European Journal of Special Education Research
ISSN: 2501 - 2428
ISSN-L: 2501 - 2428
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1095187 Volume 3 | Issue 1 | 2018

LEARNING PATHS AND LEARNING STYLES IN DYSLEXIA: POSSIBILITES AND EFFECTIVENESS - CASE STUDY OF TWO ELEMENTARY SCHOOL STUDENTS AGED 7 YEARS OLD

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Abstract:
The difficulty in reading and writing, spelling mistakes and poor speech are considered as the main elements that characterize students with dyslexia. If one thinks that most of the things in a class are based on writing and reading, then the importance of such a learning difficulty is that it is recognized as soon as possible and with appropriate strategies that people with dyslexia can be helped in their progress. The main aim of the current study was to stress the contribution of early diagnosis of dyslexia to the creation of effective learning environments based on individual learning difficulties, learning styles, and learning paths. To this end, were studied different difficulties in the domains of memory, phonology, grammar, and syntax differentiated the learning styles as well as the strategies of each case, resulting to the implementation of multisensory individualized teaching approaches. Conclusively, early diagnosis of dyslexia as well as multisensory intervention approaches were considered as the most effective factors in the improvement of the two cases learning achievement.

Keywords: dyslexia, learning, METAFON, reading

1. Introduction

1.1 Learning Process

At the beginning of the twentieth century, psychologists made a behavioral approach to understanding human learning (Stewart, 2013). "*Learning is a relatively stable change in a*

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behavioral potential, which occurs as a result of enhanced practice" (Kimble, 1980). A definition for learning that is considered more representative than no one can be satisfactory (Trillian, 2003).

As a biological process, learning is observed in both animals and humans and is considered to be a result of long-standing exercise and repetition. As a spiritual process, it only appears to human. He directs this process himself and presents it with behaviors (Haralambopoulos, 2001).

One of the key factors in learning is that learning is a dynamic process in which different parts of the brain interact with other parts, each based and interacting with each other (Reid, 2015).

Students develop different skills and strategies throughout their learning. But they remain more stable in how they approach the environment, process information, express and use knowledge (Tambin & Ward, 2006).

This is basically a very basic functional definition of learning because learning is considered as a function mapping behavioral experience (Houwer et al., 2013). Domjan (2010) argues, however, that such a simple functional definition of learning is unsatisfactory. Different cognitive theories differentiate the exact nature, experiences, conditions of conditioning, and conditions that affect behavior (Bouton, 2007).

Different learners' learning styles will affect the way of their learning process, including linguistics. Many researchers (Kiersey, 2000, Honey, 2002) have considered other possible effects on a person's learning style such as personality, cognitive style, temperament, sensory processes, age (Boneva & Mihova, 2012). Similarly, some people want to listen and talk, others prefer text analysis or study with visual support. Most, however, have a mixed learning style (Fleming, 2001). Importantly, learning theorists have devised more than 70 learning models as well as ways of identifying those (Coffield et al, 2004).

Each model is accompanied by its own assessment methodology and often by proposals for ways to be applied in later school programs (Mortimore, 2005). At this time, each learning style can be evaluated using questionnaires, interviews, observation, profile creation, or a combination (Mortimore, 2003).

There are, of course, critics who state that marking a student with a particular learning style that is considered reliable can limit rather than release the learner (Coffield et al, 2004). Learning and teaching alone are inappropriate when emphasizing learning style rather than other social and contextual factors (Coffield et al, 2003).

Most developmental and cognitive theories predict that many of the phenomena associated with exploring learning would make it a relatively inefficient teaching method (Mayer, 2004). Many children in a state of discovery are more likely to face inconsistent and misleading feedback, to encode error and to experience inadequate practice and treatment in comparison with children who receive direct instruction (Klahr & Nigan, 2004).

Although learning difficulties have been studied for decades, a broadly accepted comprehensive and precise definition, as well as the clarification of the endo-

phenotypic and phenotypic characteristics of specific learning difficulties still remains a controversial issue (Elliott & Grigorenko, 2014; Markovitis & Tzouriadou, 1991). An interesting and broadly accepted definition of learning difficulties is given by the National Joint Committee on Learning Disabilities (1999, p.1): "*Learning difficulties is a general term that refers to a heterogeneous group of disturbances arising from serious difficulties in the learning and use of speech, reading, writing, logical thinking and learning situations*".

