity disorder, mood disorders, developmental disorders, stereotypic movement disorder and mental disorders (Kakouros & Maniadaki, 2002).

Another necessary process is the evaluation of mental retardation. It includes the administration of standardized tests of intelligence and behavior, which is done by an interdisciplinary team that works together to derive a comprehensive and valid result. This global and comprehensive assessment presupposes the recording and interpretation of the results of the above tests and the communication of the members of the interdisciplinary team and the receiving of information from the people in the close environment of the person with mental retardation. Also, it is very useful to observe the interaction of the individual in the environment in which they live and act, such as school (Bisconer & Ahsan, 2017). This assessment process includes individual's history taking, cooperation of the multidisciplinary team, administration of intelligence test and special ability test and use of adaptive behavior rating scales.

The examinee's history includes all written information collected from the examinees themselves, from people close to them, or from other professionals. The history contains all the general information of the individual such as the examinee's name, date of birth, address, telephone, parents' names and their occupations, the existence of siblings, as well as if there is a referral from a specialist. Also, important is information on burden factors such as hearing impairment, pharmaceutical or neurological factors, dental difficulties, maturation and motor development (Shipley & McAfee, 2013).

The interdisciplinary team that supervises the evaluation and diagnosis of mental retardation consists of different specialties of scientists, such as a psychologist, who evaluates the child's development, on a mental and emotional level and administers the psychometric tests, and a child psychiatrist, who evaluates and organizes the examinee's history. The team also includes a social worker, who collects information and assesses the student's family environment, a special educator, who assesses the student's learning level and creates the educational program according to the

diagnosis and a speech therapist, who assesses the difficulties in speech, speech and articulation, at the level of perception and production (Stathis, 1994).

The assessment of intelligence in children and students can be done with different types of measurement scales. These scales are characterized by precision and predictability. It is indicated that they are used on an individual level, so that it is possible to structure an appropriate individual educational program, based on the needs of each child (Patsoura & Stoidou, 2021). Moreover, students with intellectual disabilities are likely to fall behind in certain areas, while being functional in others, so tests of special abilities are used to assess children's innate and acquired skills. Also, the acquired skills that are related to the quality of the individual's daily life are very basic in order to measure the degree of self-sufficiency and satisfaction that the individuals have in relation to themselves. For this reason, various standardized scales have been created that have the corresponding degree of validity and reliability, which can be used for a large number of goals and axes. In addition, other evaluative tools can, also, be used, such as the interview with the child's parents and the direct observation of the child by the evaluators.

CAPITAL 2: PECULIARITIES OF LANGUAGE FUNCTIONING IN STUDENTS WITH MENTAL RETARDATION

Children with mild mental retardation present peculiarities and difficulties at all levels and parameters of language in relation to their typically developing peers. Specifically, they show difficulties in semantic level, syntactic level, phonological level and pragmatic level of language.

Semantics deals with understanding the meaning of words and sentences. At about one year of age, the children produce their first words, and then acquisition of new words occurs at a rapid rate. By the age of about 30 months, they can produce more than 500 words and understand even more (Fenson et al., 1994), because the process of understanding requires only the recognition of meaning of speech and the production process requires recalling or retrieving from the child's memory the word and its meaning (Kuczaj, 1986). Children with Down syndrome develop vocabulary at a rate comparable to their mental age level or may be delayed due to their articulatory deficits (Bampi & Mylonaki, 2017). Children with Down syndrome mainly develop usage words to label objects at the basic level, such as "car" and "dog" and not more specific secondary, such as "Audi" and "Bulldog" or of a more general overarching

concept, such as, for example, “vehicle” and “animal”. Objects are, also, classified at the basic level, as children usually put all the cars together in one group, all the dogs in another group, etc. (Mervis & Rosch, 1981). Older children with Down syndrome have better understanding of words at a basic level compared to secondary or superordinate levels (Tager-Flushberg, 1985).

The role of functional principles is important in understanding how young children rapidly acquire large vocabularies. These principles limit the set of possibilities that children must consider when they hear a new word, which develops as the child gains experience. Another principle that plays a very important role is the principle of expansion, by which a child can use the word “car” to refer to many objects, such as buses, trains, trucks, etc. Children with Down syndrome expand the meaning of the words in the same way as typically developing children do (Mervis, 1988). Another principle is the whole object constraint (Markman & Wachtel, 1988) which states that words refer to whole objects and not to parts or their characteristics. Also, the novel name-nameless category principle plays a very important role in rapid learning abilities of children’s words, such as the ability to map young people’s concepts of words. More specifically, a child can more easily associate a new word with a new item in a group that is usually familiar with a new item and a new word, (Golinkoff et al., 1995). According to Mervis and Bertrand (1997), children with Down syndrome learn words for the whole object and not for features or parts of objects and master the novel name-nameless category principle at about the same time as acquire the ability of classification. Also, children with mental retardation have difficulties in understanding the speech, as they use the words in their literal sense, because they find it difficult to understand the metaphorical meaning of the words. At the proposal level, they use very few secondary elements of time, place, acquisition, etc. which allow the development of the basic idea of the proposal (Owens, 2016).

2.1. Syntactic level

Some of the peculiarities and difficulties presented by children with mental retardation at all levels and parameters of language in relation to their typically developing peers are related to the syntax of speech. More specifically, they have the same standard of language development but at a slower pace. The length and complexity of the sentences increase with age. They use shorter and less complex sentences, simple declarative or negative sentences and the secondary sentences are

absent. There is an insufficient development of language rules and they use early syntactic structures. Finally, there is the impossibility of revoking whole sentences due to difficulty in representing sentences or coding the dominant important information conveyed by the sentence. On morphology they show a slow pace of conquest of forms (Owens, 2016).

2.2. Phonological level

Regarding phonology, in the process of mastering the meaning of words, children learn how to articulate these words following the phonological rules of the language. Most phonological development is completed by the time children enter school, although they continue to make errors in their articulation, reducing or simplifying their language. Children with mental retardation usually show deficits in their articulation (Rosenberg & Abbeduto, 1993). They have difficulties in understanding and applying the rules that govern the use of the selected language tones. There is an increased use of simplification of the phonological system while their phonological errors are much more than those in normal population. Finally, they have an inconsistency in mistakes, while their most common mistake is the omission of consonants.

2.3. Pragmatic level

Regarding to pragmatics, the limitations faced by people with mental retardation in their ability to respond satisfactorily to the daily demands of their living through their linguistic and interpersonal relationship with other people, have motivated the conduct of research on their pragmatic development (Abbeduto, 1991). However, during the conduct of these investigations, the necessary importance has not been given to finding the etiology, because in many cases of individuals with mental retardation, the etiology remains unknown (McLaren & Bryson, 1987) and there is a strong belief that due to the common cognitive limitations that presented by individuals of this category, the pragmatics will be affected independently of the etiology.

According to Mervis and Bertrand (1997) there is a significant discrepancy in linguistic, cognitive, social and emotional deficits associated with mental retardation in different genetic syndromes. Individuals with mental retardation develop appropriate intentional communication behaviors through movements, gestures and

eye contact to attract attention and express their wishes. In addition, they develop their speech through answering, asking questions, commenting, imitating and “playing” spontaneously with their speech. They demonstrate the ability to perceive the communicative intent of their interlocutor, however, they are less able to understand the emotions that are not expressed verbally and that way their response is not the right one. They are able to choose the right subject according to the given situation, however, they find it difficult to ask questions when the situation is not clear. They need extra verbal help to understand the situation and during the conversation they have a secondary speech due to the weakness control of their environment (Zafeiriou, 2015).

2.4. Development and factors affecting language development in people with mental retardation

Children with mental retardation have a more limited vocabulary than that of typically developing children. Very often, mentally retarded children find it difficult to understand the abstract nature of words that refer mainly to size, spatial relationships and physical features, and they usually use these words in a wrong way and in a different context than the one in which they were taught. The vocabulary of children with intellectual disability is characterized by a small number of verbs, with the result that they find it difficult to express different actions and by a limited number of adjectives, with the result that they do not understand metaphors and similes and cannot give color and texture to their speech.

There are many cognitive skills that children must master in order to become proficient users of language. It is important for them to understand how to classify the speech sounds they hear, into linguistic units, such as words, that have some meaningful meaning. Although specific phonological development presupposes some cognitive control by children, it is a process that occurs indirectly without children being aware of it (Conway & Pisoni, 2008). The child’s memory is of primary importance during the process of language acquisition, as it allows the short-term storage of information.

Stasinou (2013) refers that the main characteristic of children with mental retardation is the reduced ability to learn, as they face difficulties in almost all areas of cognitive functioning. Although their development follows the same stages of development as other typically developing children until they reach adulthood, it

follows a slower pace with the result that it is not completed and they never reach the highest spiritual levels.

Individuals with mental retardation present various behavioral characteristics, which hinder their cognitive development. Students of this category, when faced with difficulties in the learning process, apply cognitive avoidance strategies, while showing reluctance to take initiative in learning. Also, they are unable to utilize the existing problem-solving options and to integrate the newly acquired knowledge into the acquired ones. They have difficulty gathering information from the environment and sorting it, as well as generalizing a learned skill and applying it to situations of everyday life. Also, they are unable to assimilate complex language instructions and focus their attention only on the basic information, ignoring details and individual events. After all, they have limited short-term and auditory memory (Stasinis, 2013).

2.5. Reading development in children

The basic reading skills that a person must have in order to be able to read successfully are comprehension, decoding, fluency, vocabulary knowledge and phonological awareness.

Reading comprehension is the process of understanding a text by the reader as well as their ability to create or extract the meaning of the text and is perceived indirectly, as the reader reports what they understood, what made it difficult for them, what pleased them or what upset them. Comprehension is considered to a large extent responsible for the success or failure of students in school and is ultimately a criterion by which one is considered literate or functionally illiterate in adulthood (Snow, 2002).

The automatic decoding skill is achieved in students through their practice of phonological awareness, syllable composition and understanding of word structure. The continuous and repeated activation of word morphemes increases the speed of access to long-term memory and thus the recall is almost automatic, without much mental effort. The key practice that must be implemented to enhance decoding through phonological and orthographic awareness for automated word reading is repetition and continuous exposure of students to printed material (Levy et al., 1993).

