

PROBLEMS OF DYSCALCULIC CHILDREN AND PROPOSED SOLUTIONS



Assoc. Prof. YILMAZ MUTLU
Assoc. Prof. ZEKERİYA ÇAM
Dr. EMİR FERİDUN ÇALIŞKAN





DYSCALCULIA ASSOCIATION

WRITTEN BY

Assoc. Prof. YILMAZ MUTLU
Associate Prof. ZEKERİYA ÇAM
Dr. EMİR FERİDUN ÇALIŞKAN



"This report was produced with the financial support of the European Union within the framework of the Etkiniz EU Programme. Only Dyscalculia Association is responsible for the content of this publication and by no means it does not reflect the EU's opinions."

ABOUT US

Dyscalculia Association, founded in 2017, has been continuing its activities together with many specialized academicians and teachers to form instructional intervention environments on a scientific foundation for individuals having challenges with mathematics, with the slogan "Everyone can learn Mathematics!".

Our association conducts activities in terms of raising awareness and knowledge among individuals having problems with learning mathematics in society and the educational community on social media platforms. On the other hand, it organizes instructional seminars on dyscalculia for our instructors. In addition, it drafts comprehensive reports on a variety of subjects and and strives to meet the need for sources in the field. Accordingly, we are very glad to offer you another remarkable study assumed to greatly contribute to the field.

In the present study, the problems of dyscalculic children have been detected in line with their parents' opinions and proposed solutions to the current problems have been offered in line with legal regulations and scientific studies. We wish this study will contribute to the society.

With kind regards,

Assoc. Prof. Yılmaz MUTLU

Dyscalculia Association

Chairman of the Executive Board

PREFACE

In 42nd Article of the Constitution of the Republic of Turkey, It is stated that "no one can be deprived of the right for education." Such a statement has a significant meaning for students, teachers, and parents, who are a part of education. Because every student has their own method of learning. Therefore, it will be fair to say that the more students are present in a school ecosystem, the more varieties of learning methods students have.

It is not possible to be indifferent to the challenges of children who are identified or yet to be identified with but facing developmental dyscalculia and thus failing to learn as their peers. In line with this basic motivation and the principle of equal access to education for every individual, our association makes a great effort to determine the problems of the children suffering from dyscalculia, to improve their educational opportunities, and to develop tools and equipment to simplify their learning processes. However, the solution of specific learning difficulties like developmental dyscalculia seen in children makes it mandatory to conduct a multi-dimensional examination and collaboration. One of the primary addressees during this process is parents.

Within the scope of this report, the problems of the parents having children with developmental dyscalculia were addressed. It was attempted to offer a depiction on the parents' problems related to the basic subjects such as identification, supporting education, and regulations. Unfortunately, as in all the world, the basic problem which these types of children, their parents, and teachers encounter in Turkey has been expressed substantially by families as to be the problem of identification. In many cases similar to this, the problems that families have personally and face due to their childrens' such special conditions have been examined. With this research report, it is hoped, in general, to shed light on the specific learning disability, and in particular, on implementers, researchers, and policymakers regarding children with developmental dyscalculia.

Writers

October 2021 - MUŞ

CONTENTS

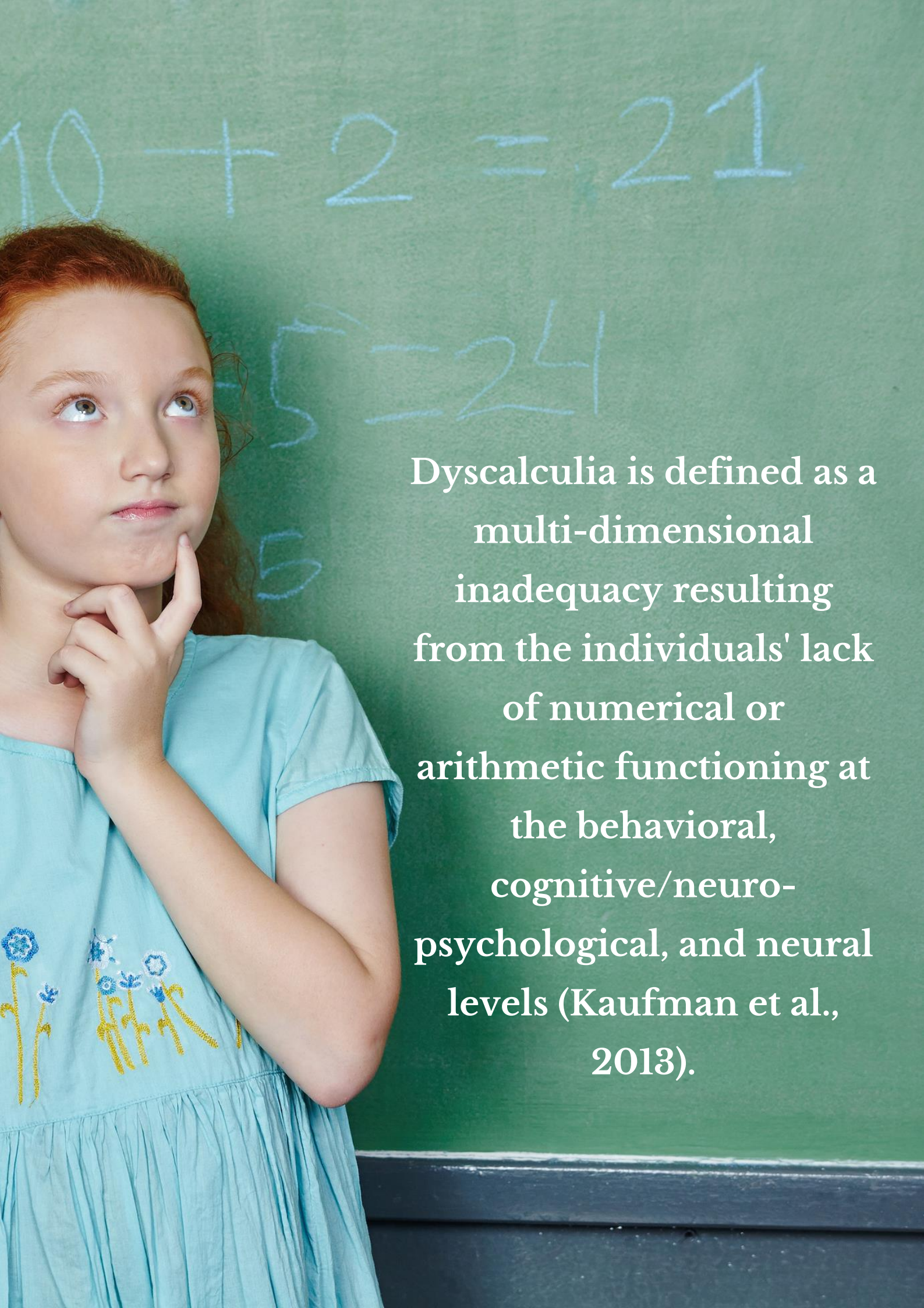
1	DYSCALCULIC CHILDREN
6	WHAT ARE THE INDICATIONS OF DYSCALCULIA?
8	WE ASKED THE PARENTS OF DYSCALCULIC CHILDREN
11	THE PROBLEMS IN THE IDENTIFICATION OF DYSCALCULIC CHILDREN AND THEIR PROPOSED SOLUTIONS
23	THE PROBLEMS IN SUPPORTIVE EDUCATION AND THEIR PROPOSED SOLUTIONS
42	THE PROBLEMS IN THE EVALUATION OF EXAMS AND THEIR PROPOSED SOLUTIONS
50	THE PROBLEMS IN LEGAL REGULATIONS AND PROPOSED SOLUTIONS
65	OTHER CHALLENGES FACED BY THE PARENTS OF DYSCALCULIC CHILDREN AND ROPOSED SOLUTIONS