These learning disruptions tend to be replaced by evolutionary speech / learning disorders that include specialized subcategories that often coexist but are not identifiable (Rousohatzaki, 2014).

In contrast to many other disabilities, recognizing a learning disability creates some particular challenges (Pierangolo & Giuliani, 2007): as learning disorders are evaluated through conclusions based on student responses (Ministry of Education, British Columbia, 2011), it is not understood that particular pupil's learning disabilities are due to a learning disability (Delaney, 2008).

1.2 Dyslexia

One of the most important learning disabilities is dyslexia. As an unusual equilibrium of skills, dyslexia is considered a syndrome (Lucid, 2006). Dyslexia syndrome, which is widely recognized as a particular learning disability of neurological origin, does not necessarily mean low intelligence or poor educational ability and is independent of race and social background. Often more than one member of the same family presents dyslexia (an element of heredity) (Lucid, 2006).

But what exactly does syndrome mean? Dyslexia refers to a cluster of symptoms, which result in individuals experiencing difficulties in learning specific skills (IDA, 2017). Dyslexia is considered to be one of the most common forms of learning difficulties (Porpodas, 2002). Children with dyslexia occur difficulties in reading, writing, spelling, and sometimes even in speaking (Kassotakis, 2015). If one believes that most of the activities in a class are based on writing and reading, it becomes important the learning difficulties in these domains to be recognized as soon as possible while the progress of students with dyslexia to be enhanced through appropriate strategies.

It has been accepted that although dyslexia is widely recognized as a particular learning disability of neurological origin, does not necessarily mean low intelligence or poor educational ability and is independent of race and social background. Often, more than one member of the same family presents dyslexia (an element of inheritance) (IDA, 2017)

120 years ago, in 1886 a doctor in Sussex, England, W. Pringle Morgan, made the first description of what we call developmental dyslexia. It has led to the theory that reading ability is seen as a substitute for intelligence. For 100 years, this theory has dominated, and people believed that if someone is smart, motivated and educated they will learn to read (Shagairz, 1996). This, however, has proven to be false.

In particular, dyslexia reflects an inadequacy in the processing of distinctive linguistic units, the phonemes, which make up all the oral and written words. Similarly, phonological awareness, which is considered to be the most reliable predictive indicator for the later occurrence of reading difficulties (Lew Kowicz, 1980), and whose teaching contributes significantly to attitude learning difficulties (Fayne & Bryant , 1981). Therefore, children who have been sensitized in the phonological analysis of spoken words, before entering primary school, can more easily internalize reading and writing.

A specialized, oriented, structured and systematic educational process that always need people with dyslexia (Hellenic Society of Dyslexia, 2017) along with early diagnosis can help to integrate successfully into the learning process. The value of early recognition is equally decisive in dealing with dyslexia, as with the timely use of alternating learning methods, people with dyslexia can succeed (Kassotakis, 2015). Appropriate early childhood education of children with dyslexia has shown that most can cope with their normal classroom work, while late recognition even to major elementary classes leads to less than half of the children advancing. If recognition is at the stage of secondary education, the rate of successful rehabilitation falls to 10-15% (Tresman, Cooke & Vose, 2006).

In Greece, the diagnosis of dyslexia is made using a variety of criteria from internationally recognized organizations such as the International Health Organization or DSM-V, Greek Instruments or empirical procedures (Hellenic Society of Dyslexia, 2017).

The same is true in other countries. According to Thomson (2010), a survey conducted in English-speaking countries found that no country had a single policy to diagnose dyslexia. And this is because dyslexia is not a distinct disorder. It has some features (IDA, 2014).

In a verbal context, students with dyslexia learn to speak slowly and find difficult to pronounce words, vocabulary, follow instructions, learn the alphabet; usually, they confuse terms such as before and after, right to left, etc. (Mercer, 2004).

In reading, especially as it concerns phonological languages, students with dyslexia occur difficulties in learning to read, recalling names or letters, and corresponding the phoneme to the grapheme of a letter (Moll et al, 2013). In writing, they find difficult to record their thoughts on paper, correct a text or develop a text without many misspellings (Caroll et al., 2014).