Fluency is a skill that mainly concerns pronunciation, accuracy, automatic word recognition and intonation. Readers who understand a text can read comfortably, accurately, and with the correct intonation either aloud or silently. Because they can

recognize words automatically, they focus on comprehension and use high-level skills, in contrast to poor readers, who, because they have difficulty recognizing words quickly, focus all their effort on reading the words, many times skipping or repeating words, reading syllabically, monotonously and without intonation (Salvaras, 2000).

Vocabulary development presupposes the interaction of phonology, orthography and semantics. Indeed, the relationship of vocabulary to reading comprehension is based on the number of words a person knows and the depth of vocabulary, that is, how well a person knows the semantics of a word. Specifically, the small number of difficult words in a text and the number of words the reader knows are positive factors for the development of reading comprehension (Ouellette, 2006).

Visual-spatial processes have been documented to play a significant role in the state of reading and a lot of studies have reported the relationship between visual-spatial deficits and dyslexia. This is due to the fact that visual perception is the set of skills an individual uses to gather, analyze, and interpret visual information. Because it depends on the functioning of the central nervous system, it is directly related to the child's normal development and learning. Many times, learning disabilities are related to difficulties in interpreting and effectively using visual information (Giovagnoli et al., 2016).

Another significant process for the reading acquisition is phonological awareness. Panteliadou (2001) refers to phonological awareness as a meta-linguistic skill, which is related to the knowledge of the distinct parts of words (syllables and phonemes), while in agreement with Porpodas (2002), the specific skill is the human's ability to transfer from the obvious to the non-obvious features of the language and to handle the basic structural elements of the word, such as phonemes.

2.6. The reading status of people with mental retardation

The characteristics of students with mental retardation in relation to reading are wide-ranging. Students face difficulties in language expression, have poor short-term memory, low level of metacognitive skills and make limited use of logic and organization. Some students, due to their motor difficulties, find it difficult to write by hand or hold the reading manual firmly (Rizopoulos & Wolpert, 2004).

Many people with intellectual disabilities have a low level of reading ability and many of the teaching materials but also many teachers have limited information about

the academic features, assessment procedures and teaching of the language course for students with intellectual disabilities. In recent years, school systems have begun to include students with moderate to severe mental retardation in assessments (Dielas, 2012) and have also included them in more academic instruction, with the result that students have achieved higher and more complex levels than what experts expected. This strong evidence has convinced educational professionals of the need to investigate new, explicit methods of teaching reading for students with intellectual disabilities (Moore-Lamminen & Olsen, 2005).

The didactic approach to reading for students with mental retardation is divided into two categories. One category is the traditional or direct instruction approach which teaches reading as distinct subsets of skills such as phonemes and visual word recognition (Rizopoulos & Wolpert, 2004).

The traditional approach is based on a behavioral model emphasizing the practice and practical application of a set of language skills. The second approach is a progressive, holistic approach which teaches comprehension and critical thinking alongside phonological recognition, decoding, vocabulary and the need for fun (Katims, 2000). Rizopoulos and Wolpert (2004) have concluded that both traditional and progressive approaches can be appropriate for particular students.

According to Snowling (2000), people with mental retardation find it difficult to develop complete and clear phonological representations, and as a result they face many difficulties in procedures that require the use of phonological and orthographic codes. One of these processes is learning and using basic graphics-phonemic correspondences of the alphabet (Vellutino et al., 1996). Many students with mental retardation are unable to use these correspondences to decode words, resulting in their reading being extremely slow and error prone (Rack et al., 1992). These students are unable to read new or difficult texts correctly and quickly and develop their visual vocabulary, so they can read words they have encountered and handle multiple times, without involving the decoding process, which is usually followed in reading new words. This leads people with retardation to read, slowly and with difficulty, only the difficult words, the low frequency words and the frequently encountered ones.

Difficulties in learning and automating alphabetic and decoding skills result in the refusal of many children with intellectual disabilities to read words that either they have not come across before or they find very difficult and to make errors in verbal substitution, such as the reading of the word “television” as “telephone” or semantic

substitution errors such as the reading of the word “dark” as “black” (Wimmer & Goswami, 1994). Students of typical development do not present such reading difficulties (Frith, 1985).

Students with mental retardation due to the difference they present in relation to their peers in cognitive skills face many reading difficulties during their transition to higher educational levels. Stasinou (2013) states that students with mental retardation during their transition to higher educational levels reveal more deficits because they are involved with learning skills that require higher intellectual skills and higher conceptual approaches that they are unable to follow. The reading difficulties faced by these students during their transition to the higher educational levels, are an obstacle in their learning process mainly in the subject of language but also in other learning subjects such as mathematics, history and geography.

Students with mental retardation should receive specialized training during their studies in primary school regarding the structure of written and spoken language, such as formulating and producing simple and complex sentences and enriching their vocabulary. Also, they must practice activities that help to master the skills of the pre-reading and pre-writing stage, such as perception, attention to visual and auditory stimuli, the connection of the spoken word with the written word and orientation in space and time. If students attending elementary school do not master the mechanisms of reading and writing, during their transition to higher educational levels they will show deficits in important areas of language development, such as understanding the written word, reading and understanding signs and codes written communication and an abundance of textual genres, the understanding of factual elements and figures of speech, weakness in grammar, sentence structure, distinguishing verb tenses, vocabulary, spelling and word composition (Panopoulos, 2019).

CAPITAL 3: SPECIAL EDUCATION FOR STUDENTS WITH MILD MENTAL DISABILITIES IN GREECE

The teaching of the language course in primary schools aims to develop students’ oral language skills and to help them move from spontaneous oral speech to literate oral speech (Ministry of Education and Religious Affairs, 2004). In particular, the aim is to develop communication skills, enabling children to handle oral and written speech appropriately in various situations at school and in everyday life.

The therapeutic approach for students with mental retardation should include both long-term and short-term goals of intervention. Long-term goals include meeting daily communication needs, improving perception and recognition of various stimuli, and using conventional morphology, syntax and pragmatics in interactions with others. Short-term goals should include reinforcing maintenance of eye contact with ongoing encouragement, and eye contact is preferred with the provision of favorite objects and food. The use of toys with sounds and movements can also help focus attention there. It is also a good way to increase the frequency of traditional intentional communication by moving the desired object a little further away so that it can be protested or requested through appearance, movement or sound.

The behavioral approach targets learning, success criteria and learning outcomes for students through the analysis of skills and behavior modification techniques in children with intellectual disabilities. This approach contributes to the learning of social skills and the development of self-care, but has the disadvantage that specific knowledge is not retained and generalized, as this approach aims to acquire knowledge without the child understanding it. The cognitive approach aims at the interaction between the child and the environment as well as between mother and child. Educational practices aim to organize the environment through the active participation of the child with mental disorders. In this approach, adults are not in full control and the focus is on the process and the outcome (Panteliadou & Argyropoulos, 2011).

Moreover, educational software can be used for teaching students with mental retardation. The definition of software includes a program of instructions that can be used and executed by a computer system, and these instructions are expressed in a computer language (Papas, 1989). Educational software is based on certain pedagogical principles and approaches that enhance learning and collaborative interaction. The software can be used as a tool by teachers or as a support material for self-training by students (Panagiotakopoulos et al., 2003).

PART 2: RESEARCH DESIGN

CAPITAL 4: RESEARCH METHOD

4.1. Purpose statement

The purpose of this specific work is to compare students with mild mental retardation and students with typical development, who attend the second and third grade of elementary school, regarding reading skills and specifically regarding decoding, fluency, morphology-syntax and comprehension. To accomplish this purpose, the “Reading test- Test A” was administered, which helped to compare the results scored by typically developing students in relation to students with mental retardation.

4.2. Research objectives

The research objectives of this specific research are as follows:

1) The comparison of typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the decoding of a read text.

2) The comparison of typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the reading fluency of the students.

3) The comparison of typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the morphology-syntax of read sentences.

4) The comparison of typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the comprehension of a read text.

4.3. Research hypotheses

The research hypotheses, on which this specific research is based, are as follows:

1) Delayed intellectual and language development in students with a mild degree of mental retardation leads to secondary disorders in reading skills associated with clear difficulties in decoding, fluency, morphology and syntax and understanding the meaning of a read text.

2) Preserved intellectual and language functions in students with typical development suggest good reading skills and high scores on indicators of decoding, fluency, morphology-syntax and reading comprehension.

3) On measures of decoding, fluency, morphology-syntax, and reading comprehension, students with mild mental retardation will show significantly lower scores than typically developing students of the same age.

4.4. Research questions

The research questions that this research attempts to answer are as follows:

1) What are the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the decoding of a read text?

2) What are the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the reading fluency of the students?

3) What are the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the morphology-syntax of read sentences?

4) What are the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the comprehension of a read text?

4.5. Methodological framework

The specific study that was conducted is based on the quantitative research design, because the purpose of the research is to find the relationships between the variables and to interpret its results from the population under study. The research questions asked led to the basic sampling unit which is students with typical development and students with mild mental retardation attending primary school, while then the research population was determined, which consists of students with typical development and students with mild mental retardation, who attend the second and third grade of general primary school. Through the research population, the studied sample was determined, which was chosen through selective sampling, i.e. the students who were chosen, were immediately available to take part in the research, due to the ease of gathering the data in a reasonable period of time (Papanastasiou &

Papanastasiou, 2014). The sample of the study consisted of students with typical development and students with mild mental retardation studying in the second and third grade of Greek primary schools in different prefectures (Attica, Viotia, Thessaloniki, Ioannina, Cyclades, Larissa, Pieria and Rethymno).

4.6. Research participants

A total of 80 students, who attended the second and third grade of primary school, participated in this research. Of this total number of students, 40 students studied in the second grade of primary school and the other 40 students studied in the third grade of primary school. From the total of 40 students in the second grade of elementary school, 20 students were of typical development and the other 20 students were mildly mentally retarded. The median chronological age of all typically developing students, attending the second grade of elementary school, was 7-8 years old. The mean chronological age of all the students with mild mental retardation, studying in the second grade of elementary school, was 7-8 years old, with the exception of four students who were 9 years old. The median chronological age of all typically developing students, attending third grade elementary school, was 8-9 years old and the median chronological age of all students with mild mental retardation, attending third grade elementary school, was 8-9 years old, with the exception of five students who were 10 years old.