DYSCALCULIA AND DYSCALCULIC CHILDREN

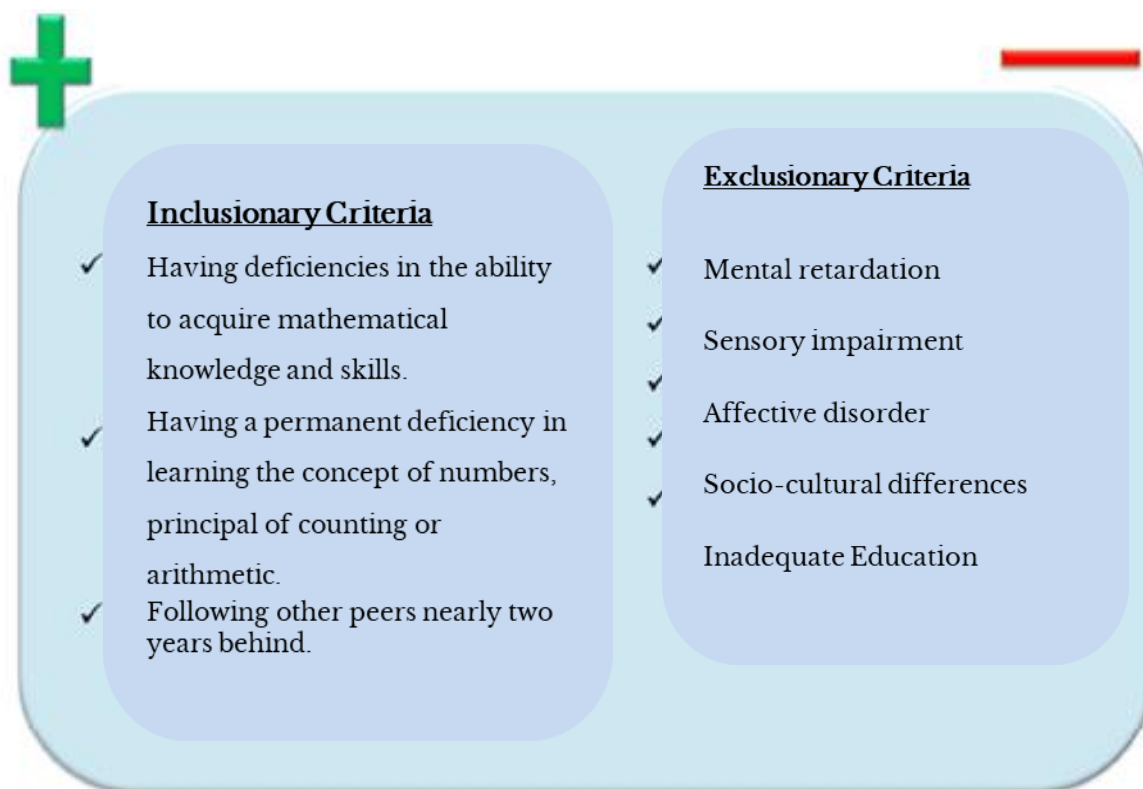
Learning difficulties, which has become prevalent in modern communities, are seen in reading, writing, and arithmetical abilities that we need in our daily life. The students with learning difficulties constitute in many countries the category that includes the highest number of individuals among the categories of students who need special education (Büttner and Hasselhorn, 2011). Therefore, in recent years, studies have been conducted on the challenges that the students with learning difficulties encounter in academic areas. However, the conducted studies are mainly concentrated on reading and writing (dyslexia-dysgraphia) and it can be seen that the number of studies conducted on the challenges with learning mathematics is quite limited (Hannell, 2013).