However, the issue of dyslexia's diagnosis becomes controversial due to the fact that although dyslexia is considered as a neurodevelopmental disorder, it is characterized by difficulty in learning reading and writing (Moll et al, 2014). There is also, no clear distinction between "dyslexia" and "social" reading (Snowling & Hulme, 2012).

Whatever criterion should be used, account should be taken both of the complexity and heterogeneous manifestation of the symptoms as well as the unique profile of each individual with dyslexia (Swanson, 2009).

1.3 Learning styles and learning paths in Dyslexia

Cognitive difficulties (i.e. difficulty in memory and organization of information) are commonly considered as the main difficulty of students with dyslexia. However, similar difficulties can be manipulated applying appropriate forms of learning in which the teacher plays an important role (Reid, 2015).

Well adapted forms of learning could define how each student gathers, processes, and maintains new as well as difficult information (Dun & Dun, 1993). According to the vary advantages and preferences of each individual, the forms of learning could be classified in 5 categories, as following (Boheva & Mihova, 2012):

- Environmental: Some people like to study in absolute peace, others with music, some sitting in a chair, others on the couch, some with strong light, and others with a natural one.
- Emotional: People with dyslexia have difficulty organizing their time and completing their work on time. They know what they have to do but they have difficulty in how to do it.
- Sociological: Some prefer to study by themselves and some with others. This category also includes dyslexic people who think they can learn more easily when they do it together with someone else. It helps them to better understand, perceive and remember the information. For bilingual students with dyslexia, it is even more important to work with someone who has a good knowledge of the language of the school.
- Physics: People with dyslexia learn more effectively with small pieces of study accompanied by regular breaks. Others with short breaks and others with non-stop.
- Psychological: In this form are included personal features such as thinking, skills, motivation and temperament.

However, to-date is generally accepted that students with dyslexia benefit more from a multi-sensory approach where information is presented simultaneously through various channels.

Specifically, it has been supported that an advanced interpersonally intelligent student with dyslexia enjoys learning with other classmates and, when involved in collaborative lessons, develops himself (Blodget, 2000). Otherwise, a strong visual-spatially intelligent student with dyslexia probably responds better to memorandum techniques for learning a new vocabulary (Boheva & Mihova, 2012).

Certainly, students with dyslexia can achieve both academic and personal goals, provided that their needs are recognized and supported appropriately not only by specialists but also by the whole school (Exley, 2003). Motivation is considered very important for learning, and as soon as students succeed, they will begin to feel good about themselves (Hales, 2001).

1.4 Objectives

In the light of the above, the objectives of the present study were as follows:

(i) To highlight the particular features that compose individual profiles of SDD;
(ii) To test the hypothesis that specific learning difficulties delineate specific learning styles;
(iii) To recommend the effectiveness of early-stage diagnosis in shaping well adapted individualized learning paths.

2. Material and Methods

In the current paper, we present the case of two students diagnosed with dyslexia at the first school age.

The case study differs from other research methods in that researchers are not aiming to extract a universal generalized truth. Instead, it is important to discover and eventually describe the case under consideration in the interpretative example. In particular, a case study is an illustrative case study in particular circumstances with a relatively small ambition to generalize their findings or act as critical tests in marginal circumstances with the ultimate goal of overturning widely-used research claims (Paraskevopoulos, 1993).

Aiming both a comprehensive assessment to be applied and appropriate learning environment be adjusted to the characteristics of each individual profile, the teacher designed and applied particular learning approaches, as they are shown in Figures 1 and 2.

Types of difficulties:	**Material for development of reading ability and comprehension**
General Dyslexic Symptoms • Failure of reading, understanding and sonorant reading of words • Failure in the process of reading of non- words • Failure of grouping letters in words **Particular Dyslexic Symptoms** Memory 1. Orientation and direction problems 2. Inefficient methods and strategies of internal repeat, new information connection with already existing knowledge 3. Lack of strategic information organization Phonology 1. Failure to manage the phonemes through composition, analysis, distinction, addition and deletion. Reading 1. Rhythm and prosody errors 2. Semantic errors 3. Punctuation errors 4. Words' segmentation errors Writing and Spelling 1. Spelling errors	**Techniques** • Dichotic hearing • Signage or touch letters (visual perception) **Phonological processing** • Vocal syllabification following the code CV1, CCV • Articulator sequences VCC, VCCC • Minimal pairs • Common syllable words (beginning – ending) **Grammatical processing (according to the curriculum)** • Syllabification • Nouns • Singular-plural of nouns • Stress • Declension of nouns **Syntactic structure** • Punctuation • Sentences and paragraphs