4.7. Data collection tool

A standardized evaluation test was used as a mean of data collection for the conduct of this study, which is an objective mean of data collection with the aim of measuring comparable variables concerning the subjects of the research, under controlled conditions, as the procedures for administering, scoring and interpreting the results are the same for all individuals in the sample. The method of administering the test was a personal visit to each school attended by the participants. This specific method was chosen as the most appropriate because it allows the researcher to solve any questions the students have regarding the test activities (Papanastasiou & Papanastasiou, 2014). The purpose of the use of this tool is to assess the reading disorders of the students in mild retardation comparatively to their same aged typical developed students in general schools and support the special educational needs of

these children via personalized teaching methods based on their deficits and abilities and promoting the inclusive way of teaching methods.

4.8. Description of the tool

Before administering the assessment test, an introductory note was distributed to the parents of the participants, which included the researcher's details, the purpose of the assessment test, the importance of their children's participation in the research in terms of scientific validity and reliability and provides the necessary assurances to ensure the anonymity of the participants. Subsequently, a responsible statement was distributed in which the parents of the students, signed consent for the children's participation in the research process and assured them of the termination of the process, in case the students desire so.

Subsequently, the student was given the "Reading Test - Test A" tool, which is standardized to the Greek student population and assesses the reading skills of male and female students attending elementary school up to the third grade of high school (Panteliadou & Antoniou, 2007). It contains and evaluates four main sections (decoding words, reading fluency, use of rules of morphology and syntax, text comprehension) through specific activities.

The test consists of 10 exercises, which can be answered orally by the students. For each area, the student's grade is obtained and at the end, each student's "Test A" index is calculated, which indicates the student's position in their overall reading (Panteliadou & Antoniou, 2007). The score range for the entire test varies from 0 to 440 points for each correct answer.

In more detail, at the beginning of the test there are questions about the students' demographic information (mother tongue, class, area of residence), without filling in the students' name and school, for reasons of ensuring their anonymity. Regarding the structural axes of the test, decoding is evaluated by scales 1, 2, 3 and the score range for this axis is from 0 to 116 points for each correct answer. Fluency is evaluated by scale 4 and the score range for this axis is from 0 to 279 points for each read word. Morphology and syntax are evaluated by scales 5, 6, 7, 8. **Scale 7 of the test was not applied in this particular research study.** The score range for this axis is from 0 to 20 points for each correct answer. Comprehension is evaluated by scales 9 and 10 and the score range for this axis is from 0 to 25 points for each correct answer. The

“Reading Test-Test A” is easy to use and the average administration time is 40 minutes

In the **scale 1**, the skill of reading nonsense words is assessed using a phonological strategy. The student must read twenty-four nonsense words, which are presented to the student in three columns of eight words each one. Of these words, two are two-syllable, eight are three-syllable, eight are four-syllable and six are five-syllable. The student reads the words column by column and the assessor gives one point for each correct answer.

The **scale 2** assesses the skill of reading real Greek words using an orthographic or phonological strategy. The student reads fifty-three real words, which are presented to the student in six columns of eight words each one and in one column of five words. Of these words, six are disyllabic, nine words are three-syllable, eight words are four-syllable, twelve words are five-syllable, thirteen words are six-syllable, three words are seven-syllable and one word is eight-syllable. The evaluator gives one mark for each correct answer, while for each incorrect answer they mark zero.

The **scale 3** assesses the skill of distinguishing meaningful words from nonsense words. The student reads thirty-nine mixed real and nonsense words, which are presented in four sets of three words, three sets of four words, and three sets of five words. Of these twenty-two are real words, of which ten are disyllabic and twelve are trisyllable. The remaining seventeen words are nonsense, of which four are disyllabic and thirteen are trisyllabic. The student reads the words in each row and then says what the real words are. For each real word reported as real and for each nonsense word not reported as real, they score one point and for each nonsense word reported as real and for each real word not reported as real, they score zero.

The **scale 4** assesses the reading fluency skill. The student reads a descriptive text of three paragraphs, which consists of twenty-three lines and two hundred and seventy-nine words. This text describes the consequences of the development of technology on the atmospheric pollution of the planet. The evaluator times the student’s reading for one minute, marks a bracket at the point where reading stopped and circles the words that were read incorrectly, skipped, or read by them. For each word that is read correctly, the evaluator marks it with one point.

The **scale 5** assesses the skill of forming verbs in different persons, conjugations and tenses. The student is presented with eight sentences, which have an

empty verb position, which is given in parentheses in the first person singular of the present tense. The student reads the entire sentence silently or aloud. Then, they re-read it, orally filling in the correct word or words in the blank, putting it in the correct person, conjugation and tense, so that it matches the meaning of the sentence. An answer is evaluated as one regardless of the number of words used. For each correct answer, the evaluator gives one point and for each incorrect answer they give zero.

The **scale 6** assesses the skill of producing complex words and handling the morphological elements of the language, namely the number and declension of nouns, tense, inflection, person and number of verbs. The student is given nine sentences with a blank in the place of some compound verb, noun or adjective, which is given in parentheses in the original form of the two compounds. The student must join the two compound parts and make the compound word by putting it in the correct tense, person, case or conjugation respectively, so that it matches the rest of the meaning of the sentence. The evaluator scores one point for each correct answer and zero for each wrong answer.

The **scale 8** assesses the skill of writing sentences. The student reads a series of words and forms a sentence with them. The student is given five sets of words. Each row has a sentence, in which its words are presented in jumbled order and the student must put the words in the correct order to form a sentence in correct syntactic order. The student should have recognized that the sentence begins with the word that has a capital letter. The evaluator scores one point for each correct answer and zero for each incorrect answer.

The **scale 9** assesses the skill of recognizing semantically equivalent sentences. The student reads the five sentences in each exercise and mentions the two sentences that have the same meaning. Five groups of sentences are presented to the student and each group consists of five sentences. The student can mention the entire sentences or only the numbers that represent them. The evaluator scores one point for each correct answer and zero for each incorrect answer.

The **scale 10** assesses the text comprehension skill. The student reads the text aloud or silently, depending on what makes it easier for them. Then the assessor reads aloud the questions and the possible answers with the number that corresponds to each answer and the student indicates the correct answer, saying the complete sentence or the number that represents it. During the questions, the student can refer back to the text. More specifically, the student is presented with three different texts,

with seven comprehension questions in each one. Each question has four possible answers, of which only one is correct. The first text is narrative, consists of twelve lines and has the title “The exploration”, the second text is descriptive, consists of nine lines and has the title “The education of Alexander the Great” and the third text is descriptive, consists of eleven lines and has the title “The Mayan civilization”.

4.9. Research methodology

The resulting data were extracted into a spreadsheet, which was used to process and analyze the results. The data was analyzed using the statistical software package IBM SPSS Statistic, Version 20. Descriptive statistical analysis was applied to analyze the demographic data, the results of which are presented through figures. The purpose of descriptive statistics is the collection, organization and summary presentation of data in an easy-to-understand format (Chalikias et al., 2015).

CAPITAL 5: ANALYSIS OF RESEARCH RESULTS

5.1. Descriptive statistics

Table 1 presents the descriptive statistics of the whole sample for the study variables. Considering the possible decoding range, the mean was moderately estimated ($M=55,18$, $SD=34,91$), with the most frequent errors being the omission of letters and syllables ($M=19,54$, $SD=16,74$), followed by replacing letters and syllables ($M=15,19$, $SD=9,07$), adding redundant letters and syllables ($M=13,43$, $SD=11,17$), and shuffling letters ($M=12,68$, $SD=10,7$).

Among the words they were able to read, errors were associated with word repetition (perseverations) - reading the same word ($M=4,39$, $SD=4,07$) and word omissions ($M=4,24$, $SD=4,21$).

Regarding the possible range of morphology and syntax, the mean was in the low range ($M=7,50$, $SD=5,62$). The most frequent and more pronounced errors are at the level of morphology - forming verbs ($M=5,09$, $SD=2,42$) and generating complex words ($M=4,88$, $SD=2,39$), followed by errors at the level of syntax - sentence construction ($M=2,54$, $SD=1,35$).

A low mean value of the correct answers ($7,59$, $SD=5,55$) was also registered at the semantic level - sentence comprehension.

Table 1: Descriptive Statistics of variables for the whole sample (control and experimental)

Variable	M	SD	Min	Max	Possible Range
<i>Decoding</i>	55,18	34,91	5,00	114,00	[0,116]
Replacement of letters and syllables	15,19	9,07	0,00	37,00	
Omission of letters and syllables	19,54	16,74	0,00	72,00	
Addition of superfluous letters and syllables	13,43	11,17	0,00	55,00	
Reversal of letters	12,68	10,77	0,00	48,00	
<i>Fluency</i>	30,78	22,08	2,00	79,00	[0,279]
Repetitions of the same words	4,39	4,07	0,00	21,00	
Omission of words	4,24	4,21	0,00	19,00	
<i>Morphology-syntax</i>	7,50	5,62	0	19	[0,20]
Verb formation	5,09	2,42	0	8	
Production of complex words	4,88	2,39	0	8	
Production of sentences	2,54	1,35	0	7	
<i>Comprehension</i>	7,59	5,55	0,00	22,00	[0,25]
Comprehension wrong	17,41	5,55	3,00	25,00	

Table 2 presents the results for the performance of students. It seems that, decoding performance is 47,56%, fluency 11,03%, morphology-syntax is 37,50% and comprehension is 30,35%.

Table 2: Descriptive statistics of performances for the whole sample (control and experimental)

Variable	M	SD	Minimum	Maximum
Decoding	47,56	30,09	4,31	98,28
Fluency	11,03	7,91	0,72	28,32
Morphology-syntax	37,50	28,08	0,00	95,00

Comprehension	30,35	22,22	0,00	88,00
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5.2. Normality of variables

Table 3 presents results of normality test for the scale variables of study using the Shapiro Wilk test. All variables are not normally distributed except from “Replacement of letters and syllables” ($p=0,149$). Figures 5-8 represent the histograms of variables. Thus, to compare performances between 2 small independent samples ($n<30$), non-parametric Mann Whitney test¹(comparison of medians) will be used at all variables except from “Replacement of letters and syllables” where independent samples t-test (comparison of means) will be used. In addition, to examine correlations between scale variables, the non-parametric Spearman coefficient will be used.