Dyscalculia is defined as a multi-dimensional inadequacy resulting from the individuals' lack of numerical or arithmetic functioning at the behavioral, cognitive/neuro-psychological, and neural levels (Kaufman et al., 2013). In another definition, dyscalculia is expressed as an unexpected low performance of the student in mathematics despite the absence of mental retardation, sensory impairment, affective disorder, socio-cultural and economic disadvantageousness, and inadequate education (Büttner and Hasselhorn, 2011). World Health Organization has defined developmental dyscalculia as an inconsistency between general intelligence and mathematical performance, which cannot be explained through mental retardation, low social environment, or inadequate education (WHO, 2018).



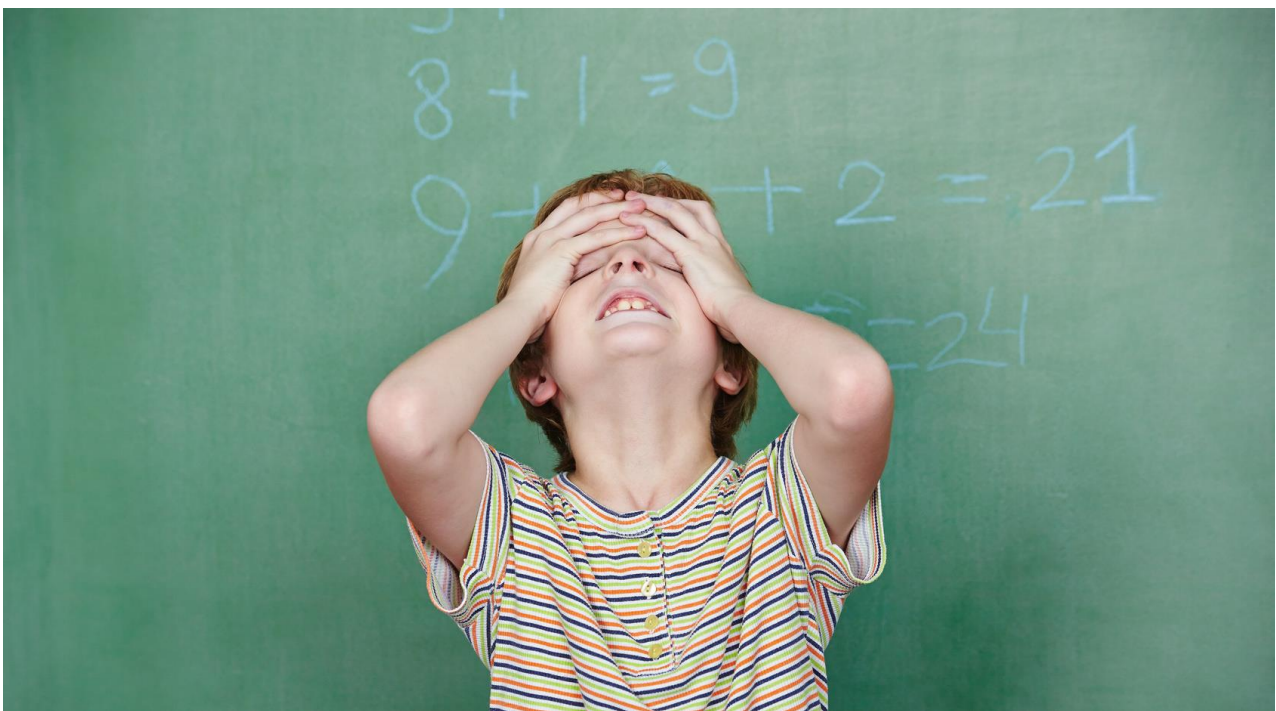
Dyscalculia is defined as a multi-dimensional inadequacy resulting from the individuals' lack of numerical or arithmetic functioning at the behavioral, cognitive/neuro-psychological, and neural levels (Kaufman et al., 2013).

Mutlu and Akgün (2017) offered the following exclusionary and inclusionary criteria suggesting a framework on what dyscalculia is with reference to the definitions made on dyscalculia.



Within the context of dyscalculia, that the individual has normal and superior intelligence, they demonstrate a fairly lower level of achievement in mathematics than what is expected from their ages and intelligence levels even though they are provided with a good quality of education using appropriate instructional methods suitable for their age, they do not possess number sense, and they are nearly two or more years of age behind their peers indicates the presence of dyscalculia; while a lower level of achievement in mathematics due to mental retardation, inappropriate pedagogical approaches, and socio-cultural reasons is not associated with dyscalculia. Here this functional definition rather aimed at instructors can be suggested independently of the reasons for dyscalculia. Dyscalculia is a condition when an individual with a normal and superior intelligence demonstrates a fairly lower level of achievement in mathematics than what is expected from their ages and intelligence levels even though they are provided with a good quality of education in accordance with their age, they do not possess number sense, and they are nearly two or more years of age behind their peers.

Dyscalculic individuals fail in performing even very simple arithmetical operations. This affects their daily life quality very badly (for example, when summing up two products' prices, finding directions, or managing their time), causing the individuals to have various psychological problems such as anxiety, stress, fear, and low self-esteem. Furthermore, dyscalculia adversely affects the individual's academic development and professional preferences. However, dyscalculic children receive education in the same class with their peers who demonstrate the normal developmental processes in mathematics using the same methods, and they are expected to demonstrate the same level of achievement in the same exams having the same level of hardship. Yet it is mandatory to accommodate instructional environments for children with dyscalculia in accordance with their features and requirements. The absence of such an accommodation is believed to cause the infringement of the individual's education and training rights.



It is mandatory to arrange instructional environments for dyscalculic children by considering their features and requirements.

Dyscalculic individuals fail in performing even very simple arithmetical operations. This affects their daily life quality very badly, causing the individuals to have various psychological problems such as anxiety, stress, fear, and low self-esteem.