2. Letters and words omissions 3. Specular writing 4. Letters impurities and grouping 5. Punctuation errors <u>Grammar</u> 1. Recognition and use of article 2. Recognition of genera 3. Use appropriate types of verb and noun 4. Tense accordance <u>Approaches</u> 1. Spatial perception and orientation 2. Grapho-motor skills 3. Visual-motor coordination	**Segmentation (with highlighting)** • Morpheme segmentation • Sentence segmentation • Text segmentation **Comprehension / comprehension questions concerning** • People • Place • Time • Facts _____ C=Consonant V= Vowel

Figure 1: The comprehensive assessment approach of A. M learning profile

<u>Types of difficulties:</u> **General Dyslexic Symptoms** • Failure of reading, understanding and sonorant reading of words • Failure in the process of reading of non-words • Weakness in visual perception, in other words weakness to recognize form and shape of letters **Particular Dyslexic Symptoms** <u>Memory</u> 1. Deficits in initial stage of processing information and mainly in visual memory 2. Inefficient methods and strategies of internal repeat, new information connection with already existing knowledge 3. Lack of strategic information organization 4. Less mnemonic capacity of short memory (recall less information and succession information or linguistic sequences) <u>Phonology</u> 1. Failure to recognize the distinct parts of speech – phonemes 2. Failure to manage the phonemes through composition, analysis, distinction, addition and deletion <u>Reading</u> 1. Wrong intonations 2. Rhythm and harmony errors 3. Punctuation errors	**<u>Material for development of reading ability and comprehension</u>** **Techniques** • Rhythm (hearing approach) • Color (visual discrimination) **Phonological processing** • Vocal syllabification following the code CV1, CCV • Articulator sequences VCC, VCCC • Discrimination of consonant phonemes, both contrasting and phonemes of the same phonological category (p-v-f, t-đ-Θ, s-z) **Grammatical processing (according to the curriculum)** • Nouns • Singular-plural of nouns • Stress • Verbs **Syntactic structure** • Punctuation • Sentences and paragraphs **Segmentation (with highlighting)** • Phoneme segmentation • Morpheme segmentation • Syllable segmentation **Comprehension / comprehension questions concerning** • Place • Time • Facts

4. Word or text segmentations Writing and Spelling 1. Spelling errors 2. Letters and words omissions 3. Letters confusions and substitutions 4. Letters impurities and grouping 5. Scribbles poor handwriting and many times illegible 6. Semantic errors 7. Use of capital letters between lowercase Grammar 1. Recognition of genera 2. Verb endings 3. Converting singular to plural and vice versa Approaches 1. Focus of attention. 2. Grapho-motor skills 3. Visual-motor coordination 4. Visual discrimination of shapes 5. Perception of visual and auditory sequences	C=Consonant V= Vowel

Figure 2: The comprehensive assessment approach of M.S learning profile

The observation and personal interview of involved pupils and parents was also used in this research.

It is worth to note that the change in underlying sub-phonological performances (Kidd et al, 2015; Snowling, 2000) of two individuals' phonological ability was a targeted task in our study.

The test that has been performed to apply to these two students was the METAFON test (Gianetopoulos & Kirpotin, 2007). METAFON test plays an important role in both primary and secondary school pupils and students. It detects reading disorders that in turn can lead to other learning difficulties (Gianetopoulos & Kirpotin, 2007).

"Metafon test" has been standardized in Greece for the detection of likely difficulties in the phonological awareness, reading and writing. Through this test have been examined particular phonological processes, pragmatic skills, as well as syntactic and morphological features.

In this research study, METAFON was applied to evaluate the readiness of the two students, who, until the stage of assessment; they have treated their learning difficulties following different learning paths.

2.1 Case's presentation

Case study 1

M.S, 7.2 years old, was born and raised in a village in the prefecture of Ioannina. He was the third child in the family, very active and skillful in constructions. He did not attend kindergarten like his other brothers.