Table 3: Test of normality using Shapiro Wilk test for the whole sample (control and experimental)

Variable	W (80)	p-value
<i>Decoding</i>	0,912	<0,001
Replacement of letters and syllables	0,977	0,149
Omission of letters and syllables	0,866	<0,001
Addition of superfluous letters and syllables	0,914	<0,001
Reversal of letters	0,910	<0,001
<i>Fluency</i>	0,925	<0,001
Repetitions of the same words	0,874	<0,001
Omission of words	0,867	<0,001
<i>Morphology-syntax</i>	0,938	0,001
Verb formation	0,912	<0,001
Production of complex words	0,927	<0,001
Production of sentences	0,912	<0,001

¹Mann Whitney test was used for variables that follow a non-normal distribution, otherwise t-test was used

<i>Comprehension</i>	0,944	0,002
Comprehension wrong	0,944	0,002

5.3. Comparison of separate variables between students with normal development and students with a mild degree of mental retardation

5.3.1. Reading –decoding

Second class

According to Table 4 statistically significant results were presented in all decoding variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class.

Table 4: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in decoding variables

Variable	Control group	Experimental group	U/t*	p-value
<i>Decoding</i>	95,5	18,5	U=3	<0,001
Replacement of letters and syllables	8,85	21,85	t (38) = -5,794	<0,001
Omission of letters and syllables	7,0	32,50	U=20,5	<0,001
Addition of superfluous letters and syllables	3,5	20,5	U=22	<0,001
Reversal of letters	3,0	16,5	U=27	<0,001

In particular, for second class, median decoding value of students with normal development-control group (95,5) is statistically significantly higher ($p < 0,001$) than median of students with a mild degree of mental retardation (18,5). In addition, median omission of letters and syllables value of students with normal development (7,0) is statistically significantly lower ($p < 0,001$) than median of students with a mild degree of mental retardation (32,5). Furthermore, median addition of superfluous letters and syllables value of students with normal development (3,5) is statistically significantly lower ($p < 0,001$) than median of students with a mild degree of mental retardation (20,5). Last, median reversal of letters value of students with normal development (3,0) is statistically significantly lower ($p < 0,001$) than median of

students with a mild degree of mental retardation (16,5), considering second class (Figure 1).

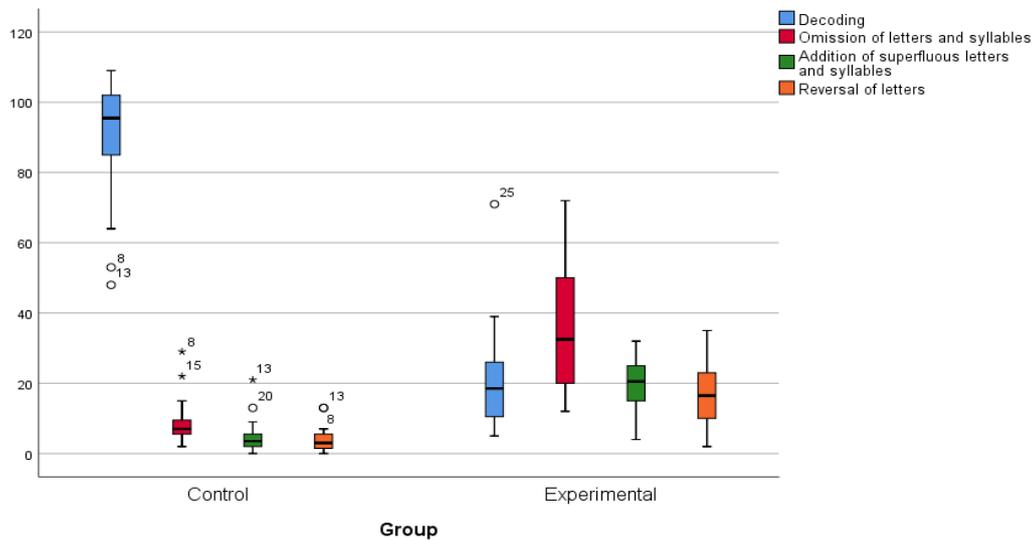


Figure 1: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in decoding variables

According to Figure 2, mean replacement of letters and syllables value of students with normal development-control group (8,85) is statistically significantly lower ($p < 0,001$) than mean value of mild degree of mental retardation-experimental group (21,85), considering second class.

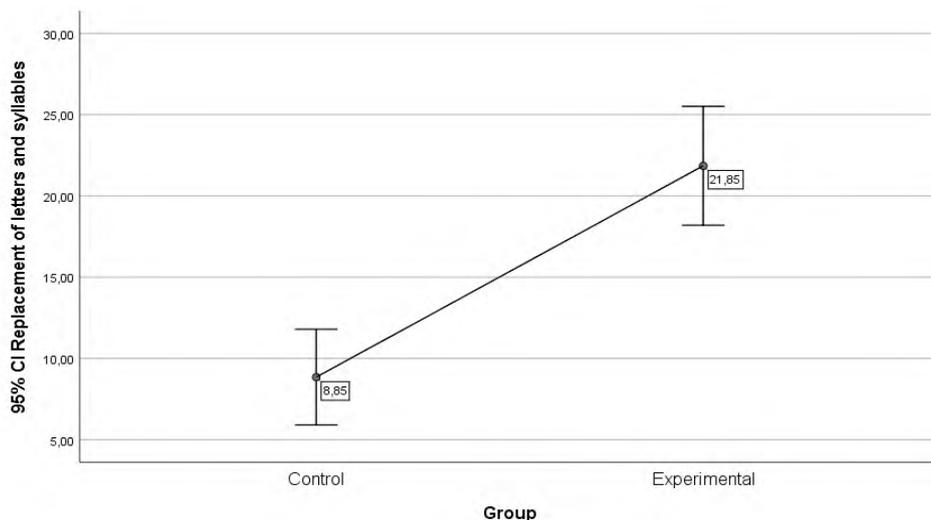


Figure 2: Mean differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in replacement of letters and syllables

Third class

According to Table 5, statistically significant results were presented in all decoding variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class.

Table 5: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in decoding variables

Variable	Control group	Experimental group	U/t*	p-value
<i>Decoding</i>	81	28,5	U=23,5	<0,001
Replacement of letters and syllables	12,05	18,0	t (38) = -2,302	0,027
Omission of letters and syllables	8,5	19,5	U=58	<0,001
Addition of superfluous letters and syllables	5,5	21,0	U=44	<0,001
Reversal of letters	8,5	17,5	U=70	<0,001

In particular, for third class, median decoding value of students with normal development-control group (81,0) is statistically significantly higher ($p < 0,001$) than median of students with a mild degree of mental retardation-experimental group (28,5). Also, median omission of letters and syllables value of students with normal development (8,5) is statistically significantly lower ($p < 0,001$) than median of students with a mild degree of mental retardation (19,5). In addition, median addition of superfluous letters and syllables value of students with normal development (5,5) is statistically significantly lower ($p < 0,001$) than median of students with a mild degree of mental retardation (21,0). Last, median reversal of letters value of students with normal development (8,5) is statistically significantly lower ($p < 0,001$) than median of students with a mild degree of mental retardation (17,5), considering third class (Figure 3).

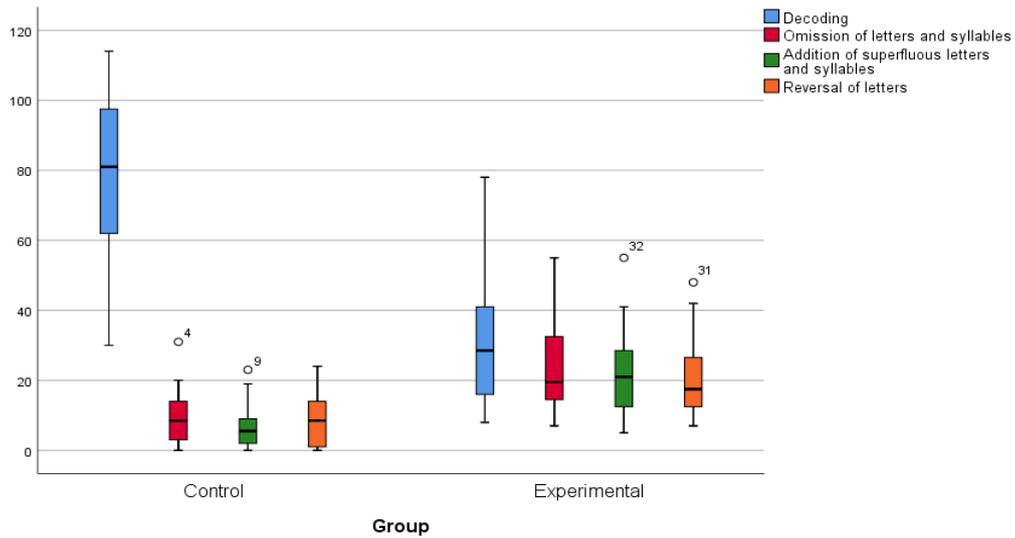


Figure 3: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in decoding variables

Figure 4 indicates that mean replacement of letters and syllables value of students with normal development (12,05) is statistically significantly lower ($p=0,027$) than mean value of students with a mild degree of mental retardation (18,0), regarding third class.

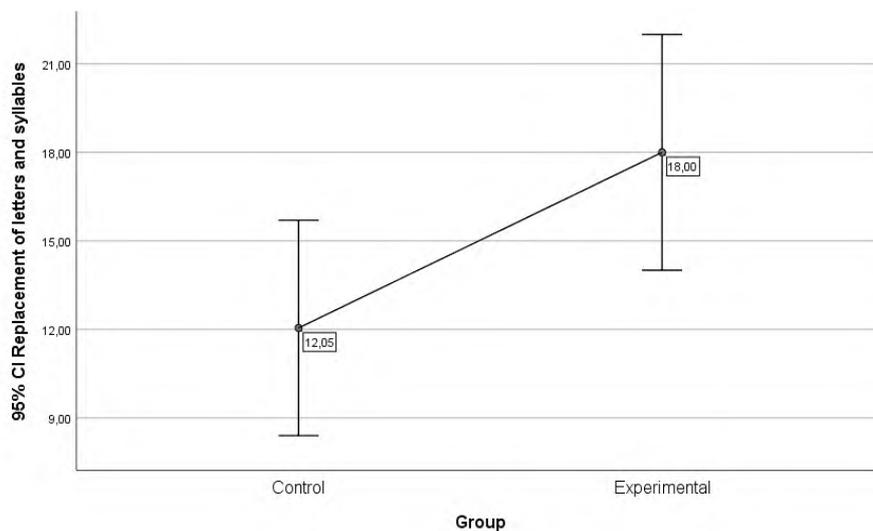


Figure 4: Mean differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in replacement of letters and syllables

5.3.2. Reading fluency

Second class

According to Table 6, statistically significant results were presented in fluency and repetitions of the same word between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class.