INDICATIONS OF DYSCALCULIA

We can list some common features of dyscalculic children as follows (Haberstroh and Schulte-Körne, 2019).

- They have had difficulty in processing numbers and quantities as of their pre-school periods.
- They have difficulty in correlating a number (for example, 2) with a quantity it represents (for example, 2 apples).
- They fail to perceive the relationship between numbers and quantities (two apples and one apple = $2+1$).
- They have difficulty in counting, comparing two numbers or quantitative multiplicity, rapid evaluation, and determining small amounts of (4-5 at most) points, determining a position of a number on a number line, and comprehending the place-value system.
- They have difficulty in basic arithmetical operations and other mathematical tasks.
- Dyscalculic children fail to understand calculations rules because they have no or a limited understanding of the logic lying under numbers and quantities ($17 + 14 = 1 + 1$ and $7 + 4 = 13$ or 211).
- They may need to revise their answers to simple calculation problems over again. Because they are deprived of storing and recalling the fact of numbers due to their insufficient memories.



- They employ simple strategies, and they either start from one or most likely count on the basis of that when they perform calculating ($8 + 4 = 9, 10, 11, 12 = 12$). They are not capable enough to use counting strategies ($8 + 4 = 8 + 2$ and $2 = 12$) efficiently. Their inadequacies and challenges get worse with the increased complexity of advanced mathematical subjects (greater range of numbers, written calculations, multiple calculation operations, verbal problems).
- Finger-counting only is not an indication of dyscalculia. However, if a child insists on finger counting even in simple calculations despite his/her knowledge of different strategies in advanced ages, it indicates a real problem. Furthermore, not only their mistakes in calculations but also the variety, permanence and frequency of these mistakes are required to be considered.