In the early days in elementary school, he took part in almost all the work, most of which were paintings. But he could easily quit what he did or left it unfinished, telling the teacher that he was tired or bored. After the first two months, the teacher began to have many warning signs to trouble him. He considered his difficulties as learning difficulties, without being able to define them.

Interestingly, in the village school was only one teacher, a teacher for all classes: 5 pupils were attending the first class, 2 the second, 3 the third, 4 the fourth, 1 the fifth, and 2 the sixth. The teacher's work was too hard; as it was the first time, he was appointed.

The main difficulties of M.S were occurred in the following learning tasks:

- To use a new vocabulary
- To repeat that has just been said.
- To separate words that are similar to each other
- To name the letters
- To do not lose track and do not skip words when reading
- To learn to copy.

With regard to the social and psychomotor sector, there were not recorded worrying indicators. An important role to this has played out the fact that all the children of this small school were either relatives or friends and out of school. Besides, there were not many children in the village.

Case study 2

A.M, 6.9 years old, was also born and raised in a village in the prefecture of Ioannina. He was the eldest child in the family, timid preferring sports. Along with entering the kindergarten, after three months, the teacher noticed a student's negative attitude in writing but not in painting.

A.M. totally struggled with:

- showing confidence and interest in reading;
- recognizing and remembering very common words;
- writing numbers, letters and symbols in the correct order, focused on the subject.

The teacher contacted his parents and informed them of the refusal of A.M to write. Whenever he tried it, he left it in the middle. Parents decided to recommend him for a diagnosis by expert, when the given diagnosis was dyslexia. The kindergarten's teacher, based on the diagnosis of specific difficulties, took the necessary steps towards the Ministry of Education so that the student receives the corresponding support in the first grade of the elementary school.

A parallel observation of the learning paths of both the students was lasted during the first and second grade of elementary school.

In the first grade of the elementary school:

- A.M. was assisted by a special educator three times a week, while in the afternoons he was receiving individual support in his homework. However, several difficulties in reading and writing were still existed. He faced severe difficulties in the lesson of Greek language, but had active participation in other lessons. At times he was asking for help, especially in cases where he had difficulty in reading and understanding new, usually, texts or more rarely in complex mathematical problems. He always was seemed to be confused and upset in the class.
- M.S. was a child who did not participate in the learning process, and every morning he was going to school unprepared, often forgetting things at home. He had the image of an intolerable student, as opposed to the image of his two brothers who were always cared for and read. He used to stand up from his post asking the teacher either to help him, either because he was bored or sometimes to leave the class, pretending to go to the toilet. The teacher was keeping to encourage him to stay in the classroom or to do something creative gave him instructions either to make something that broke down in the classroom, like the school descent of the sixth grade students or even the tap. Something that M.S always liked to do with great pleasure.

In the second grade the learning situation remained unchanged:

- M.S has all stayed behind, despite the teacher's suggestions for special, individualized support and the permanent refusal of parents.
- On the contrary, A.M continued with the same zeal, always under support of special educator, three times a week, and remaining difficulties that without core impacts in his psycho emotional situation or behavior.

3. Discussion

The general wording of this research is that the recording of different characteristics of the difficulties of the two cases indicates the different learning styles that every student presents, and the respective learning paths to be followed by each one.

The findings of the survey cannot be generalized. However, it seems that student A.M. with early diagnosis of dyslexia receiving special education, was greatly helped. He was able to have the least difficulty in learning. In the case of M.S. seems that time passed at his expense, creating even greater problems in the learning process and his negative attitude towards the lessons became rather stronger. At this point, it is considered right to emphasize the important role in both cases, negative or positive, of the attitude of the families of the cases. The supportive and encouraging attitude of A.M's parents that helped him to change attitudes towards school and the negative-disparaging of M.S's parents that was disturbing the problem.

A generally accepted aspect is that students with dyslexia benefit more from a multi-sensory approach within information is displayed simultaneously through different channels (Boheva & Mihova, 2012).

The above aspect is clearly well defined in the cases of the present study:

(i) For M.S., reading and writing were considered as the most difficult of the school lessons as well as of the skills that he had to cope with. For example, it was difficult for him to respond to relative questions, to understand the meaning of the context or localize new elements in the text. To this, he was moving away from the classroom with various excuses, resulting to slowly avoidance of these skills. However, at the technical courses he remained in the classroom working to finish first a construction or complete a presentation on computers, being particularly conversational in oral work. Their parents described him as a child who had tendency to technical things, like to build, correct, etc.; to enjoy the music. Showing his love to music, he used to tape his pencil while he was doing his work.