Table 6: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in fluency variables

Variable	Control group	Experimentalgroup	U	p-value
<i>Fluency</i>	46,5	9,5	5,5	<0,001
Repetitions of the same words	1,5	4,5	128	0,049
Omission of words	2	3	142,5	0,114

In particular, for second class, median fluency value of students with normal development-control group (46,5) is statistically significantly higher ($p < 0,001$) than median value of students with a mild degree of mental retardation-experimental group (9,5). In addition, median repetition of the same words value of students with normal development (1,5) is statistically significant lower ($p = 0,049$) than median value of students with a mild degree of mental retardation (4,5), considering second class (Figure 5).

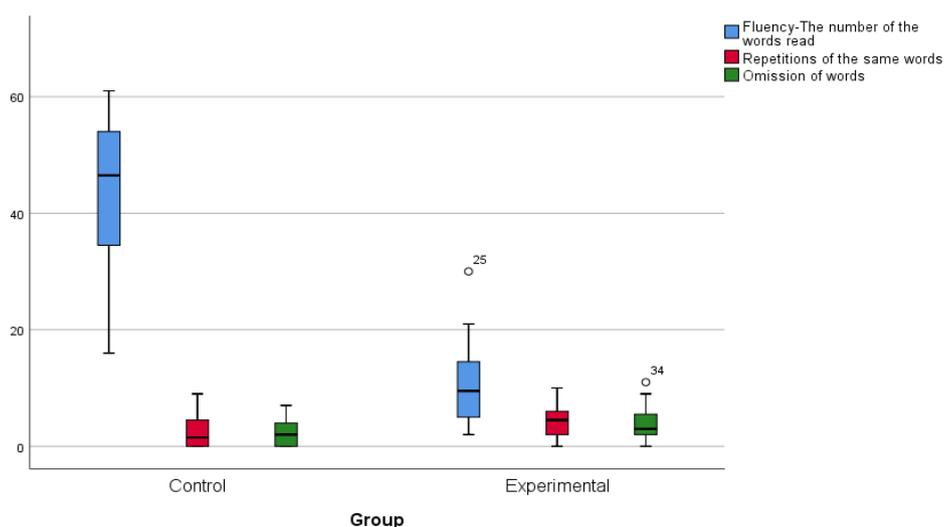


Figure 5: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in fluency variables

Third class

According to Table 7, statistically significant results were presented in fluency and repetitions of the same word between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class.

Table 7: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in fluency variables

Variable	Control group	Experimental group	U	p-value
<i>Fluency</i>	54	14	6,5	<0,001
Repetitions of the same word	3,5	6,5	121	0,031
Omission of words (wrong)	4,0	6,0	169	0,398

In particular, for third class, median fluency value of students with normal development-control group (54) is statistically significantly higher ($p < 0,001$) than median value of students with a mild degree of mental retardation (14). In addition, median repetition of the same words value of students with normal development (3,5) is statistically significantly lower ($p = 0,031$) than median value of students with a mild degree of mental retardation (6,5), considering third class (Figure 6).

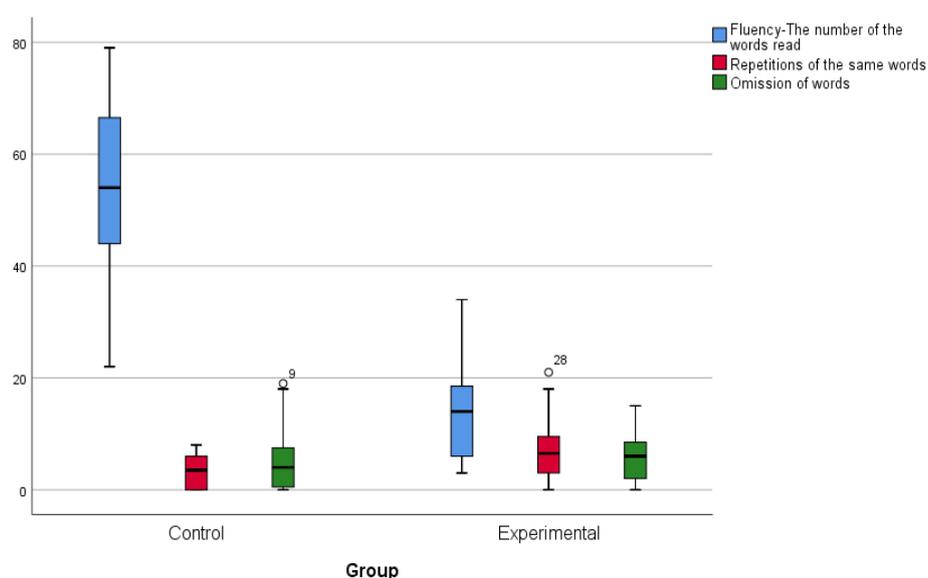


Figure 6: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in fluency variables

5.3.3. Morpho-syntactic level in reading

Second class

According to Table 8 statistically significant results were presented in all morphology-syntax variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class.

Table 8: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in morphology-syntax variables

Variable	Control group	Experimental group	U	p-value
<i>Morphology-syntax</i>	12	2	44,5	<0,001
Verb formation	3	7	34	<0,001
Production of complex words	3,5	7	44	<0,001
Production of sentences	2	4	61	<0,001

In particular, for second class, median morphology-syntax value of students with normal development-control group (12) is statistically significant higher ($p < 0,001$) than median value of students with a mild degree of mental retardation-experimental group (2). In addition, median verb formation value of students with normal development (3) is statistically significantly lower ($p < 0,001$) than median value of students with a mild degree of mental retardation (7). Furthermore, median of production of complex words of students with normal development (3,5) is statistically significantly lower ($p < 0,001$) than median value of students with a mild degree of mental retardation (7). Lastly, median of production of sentences of students with normal development (2) is statistically significantly lower ($p < 0,001$) than median value of students with a mild degree of mental retardation (4), regarding second class (Figure 7).

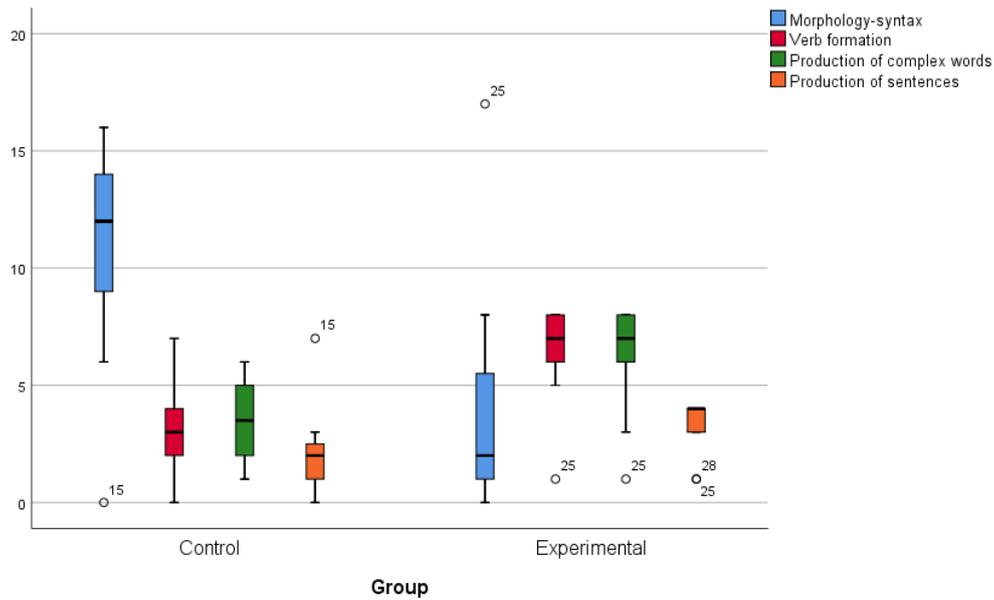


Figure 7: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in morphology-syntax variables

Third class

According to Table 9 statistically significant results were presented in all morphology-syntax variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class.

Table 9: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in morphology-syntax variables

Variable	Control group	Experimental group	U	p-value
<i>Morphology-syntax</i>	11,0	2,5	39,5	<0,001
Verb formation	3,5	7,5	64	<0,001
Production of complex words	3,0	7,0	52	<0,001
Production of sentences	2	3,5	56	<0,001

In particular, for third class, median morphology-syntax value of students with normal development-control group (11,0) is statistically significant higher ($p < 0,001$) than median value of students with a mild degree of mental retardation-experimental group (2,5). In addition, median verb formation value of students with normal development (3,5) is statistically significantly lower ($p < 0,001$) than median value of

students with a mild degree of mental retardation (7,5). Furthermore, median of production of complex words of students with normal development (3,0) is statistically significantly lower ($p<0,001$) than median value of students with a mild degree of mental retardation (7,0). Lastly, median of production of sentences of students with normal development (2) is statistically significantly lower ($p<0,001$) than median value of students with a mild degree of mental retardation (3,5), regarding third class (Figure 8).

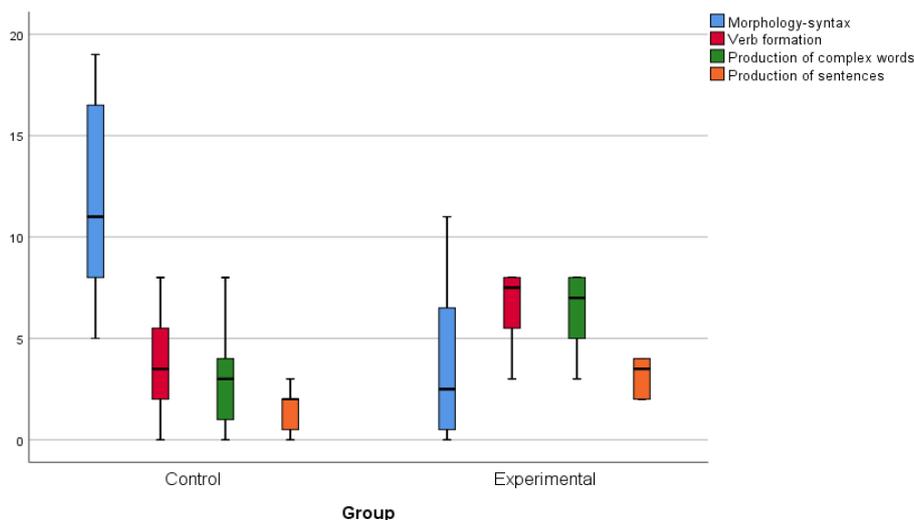


Figure 8: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in morphology-syntax variables

5.3.4. Reading comprehension

Second class

According to Table 10, statistically significant results were presented in comprehension variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class. In particular, median comprehension correct value was 8,5 for students with normal development-control group, is statistically significantly higher ($p<0,001$) than median of students with a mild degree of mental retardation (3). Similarly, median comprehension wrong value was 16,5 for students with normal development, statistically significantly lower ($p<0,001$) than median of students with a mild degree of mental retardation (22), considering second class (Figure 9).