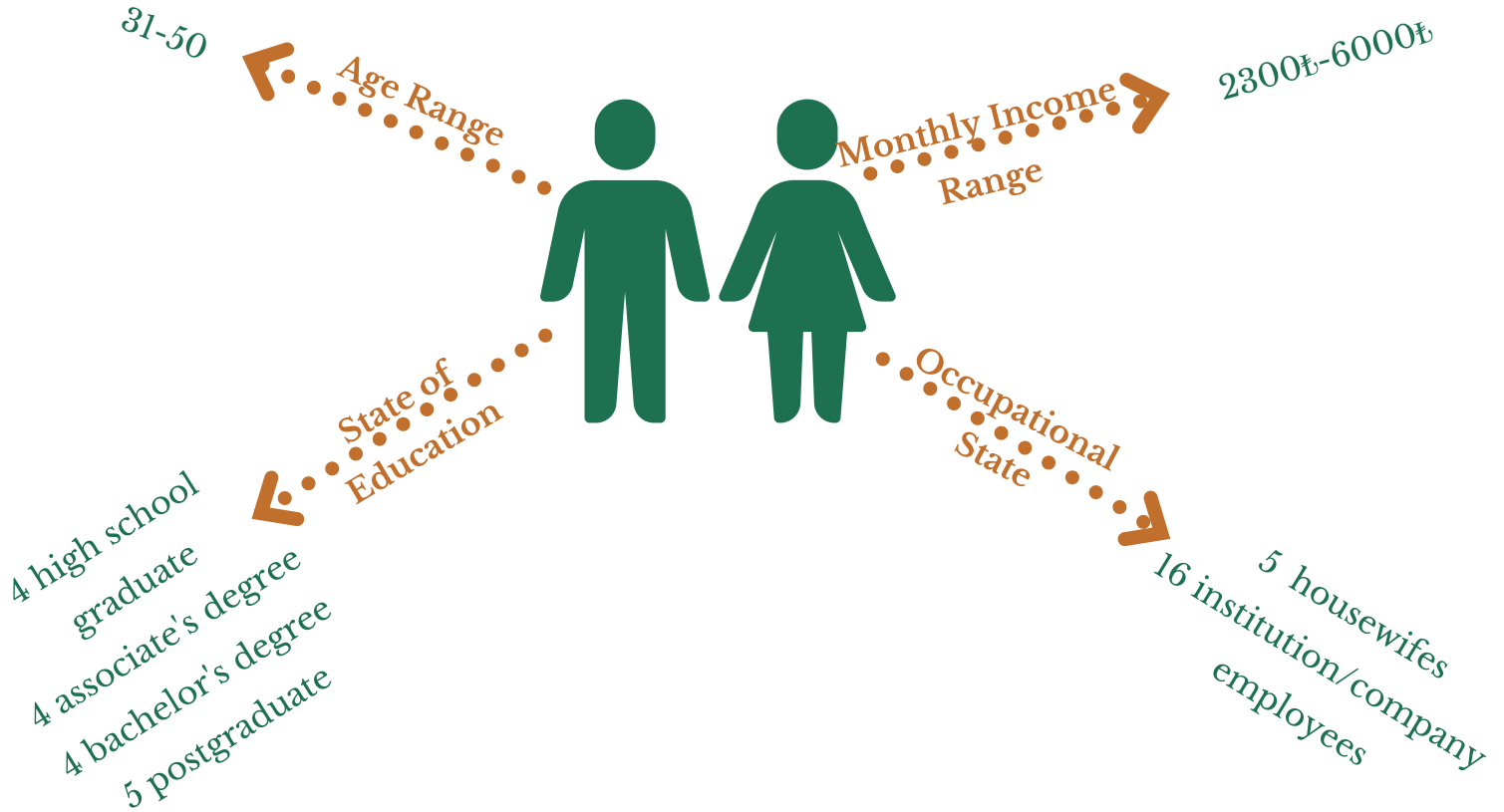




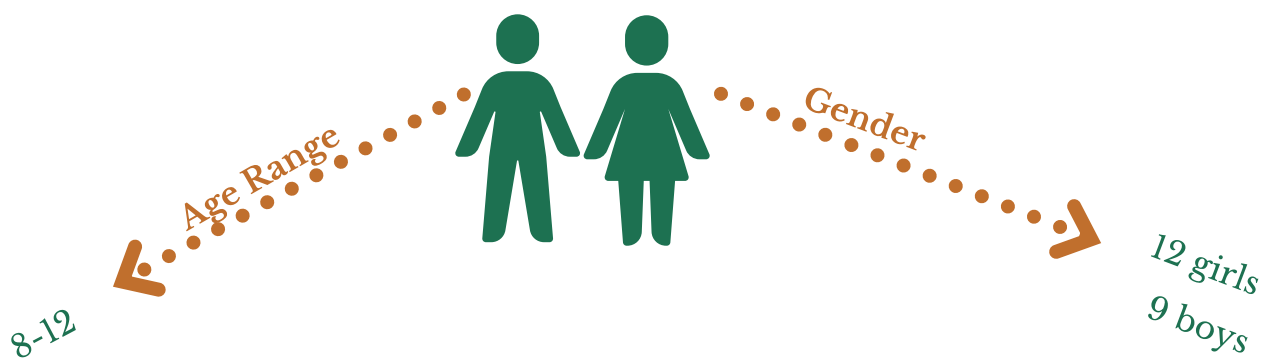
WE ASKED THE PARENTS OF DYSCALCULIC CHILDREN

Opinions of twenty-one parents having an age range of 31 to 50 and dyscalculic children were analyzed in an effort to determine the problems of dyscalculic children and to propose solutions to these problems. Out of the participants expressing their opinions, four persons were high-school graduate, another four persons were associate's degree, eight persons were bachelor's degree, and five persons were postgraduate. The participants' answers to the questions on their employment were examined and it was seen that 5 persons were unemployed and the other 16 persons were working in a variety of professions. Out of the parents partaking the study, four had one child, and others had 2 or more children. The maximum number of children of a parent had was determined to be 4. The age of the children determined to be dyscalculic ranged between 8 and 14. When examining in terms of the gender variable, it was seen that 12 out of the dyscalculic children were girls and 9 were boys. It was determined that monthly incomes of the parents whose opinions were consulted ranged between 2300 Turkish liras and 6000 Turkish liras.

Parents



Children



Details related to the opinions obtained from 21 parents interviewed are presented in the following sections. The Parents' Problems Adressed in the Interviews;

"The Problems in the Diagnosis of Dyscalculic Children",

"The Problems in Supporting Education",

"The Problems in Exams and Evaluations",

"The Problems in Legal Regulations"

"Other Problems"

were referred as five main topics and the opinions obtained were examined.





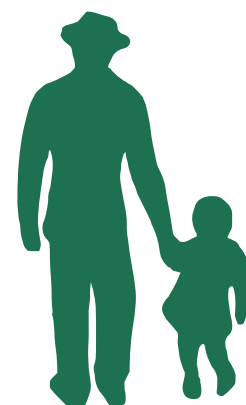
**THE PROBLEMS IN THE
DIAGNOSIS OF DYSCALCULIC
CHILDREN AND THEIR
PROPOSED SOLUTIONS**

The identification of children with dyscalculia in Turkey is a well-known problem and this problem was addressed by the participants. Any standardized tool to use in identifying these children has yet to be developed. For instance, in the identification of dyscalculic children, The WISC-R Intelligence Scale (Wechsler Intelligence Scale for Children-Revised), The Raven's Progressive Matrices Test, Screening Tests for Learning Disabilities, The Mathematics Achievement Test, Performance Tests for Calculation, The Battery of Specific Learning Disability as well as observations, interviews, criterion-referenced evaluations, error analyses, and logs are referred. However, it is uncertain which diagnostic tool is used in which cases, which one of the diagnostic tools is the most efficient, or which diagnostic tools are used in combination. This incrementally makes the identification process of the children battling against dyscalculia more complicated. For example, two parents stated that they noticed such a case as a result of their observations for their children.



They said "I noticed that some things were going wrong with my child in the last couple of months during which period we spent our time at home due to the Coronavirus pandemic. I realized that my child was having difficulty in learning mathematics and after making some research, I thought that my child could be dyscalculic. Then I decided to talk with a specialist over this matter, and I figured out the case more clearly."

"I thought (mother) that my child could be dyscalculic last month." My child had a huge difficulty with learning the word "advertisements". In the pre-school period, every child knew how to write the word "advertisements", except mine..."



When the parents' opinions were examined, It was noticed that one of the parents addressed the inadequacy of diagnostic tools in terms of the challenges in the identification process of their children as mentioned below.



"I saw my child writing the word "advertisements" reversely. I took my child to Çapa (Faculty of Medicine) for 7 years. Doctors said there was nothing wrong with my child. They applies a WISC-R test and said that my child was a genius. I was consistently telling them there was something wrong with my child, but they were mad at me. They did nothing. No specialist in this field is available in Turkey. I have more knowledge of this subject even than our doctors, but I can do nothing as I don't possess a certificate in this field. Instead of asking families, you had better urge authorized persons to help raise specialists in this field. Urge them to raise teachers to notice such children just in their pre-school periods, and then to set schools and schedules not to lose these children. Parents already struggle over desperately."

When considering the parents' explanations, the aforementioned inadequacy regarding diagnostic tools is remarkable. Along with this, stakeholders (teachers, schools, families) in education have insufficient knowledge of this subject because there are not enough specialists in the field of dyscalculia unlike dyslexia or dysgraphia from specific learning disabilities, and researches and publications on this subject have gained momentum only in the last few years. Scientific bases of the problems in the identification of dyscalculic children will be addressed, and legal bases of the identification of the children who are in need to take a special education in Turkey and their functioning processes and their functioning process will be discussed in the following pages.