(ii) A.M., on the other hand, was panicked every time he was asked to read. Like M.S., he felt more pleasant when the work was containing puzzles, paintings, etc. However, unlike M.S., he did not give up but was asking for help from the teacher or even his classmates. He also recalled details more easily after seeing pictures and could keep his attention in a task rather when there was quietness. Usually, during reading, he was waving his foot or liked to use drawings or objects in order to solve mathematical problems.

Taking into consideration the above learning characteristics it is suggested that appropriate, well adapted to the individuals' needs learning paths for each student, should be created, as follows:

(i) For M.S., whose learning is contributed by an audio-visual approach, the teacher should offer him any new task, like letter, word, etc. visualized, since the combination of words-images-sound can give him more cognitive power (Oxford & Crookall, 1990). In addition, the music could be used positively for him, since the music background or the use of rhythmic words could help him better in his study.

(ii) A.M. who is a student with good interpersonal relationships and good communication with his classmates, would have better results if he worked in group work (Garder, 1991). His mathematical logic along with his ability to think conceptually would support him to learn better through well-structured and sequential learning processes.

Although both A.M. and M.S. were diagnosed with dyslexia, they followed different course action in learning. An important role in this course seemed to play the early diagnosis of dyslexia in the case of A.M., as it elucidated the necessity of special education support resulting to minimize his weaknesses and formulate a course commensurate with his learning profile. Instead, due to a delayed diagnosis, M.S. followed a path that led to greater difficulties, as he was continuously struggling to

learn reading and writing, following unsuitable approaches (Tresman, Cooke & Vose, 2006).

All the aforementioned differences defined two different individual learning profiles, including specific learning difficulties, styles, strategies, and paths.
Interestingly, this approach is in line with the findings of a number of studies (Brant, 1998; Howard, 1994; Panteliadou, 2008), according to which learning is improved in environments within the knowledge is well-organized and students are actively interacted and motivated. In such environments, each student has the opportunity to approach learning in his/her own learning style, interests and needs (Panteliadou, 2008). Obviously, similar approaches become particularly important for students with learning disabilities (Boneva & Mihova, 2012).

It is worth to note that teachers should take into account not only what they teach but also how they teach it (Kuccelini, 2008), in order to have effective teaching; to apply a differentiated teaching, tailored to pupils' abilities, performance, interests, and particular inclinations (Kanakis, 2007). Indeed, differentiated teaching has been incorporated as an effective methodological approach in several educational systems (UK, Cyprus, Canada, USA, etc.) although it lacks research evidence (Hall, 2002). Most of the researches that have been carried out concern talented students and students with learning difficulties (Geisler et. al, 2009; Tiesco, 2002). In the case of students with dyslexia, differentiated teaching is considered to be an appropriate intervention to improve reading skills (Waldie et al, 2014).

At this point, it is important to emphasize that any differentiated teaching applied to students with dyslexia has the greatest advantage of early identification and intervention (Suttas & Shields, 2016). According to Amstrong & Squires (2012), students with an early recognition of dyslexia are able to have a reduced chance of developing low self-esteem and receive well-adapted interventions contributing to reduce the gap between their classmates.

4. Conclusions

In this study has been confirmed the heterogeneous learning entities of students with dyslexia.

Although this study is referring only in two cases, the findings initially define a number of differentiated learning characteristics, needs, and achievements of students with dyslexia. These differences constitute individual learning profiles that reflect different learning styles and consequent learning strategies. Recognizing as early as possible these styles as well as strategies that students with dyslexia develop, teachers will be able to adopt and incorporate in the lessons teaching techniques suitable to offer additional support to these students.

However, multiple differences in learning profiles and respective learning strategies intimate multiple teaching methods or approaches, as the multisensory approach is.

In our study, the teacher's sensitivity to observe and define the different learning styles and paths of the two students with dyslexia, contributed to the consideration and implementation of multisensory approaches as the most effective approaches for both of them.

Applying the multisensory approach, teacher attempted to help each of the two students to find his own learning style as well as his own way of improving any required academic performance.

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