Table 10: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in comprehension variables

Variable	Control group	Experimental group	U	p-value
<i>Comprehension</i>	8,5	3,0	35,5	<0,001
Comprehension wrong	16,5	22,0	35,5	<0,001

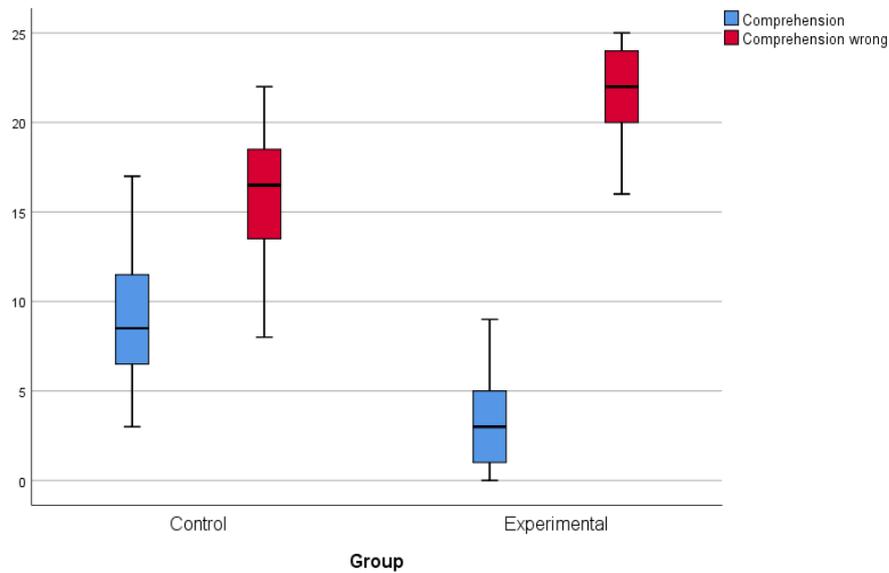


Figure 9: Median differences between students with normal development (control) and students with a mild degree of mental retardation (experimental) of second class in comprehension variables

Third class

According to Table 11, statistically significant results were presented in comprehension variables between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class. In particular, median comprehension correct value was 13,5 for students with normal development (control group), statistically significantly higher ($p < 0,001$) than median of students with a mild degree of mental retardation-experimental group (4).

Table 11: Comparisons between students with normal development (control) and students with a mild degree of mental retardation (experimental) of third class in comprehension variables

Variable	Control Group	Experimental group	U	p-value
<i>Comprehension</i>	13,5	4,0	41	<0,001
Comprehension wrong	11,5	21,0	41	<0,001

5.3.5. Comparative data analysis

Figure 10 indicates, that for students of second class, higher differences between students with normal development (control) and students with mild degree of mental retardation (experimental) were observed in decoding performance ($M_{\text{control}}=77,11$, $M_{\text{experim}}=18,53$) followed by morphology-syntax ($M_{\text{control}}=55,60$, $M_{\text{experim}}=17,25$) and comprehension performance ($M_{\text{control}}=36,60$, $M_{\text{experim}}=13,40$), with the least difference to be in fluency performance ($M_{\text{control}}=15,63$, $M_{\text{experim}}=3,89$).

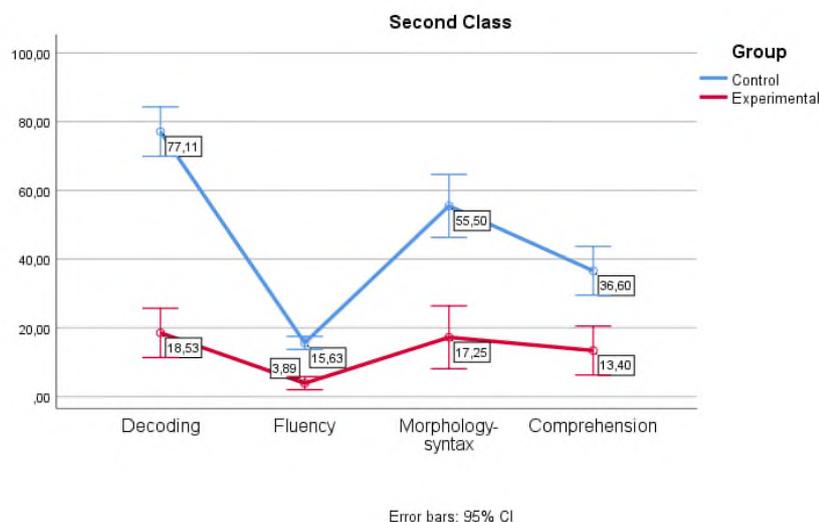


Figure 10: Mean value of performances for students of normal development (control) and students with a mild degree of mental retardation (experimental) of second class

Figure 11 indicates, that for students of third class, higher differences between students with normal development (control) and students with mild degree of mental retardation (experimental) were observed in decoding performance ($M_{\text{control}}=68,19$, $M_{\text{experim}}=26,42$) followed by morphology-syntax ($M_{\text{control}}=58,25$, $M_{\text{experim}}=19,00$) and comprehension performance ($M_{\text{control}}=53,00$, $M_{\text{experim}}=18,40$), with the least difference to be in fluency performance ($M_{\text{control}}=19,52$, $M_{\text{experim}}=5,09$).

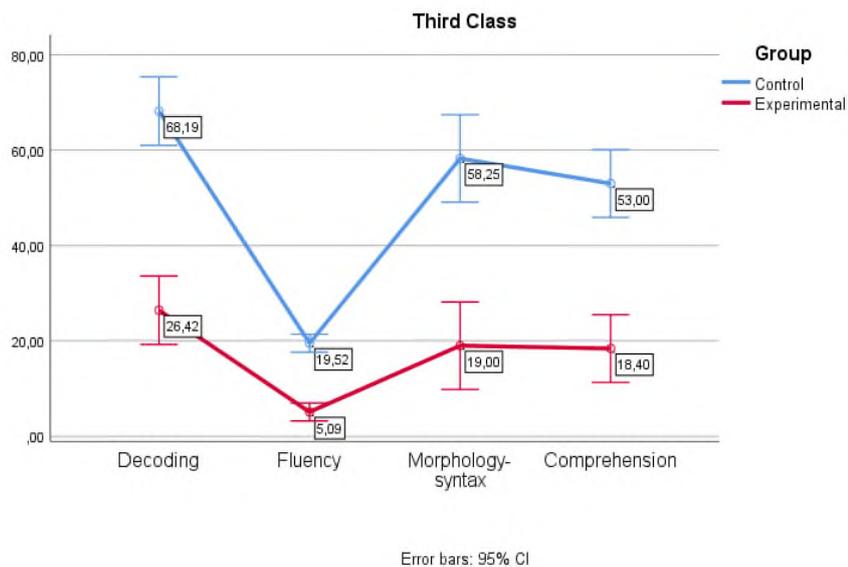


Figure 11: Mean value of performances for students of normal development (control) and students with a mild degree of mental retardation (experimental) of third class

5.4. Correlations between variables

Figure 12 presents the results of spearman correlations between variables for students with normal development where statistically significant positive correlations were observed in any case except from the relationship between decoding and comprehension which was not significant.

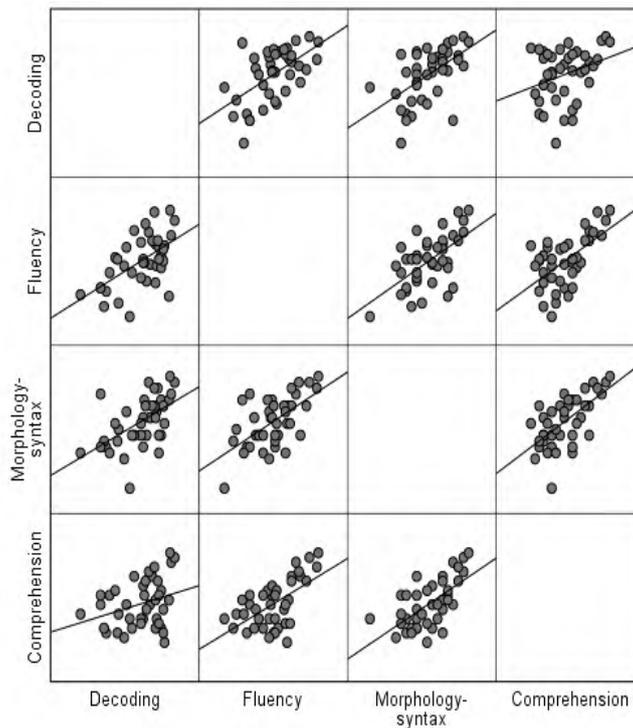


Figure 12: Scatter plot between variables for students with normal development

Table 12 presents the results of spearman correlations between variables for students with a mild degree of mental retardation, where statistically significant positive correlations were observed in any case. In general, all correlations for students with mild mental retardation were stronger than those for students with normal development. The difference between the two groups is the presence of significant correlations between the variables “decoding” and “comprehension” in reading in students with mild mental retardation.

Table 12: Spearman correlations between variables for students with a mild degree of mental retardation

Variable	Decoding	Fluency	Morphology-syntax	Comprehension
Decoding	1			
Fluency	,902**	1		
Morphology-syntax	,778**	,756**	1	
Comprehension	,558**	,574**	,512**	1

**p<0,01

5.5. Comparisons between second and third class

Independent samples t-test was used to test mean differences regarding class, as the 2 independent samples consist of 30 or more participants. According to Table 13, there was a statistically significant difference between second-class and third-class students in 3 variables.