DIAGNOSIS OF DYSCALCULIC CHILDREN

Functioning effective intervention programs in the process of special education has vital importance to meet the instructional needs of the individuals with disabilities in an appropriate and effective manner in line with their individual characteristics. Another important aspect is the identification process as well as the implementation of effective intervention programs. Because only proper identifications and efficient interventions can make it possible for individuals with disabilities to access special education services. The implementation of the identification in an acceptable and reliable framework has an impact on the proper determination of the individuals to benefit from special education services to the content of the intervention programs to be developed for them. How such an effective identification on both the incorporation of the right individuals into the special education process and the training services to be provided is required to be implemented has been a matter of discussion among the specialist in this field for a long time. Differences between the approaches employed in the identification process are an outcome of these discussions. A similar case is also applicable to the identification process of dyscalculia due to its different definitions. Thus, it is quite hard to reach a consensus on the methods that can be preferred in the identification process of dyscalculia (Gifford, 2006; Gifford & Rockliffe, 2012; Mutlu & Akgün, 2017 akt. Can, 2020).



Early identification of dyscalculic children is quite important for the development of their instructional skills (Geary, 2011; Passolunghi ve Lanfranchi, 2012).

In early identification, the origins of the students' problems can be detected (Passolunghi ve Lanfranchi, 2012). Furthermore, with the interventions at early ages, an achievement in mathematics can be obtained more easily due to the presence of a greater degree of plasticity at small ages (Thomas, 2012).



Despite numerous studies conducted on dyscalculia and the methods employed in the identification of dyscalculia, it is characterized by vaguenesses that cannot be completely distinguished in the individuals having reading and writing disabilities, attention deficit, and hyperactivity disorder, low level of achievement in mathematics or mental deficiency.

Dyscalculia

Measurements for the identification of dyscalculia can help identify the individuals that are assumed to have a risk of dyscalculia or determined to have a high-risk of dyscalculia.

PREVALENTLY USED DIAGNOSIS METHODS

Response to Intervention

The method of response to intervention is a system that aims to identify and support at early stages the students having a risk of academic non-achievement and learning disability.

Grade
3 Stages Small group
 individual
 intervention

Extended over time

Computer-Based Screening

Computer-based screening tools for dyscalculia are typically designed within the context of the findings of cognitive neuroscience studies.

Sanbil Stroop
 effect

Estimation

Multi-Filter Model

In line with the exclusionary and inclusionary criteria for dyscalculia

it is aimed to determine dyscalculia using multiple tools.

Student
acknowledgement form

Teacher opinion

Intelligence

Screening

Discrepancy Model

In this method, the discrepancy between the score that individuals take in standardized achievement tests in mathematics, and their IQ scores and ages, and the level of academic achievement is taken as a basis.

Intelligence


Achievement

Report on Children with Special Needs ÇÖZGER

ÇÖZGER (Report on Children with Special Needs) refers to a document drafted by authorized medical boards on children with special needs. The process of Medical Board Reports on People with Disabilities and their content was amended with Regulation no. 30692 issued in the official gazette of February 20, 2019. Additionally, a novel approach was developed for the evaluation and reporting process of these children.

A special learning disability is a medical identification and such a identification is reached by the evaluations of medical boards including specialists in the field of Child and Adolescent Mental Health and Disorders. The medical identification process of children with learning disabilities are carried out by the related specialists in hospitals in our country. In general, the International Classification of Functioning, Disability, and Health for Children and Youth (ICF-CY) is taken as a basis as a classification system in all evaluations studies on individuals with special needs.



A man with short brown hair and a light beard, wearing a white lab coat over a light-colored patterned shirt, is looking down at a white tablet computer he is holding in his hands. The background is bright and out of focus, suggesting an indoor setting with large windows.

The regulation of ÇÖZGER aims to document the needs of children with special needs (disabilities) independently of adults due to the fact that childhood differentiates from adolescence in terms of its developmental process, and to enable these children to have access to the right to health, education, rehabilitation, and other social and economic rights.

As a result of the evaluations, the specialists in the board can determine if the applicant individual has a special need, and if yes, how critical such a need is. The individuals determined to have a special need in ÇÖZGER can initiate their instructional, evaluation, and identification processes by applying to GRC's (guidance research centers). ÇÖZGER is applicable to a certain date and this date is not stated in the report. In case of termination of the duration of the report. they need to get an appointment for an examination over again and renew the report. After renewing ÇÖZGER, the individuals determined to have a special need are provided with a renewed Evaluation Board Report on Special Education as a result of a process of instructional evaluation and identification to be performed by GRC's.

- **HASTANE
ÇÖZGER**



- **MEDICAL IDENTIFICATION**

- **GUIDANCE RESEARCH CENTER
IEP (Individualized Education Program)**



- **INSTRUCTIONAL IDENTIFICATION**

To see the Regulation related to the ÇÖZGER, which is the report on medical identification of special needs, in detail

<https://www.resmigazete.gov.tr/eskiler/2019/02/20190220-1.htm>

is visitable.

INSTRUCTIONAL IDENTIFICATION

Evaluation and Monitoring Process with Identification

Bases of instructional evaluation and identification

(1) Instructional evaluation and identification processes of the individuals are carried out by an evaluation board for special education within GRC's.

(2) The first application related to the instructional evaluation and identification of individuals; is made by school managements, parents, or the individual in person who have no mental disability and are over the age of 18; by the persons authorized by the institution with a formal letter for those who benefit from the care and sheltering services in state institutions.