Table 13: Comparisons between second and third class

Variable	Second class (N=40)	Third class (N=40)	T	df	p-value
Decoding	55,48	54,88	0,076	75,849	0,939
Replacement of letters and syllables	15,35	15,03	0,159	78	0,874
Omission of letters and syllables	22,43	16,65	1,557	67,700	0,124
Addition of superfluous letters and syllables	12,23	14,63	-0,961	78	0,340
Reversal of letters	10,53	14,3	-1,812	78	0,074
Fluency	27,23	34,33	-1,448	78	0,152
Repetitions of the same words	3,53	5,25	-1,926	65,161	0,058
Omission of words	3,00	5,48	-2,737	60,432	0,008
Morphology-syntax	7,28	7,73	-0,356	78	0,723
Verb formation	4,93	5,25	-0,597	78	0,552
Production of complex words	5,10	4,65	0,839	78	0,404
Production of sentences	2,70	2,38	1,078	78	0,284
Comprehension	6,25	8,93	-2,206	67,452	0,031
Comprehension wrong	18,75	16,08	2,206	67,452	0,031

In particular, mean value for omission of words of second-class students (3) is statistically significantly lower ($p=0,008$) than mean value of third-class students (5,48). In addition, mean value for comprehension correct answers of second-class students (6,25) is statistically significantly lower ($p=0,031$) than mean value of third-class students (8,93). Similarly, mean value for comprehension wrong answers of second-class students (18,75) is statistically significantly higher ($p=0,031$) than mean value of third-class students (16,08) (Figure 13).

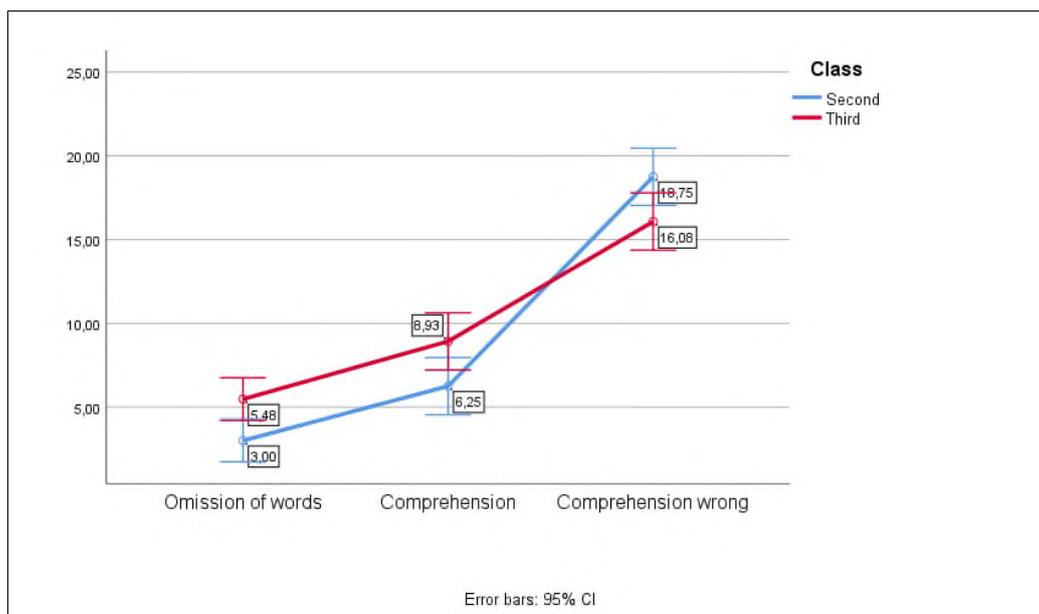


Figure 13: Mean differences between second and third class in omission of words and comprehension

CAPITAL 6: DISCUSSION

The purpose of this particular work is to compare students with mild mental retardation and students with typical development who attend the second and third grades of primary school in terms of reading skills and in particular in terms of decoding, fluency, morphology-syntax and understanding. To achieve this goal, the “Reading Test-Test A” was administered, which helped to compare the scores scored by typically developing students in relation to students with mental retardation.

From the analysis of the results of the specific research process, it is evident that in both grades, second and third grade, better results are observed in all four components of reading ability - decoding, fluency, morphology-syntax and comprehension, among students with normal development compared to their peers with mild mental retardation. The specific results coincide with the results of other similar studies, such as that of Cohen et al. (2006).

In it, the authors assessed the reading ability of 67 individuals with mild mental retardation using high- and low-level comprehension activities and activities related to sentence comprehension (identifying and composing words). The reading deficits found showed the following: 61% of the participants had difficulty in word recognition, as they managed to read less than 50% of the words correctly; 80% of participants showed deficits in the syntactic task, with less than 30% of them able to

understand sentences. Furthermore, most participants had very slow reading speed, indicating that word recognition was not an automatic process and that assembly was the primary cognitive strategy used by participants.

In more detail, the present research work is based on four research questions, which it tries to answer through statistical analysis of the collected data and in parallel to compare and contrast with the results of other scientific studies related to reading disorders in students with mild mental retardation.

According to the first research question, which was related to the results of the comparison of typically developing students and students with mild mental retardation in the second and third grades of primary school in terms of decoding a read text, it turned out that the students in the experimental group showed, on average, more low performance on the reading decoding measure compared to their typical peers. In particular, the largest percentage of their errors was associated with missing letters and syllables, quantitatively followed by substituting letters and syllables, adding redundant letters and syllables, and reversing letters. These particular errors were observed in the first and second task of the test - reading 24 nonsense (pseudowords) words and 53 real words from the Greek language.

The results of this specific research in relation to the decoding axis, agree with the results of Jenkinson's (1992) two-experiment research, students with mild mental retardation had more poor performance on the task of word identification than typically developing students in one experiment but not the other. Although, Blake et al. (1969) found no differences between groups of children with mental retardation and without mental retardation in rapid word recognition, Dunn (1954), resulted that individual with intellectual disability did more poorly than typically developed individuals on a word identification test, a test for the speed of word and phrase recognition and a multiple-choice word and nonword discrimination test. The difference in results for word identification could be due to the difficulty level of the words that were used in the tasks.

The research of Cawley and Parmar (1995), led to corresponding results, because students with mild mental retardation showed significant differences in relation to students of typical development in almost all reading tests assigned to them. In particular, there were occurred mispronunciation errors and errors in the task of word recognition, which was assessed in timed presentations. In the task where the students were directed to a phonetically structured non-word and asked to pronounce

the word, students with mild mental retardation were unable to respond to this activity and scored 0 points. Also, in the task that measures the student's ability to analyze syllables during the process of word formation, there were significant differences between the two samples of students, as the students with mild mental retardation faced great difficulties during its execution. Also, no differences found between students with mental retardation and without mental retardation on word identification task.

Also, in the research of Di Blasi et al. (2019) is referred that student with mild mental retardation of second to eight grades scored lower than peer students with typical development, in reading tasks. Generally, the reading deficits were larger for students with mild mental retardation, relative to peers. Especially, the deficits were greater for reading speed than for accuracy and for words than pseudo-words.

Finally, it is reported that there is a positive correlation between phonological awareness and reading skills, but also between memory and general intelligence (Byrne, MacDonald, & Buckley, 2002). In people with low intellectual potential, the ability to repeat phonological codes in working memory is an important process, which may contribute positively to the acquisition of reading (Connors et al., 2001).

According to the second research question, which was related to the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the fluency of the students, in this particular research, it emerged that students with mild mental retardation, who attend the second and third grade of primary school, show, on average, lower success rates in the fluency axis, compared to their typically developing peers. Specifically, the performance of the students with mild mental retardation was lower than the performance of their typical developing students and their errors were related to repetitions of the same words and omission of words. These particular errors made by the students were related to the fourth task of the "Reading test-Test A", in which the students were asked to read a descriptive text of three paragraphs, which consists of twenty-three lines and two hundred and seventy-nine words.

The results of the research on the axis of fluency are connected with the corresponding research data of the bibliographic review. In particular, fluency has long been emphasized as a fundamental reading skill that can lead to improved reading comprehension of a text. It consists of three parts: rate, accuracy and prosody.

All fluent readers can read a text at an appropriate pace, accurately, automatically and use the right expression in their voice (Merimme, 2017).

Rasinski (2012) highlighted that an individual is required to have complex skills in order to become a fluent reader, such as decoding, comprehension and attention. The degree to which the reader engages with the text depends on their attention. Rasinski (2012), also, pointed the term “cognitive energy” to describe the mental effort required decoding and understanding a text. Students with mild mental retardation often waste too much energy for decoding a text and this results in little energy left in terms of understanding. The automatic information processing theory of LaBerge and Samuels (1974) emphasizes that the automatic reading is very important and it can be achieved only when the student read the words as holistic units and not by decoding them letter by letter. Age and experience are key factors in the acquisition of automaticity in reading. Specifically, a typically developing second grader recognizes words by their individual letters, whereas an older student recognizes the whole word while reading.

According to the third research question, which was related to the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the morphology-syntax of read sentences, it emerged that students with mild mental retardation, who attend the second and third grade of primary school, show, on average, lower success rates in the morphology-syntax axis, compared to their typically developing peers. In particular, the largest percentage of their errors concerned errors of verb formation, while errors of production of complex words and production of sentences.

These specific errors made by the students were related to the fifth, sixth and eighth tasks of the “Reading test-Test A”. Specifically, in the fifth task, the students had to format verbs and made errors related to wrong formation of verbs in different persons, conjugations and tenses, in eight sentences. In the sixth task, the students had to produce complex words and made errors related to wrong production of complex words and wrong handling of the morphological elements of the language, namely the number and declension of nouns, tense, inflection, person and number of verbs. In the eighth task, the students had to read a series of words and form a sentence with them. They were given five sets of words and made errors related to wrong production of sentences.

The results of the survey are in agreement with the results of the research of Koizumi et al. (2019). According to their results, children with intellectual disability have a severe delay in syntactic development in comparison with typically developing peer students. Their research, about the syntactic development in students with intellectual disability, resulted that student with mild mental retardation had lower scores of correct answers to long sentences compared to children without mental retardation, because the comprehension of syntax is an ability related to phonological short-term memory of the individual. Moreover, due to the fact that mild mental retarded students have deficits in auditory short-term memory, they might face more difficulties in comprehending morphologically and syntactically complex aspects than the students without mental retardation. Ayuzawa and Ikeda (1993) argue that students with mental retardation are likely to present serious deficits in the expressive aspects of language, as they usually use two-clause sentences and rarely use complex sentences, a fact that indicates that they have a delay in development of editorial production capabilities.

Moreover, according to the research of Pambayun and Subiyanto (2023), which is related to a case study for the morphosyntactic abilities in children with intellectual disabilities, it resulted that students with mental retardation can produce simple sentences and complex sentences, which usually follow a specific sentence structure (subject-predicate-object) or with two arguments attached to the predicate. Related to their syntax skills, students with mild mental retardation are able to use a lot of phrases, such, e.g. noun phrase, verb phrase and prepositional phrase. Also, when producing sentences, which contain verbs that function as predicates, they usually use the base word rather than adding a suffix to the word.

According to the fourth research question, which was related to the results of comparing typically developing students and students with mild mental retardation in the second and third grades of the elementary school regarding the comprehension of a read text, it emerged that students with mild mental retardation, who attend the second and third grade of primary school, show, on average, lower success rates in the comprehension axis, compared to their typically developing peers. In particular, the largest percentage of the students with mild intellectual disability gave wrong answers to the comprehension questions of the texts given to them.

These specific errors made by the students were related to the ninth and tenth tasks of the “Reading test-Test A”. Specifically, in the ninth task, the students had to

recognize two semantically equivalent sentences. The students had to read the five sentences in each exercise and mention the two sentences that have the same meaning. Five groups of sentences are presented to the student and each group consisted of five sentences. The errors made by students were related to wrong recognition of the semantically equivalent sentences, due to wrong comprehension of the meaning of each sentence. In the tenth task, the students had to read three different texts aloud or silently. Below each text were seven multiple choice questions, which are related to the comprehension of the meaning of the texts. The errors made by students were related to wrong answer choice, due to wrong comprehension of the meaning of each text.

The results of the survey are in agreement with the results of Merrill's (1924) research on children with mental retardation and their typically developing peers, about their reading comprehension ability. Merrill's results indicate that mental retarded students performed more poorly in comparison with the students without mental retardation on three measures of reading comprehension (paragraph meaning, sentence meaning, and word meaning). Moreover, Wood et al. (1988) found that mental retarded students faced more difficulties than their typically developing peers on a reading comprehension test.

The conduct of the present scientific research and the results obtained from the collection and analysis of the data, led to the verification of the research hypotheses that had been formulated regarding the reading disorders of students with mild mental retardation.

The first research hypothesis of the study was that delayed intellectual development leads to predominant difficulties in decoding, fluency, morphology-syntax and comprehension of the meaning of a read text, as opposed to the typically intellectual development that leads to acquisition of better reading skills, which is verified by the results of the research.

An interesting, observation is the comparison between all the students of the two classes that participated in the research, from which it emerged that mean value for omission of words and for comprehension correct answers of second-class students is statistically significantly lower than mean value of third-class students and mean value for comprehension wrong answers of second-class students is statistically significantly higher than mean value of third-class students.

More specifically, for mastering reading graph phonemics is required correspondence between the conversion of graphs in phonemes and in combination of phonemes to create words and the lexical practice, according to which the reader visually recognizes a whole word, which it belongs to the set of words he already knows and which are written in a similar way and are visually similar. In parallel, it is required additional knowledge of syntactic rules and of the particular characteristics of the various types of texts with the ultimate goal of understanding a written text. Students with mild mental retardation, their low phonological awareness, face difficulties in decoding. Even if these students manage to master the decoding skill, they will still have limited comprehension and a slow reading rate (Cohen et al., 2006).

The second research hypothesis of the study was that by applying the research tool to typically developing students, it is expected that the majority will achieve fairly high success rates, because at this age the skills of decoding, fluency, morphology-syntax and comprehension are taken for granted, according to the standardized tool. According to the results of the research, for second and third class, median decoding value of students with normal development is statistically significantly higher than median of peer students with a mild degree of mental retardation. Also, for second and third class, median fluency value of students with normal development is statistically significantly higher than median of peer students with a mild degree of mental retardation. Moreover, for second and third class, median morphology-syntax value of students with normal development is statistically significantly higher than median of peer students with a mild degree of mental retardation. Finally, for second and third class, median comprehension value of students with normal development is statistically significantly higher than median of peer students with a mild degree of mental retardation.

The third research hypothesis of the study was that by applying the research tool to students with mild mental retardation, it is expected that due to the deficits they present in the cognitive domain and in working memory, they will present significant difficulties in completing the test and will achieve significantly lower success rates than their typically developing peers in decoding, fluency, morphology-syntax, and comprehension skills. According to the results of the research, is indicated that for students of second and third class, higher differences between students with normal development and peer students with mild degree of mental retardation were observed

in decoding performance, followed by morphology-syntax and comprehension performance, with the least difference to be in fluency performance. The students, that is, with mild mental retardation, of both grades, second and third grade, presented a lower performance in all categories of reading ability in relation to the typically developing students.

CONCLUSIONS

It is widely accepted is that students with learning disabilities and reading disorders do not necessarily have mental retardation, although the two conditions can co-exist. In this regard, the definition of specific dyslexia excludes primary disorders of intellect, vision, hearing or motor development as the cause of reading difficulties.

Conversely, students with mental retardation have lower mental potential and show a wide range of learning difficulties such as dyslexia, dyscalculia, dyspraxia and dysgraphia. Mental retardation creates deficits or under-development in a person's mental functioning and is a condition that cannot be changed. Specific learning disabilities cannot be cured, they are something permanent and permanent, while students can learn to manage them and reduce their negative impact on their lives (Kandarakis, 2004).

In this particular study, the goal was to examine and compare typically developing students and students with mild mental retardation related to their reading skills. Specifically, they were examined and compared according to their ability to decode a read text, their fluency, the morphology-syntax of the sentences read and their comprehension of a read text.

1) The main result of this study is that students with mild mental retardation have different learning difficulties and there is a difference between typically developing students and students with mild mental retardation.

2) Students with mild mental retardation in second and third grade show significant delays in all components of reading: decoding, reading fluency, morphology-syntax and comprehension.

3) The results of the conducted research of this dissertation prove the first hypothesis, that in students with mild mental retardation, there are pronounced signs of a violation in the development of reading skills.

4) The results of the research prove the second hypothesis that the development of intellectual and language functions, in typically developing students,

results in good reading skills and high scores on the basic reading axes: decoding, fluency, morphology-syntax and reading comprehension.

5) The measures of decoding, fluency, morphology-syntax, and reading comprehension in students with mild mental retardation proved the third hypothesis, because this group of students showed significantly lower scores than typically developing peer students.

6) The results of this research complement the conclusions of other researches, such as the research of Cain & Oakhill (2007) about the decoding skill, which is a necessary but not a sufficient skill, since it does not always guarantee reading comprehension. Specifically, in the present research it was demonstrated the absence of a strong correlation between the skill of decoding and the comprehension of a text in typically developing students.

7) Regarding students with mild mental retardation, the results of the present research showed that there is a strong correlation between decoding skill and text comprehension. Specifically, the existence of decoding difficulties leads to the slow and often incorrect reading of words, with the result that the student with mental retardation is unable to sufficiently process the connections between words, phrases and sentences, in order to structure the meaning of the text. Other researchers, such as Kelly and Barac-Cikoja (2007) and Perfetti (1994), have reached a similar conclusion.

8) Comparing the total number of students who took part in the research, depending on the grade they attend, it was shown that the second-grade students made fewer word omission errors in the fluency domain than the third-grade students. In the area of text comprehension, second grade students performed lower than third grade students.

9) Comparing the total number of students who participated in the research based on their gender, it emerged that there are no significant differences between the performance of males and females. An exception is the better performance of males on the axis of decoding and specifically on the sub-axis of omitting letters and syllables, compared to females.

DISSERTATION CONTRIBUTIONS

Theoretically oriented contributions

Aim of current study was to compare decoding, fluency, morphology-syntax and comprehension reading abilities between students with typical development and students with a mild degree of mental retardation, of second and third grade and to contribute with its results to a deeper knowledge and understanding of the reading disorders of students with mild mental retardation.

1) Mild mentally retarded students of both classes presented lower performance in all axis of reading skill, comparing to their typically developing peer students. Specifically, their most common mistake in decoding was the omission of letters and syllables. According to the axis of morphology-syntax, their common mistakes were in the verb formation activities and in the production of complex words activities. Moreover, they showed low performance in comprehension and lower performance in fluency as they failed to read most of the words, although performance in fluency was low for typically developing students, too.

2) An important contribution of the research to the theoretical scientific framework is the existence of strong correlations between variables for students with a mild degree of mental retardation. This fact means that if a student with a mild degree of mental retardation has low performance in one of the 4 tasks it is possible that they will have low performance and in other tasks with this probability to be higher comparing with a student with normal development of low performance in one task. Moreover, a strong connection between the skill of decoding and understanding a text in students with mild mental retardation, resulted from the measurements of this research, in contrast to typically developing students in whom this connection was not found. Additionally, females presented more mistakes of omission of letters and syllables than males and students of third class indicated more mistakes of omission of words than students of second class however, they had higher performance in comprehension task.

Contributions with an applied orientation

1) The results of this research indicate that it is imperative to assess the reading difficulties of students with mild mental retardation early, through the reading skill assessment test and by applying the methodology of this specific work, in order to investigate the level of development of the basic cognitive factors of each student's

reading condition. The measurements made on the students with mild mental retardation led to the conclusion that these students presented difficulties in all axes of reading, specifically in the axis of decoding, fluency, morphology and syntax and comprehension. The systematic assessment and evaluation of the mentally retarded students will achieve the teaching goals and will contribute to the planning of the appropriate type and level of educational intervention that will be designed by the scientists and applied to the student, as a specialized intervention program.

2) Considering the results of the research, special educators should focus their efforts on leading reading difficulties identified in this work. Specifically, it was shown that there is a strong connection between decoding skill and comprehension in students with mental retardation. Also, students in younger grades with mental retardation have difficulty understanding the meaning of a text compared to students in older grades. Moreover, the third graded students with mind mental retardation face more difficulties in the fluency domain and especially, in the “missing words” axis. It is important for special educators to know these data in order to utilize them in the planning and implementation of teaching interventions for students with mild mental retardation.