(3) In the process of instructional evaluation and identification, the following matters are taken into consideration:

a) Instructional evaluation and identification is conducted using suitable measurement tools for individuals' features in suitable environments. Instructional evaluation and identification processes for those who are not capable of coming to GRC's due to their health problems are done in the places where these individuals are located.

b) The individuals determined to have a need for special education as a result of their instructional evaluation and identification are guided to suitable instructional environments and services by providing them with an Evaluation Board Report on Special Education. For the students who are guided to a state special education school, a special education class, or a full-time inclusion/integration education, the (ANNEX-1) Report of 8/2/2007, and for those who are determined to be provided with a supporting education in special education institutions that provide service within the framework of the Private Educational Institution Act, the (ANNEX-2) Report are issued.

c) For the students who are determined to receive a supporting education in the institutions that provide service within the framework of the Private Education Institution Act, a one-year educational plan is prepared at most. Due plans can be renewed if needed.

(9) The individuals' and parents' opinions are received regarding the instructional evaluation and identification process.

ç) All of the processes related to instructional evaluation and identification services are conducted over the MEBBİS (Information Systems managed by the Ministry of National Education)-GRC Module.

(4) Instructional evaluation and identification processes are conducted for registered students by the GRC, which is located in the vicinity of their school, while for unregistered students these processes are carried out by the GRC, which is located in the vicinity of an institution that provides those students with its residential address or care and sheltering services.

(5) Instructional evaluation and identification are done at all types and stages of education, by taking the individual's properties in all developmental areas, their abilities in all academic disciplines as well as educational needs into consideration. Furthermore, these processes can be reproduced when needed upon written request of parents or schools in line with the individuals' instructional achievement and needs.





**THE PROBLEMS IN
SUPPORTING EDUCATION
AND PROPOSED SOLUTIONS**

Within the framework of inclusive education, supporting education is provided by the Ministry of National Education in state educational environments provided with several special tools and equipment in order to enable the students with special needs of education to gain the utmost benefit from the education that they receive together with their peers featuring a development at a normal level. Such an education is referred to as supporting education while these environments are named supporting education rooms. Such supporting education rooms are required to be opened in case of the presence of the students with special abilities or special needs of education. However, all schools are not provided with suitable environments for such a supporting education, and also this type of education provided in such environments is not effectively performed in some schools. The problems of the dyscalculic children's parents were addressed and out of 21 parents interviewed, children of 8 parents were seen to receive supporting education. Opinions of a parent who took special education for their children but did not get enough advantages of it are presented below.



"MEB (Ministry of National Education) protects students in its integration program. IEP is only a name, it has no function. Teachers do not have enough knowledge and most of them only intend to pass students on to the next class, just for their own sake. Supporting education rooms are fine, but they are not applied in practice. Teachers are required to be provided with knowledge and titles..."

When the parent's opinions were examined, it is understood that the parent thinks that the application of supporting education is a right-minded attempt but has a couple of problems. It can be clearly seen that the IEP (Individualized Education Program) program was created for show only and its implementation was nonfunctional. It was again stated by the parent that these children with special needs were not enhanced by their teachers through supporting education and additional education applications, yet they were given a minimum score and thereby being passed on to the next class by teachers' initiatives. This can be interpreted that most of the implementations determined by the ministry have been on paper. However, it is also uttered that the parents eager to help their children take education in these commercial institutions cannot afford this due to economical reasons. In this aspect, a parent's opinion is given here.

"If we don't fight for our children and their future saying my child is fixed, incompetent, and helpless, everything seems to be more miserable. If you wish to take better-qualified education in better-qualified institutions, you have to be financially strong. But if your family's budget depends on one family member's income only and you strive to raise three children with this income, these educational applications, qualified teachers, and qualified educational institutions cannot go beyond dreams for us, and all you can do is to accept your hopelessness and keep struggling."



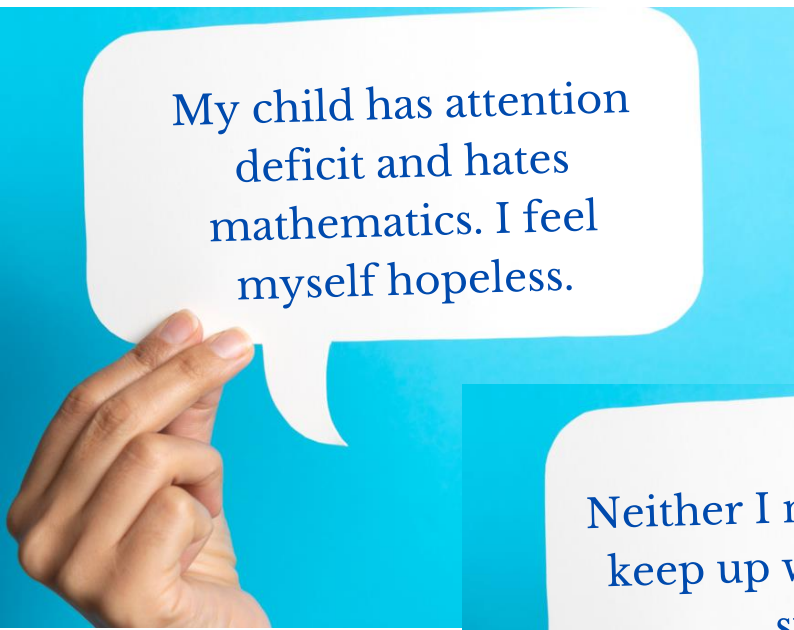
Poverty stands out as one of the obstacles before these children's opportunity to take a qualified education. Even though 12-year compulsory education in Turkey is free of charge for every student, when it comes to supporting education and additional education, it is a fact that the parents have difficulty in affording. It can be said that these children are not enough granted the right to an equal education as they are deprived of adequate identification tools, appropriate course curriculum, qualified supporting education, and they face economical problems as well as the challenge of dyscalculia. When lacking in the opportunity of taking a qualified education and economic sufficiency coexist, the parents' desperation keeps increasing. It can be clearly seen from the parent's statements . In this regard, one parent stated that the labels used for their children receiving supporting education annoy them more rather than tools and equipment.

"Some teachers immediately and adversely label even ordinary children let alone those with dyslexia and dyscalculia even in a simple incident. Children appears to be a subject of experiment in the eyes of unexperienced teachers, who are lack of development as well. Teachers and guidance and psychological counselors are required to be subjected to strict training. They are required to participate in seminars on what dyslexia and dyscalculia is and on is every vigorous child hyperactive? "


Many studies on awareness and knowledge levels of teachers and candidate teachers in Turkey have been conducted (Sezer, & Akın, 2011; Karadeniz, 2013; Kuruyer, Çakıroğlu, & Özsoy, 2019). It was observed in the studies conducted that mathematics teachers are not enough knowledgeable with the concept of dyscalculia (Sezer, & Akın, 2011; Karadeniz, 2013), and additionally most of the primary school teachers are not enough informed of the concept of dyscalculia and do not have the knowledge on how to cope with dyscalculic children efficiently. Again, it was indicated that candidate primary school teachers have an awareness of the challenge with learning mathematics, however, their knowledge of such challenges are not insufficient, they have some mistaken opinions about dyscalculia, they do not have an insight on how to detect and overcome the learning disability in mathematics (Kuruyer, Çakıroğlu, & Özsoy, 2019).

The fact that teachers do not have enough knowledge of how to cope with dyscalculia and dyscalculic children may result in the lack of a qualified instructional intervention that dyscalculic children require. Likewise, if children are deprived of the knowledge of mathematics in everyday life, their quality of life can be adversely affected. In this sense, MEB may implement in-service training activities in order to help teachers gain good level of information and accumulation on dyscalculia, and the related nongovernmental organizations may carry out informative seminars and conferences in this respect.

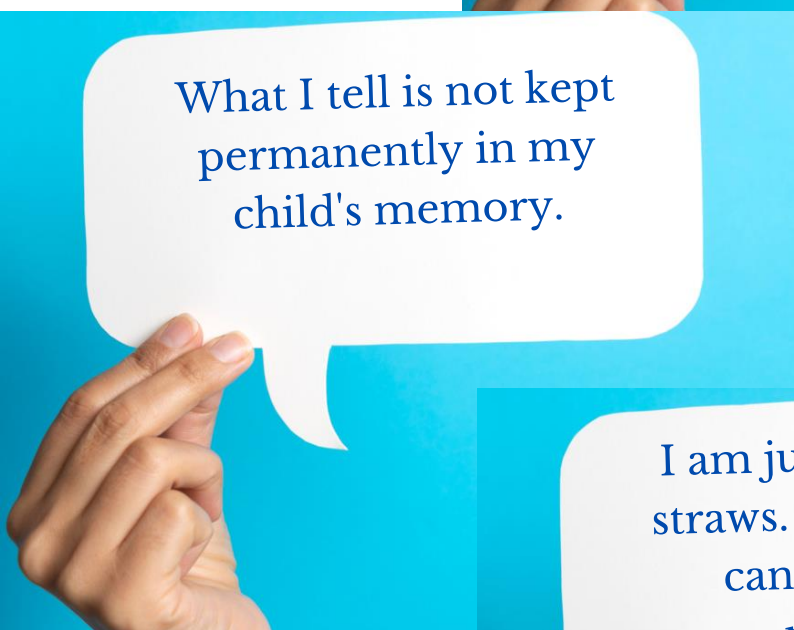
In the following sections, a general frame related to mathematic learning for children will be offered and the sources and materials to be used in the embodiment of this learning process will be addressed.



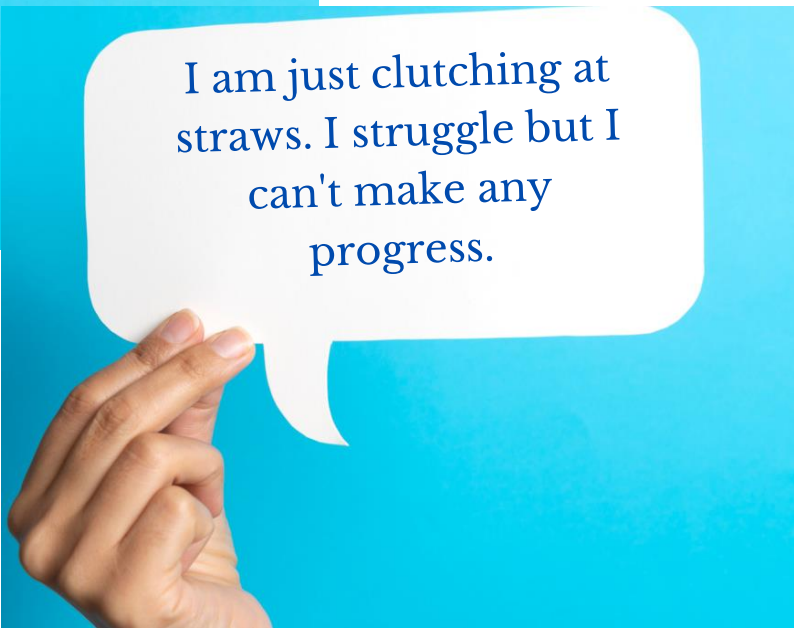
My child has attention deficit and hates mathematics. I feel myself hopeless.



Neither I nor my child can keep up with the current syllabus.



What I tell is not kept permanently in my child's memory.



I am just clutching at straws. I struggle but I can't make any progress.

TEACHING MATHEMATICS TO DYSCALCULIC CHILDREN

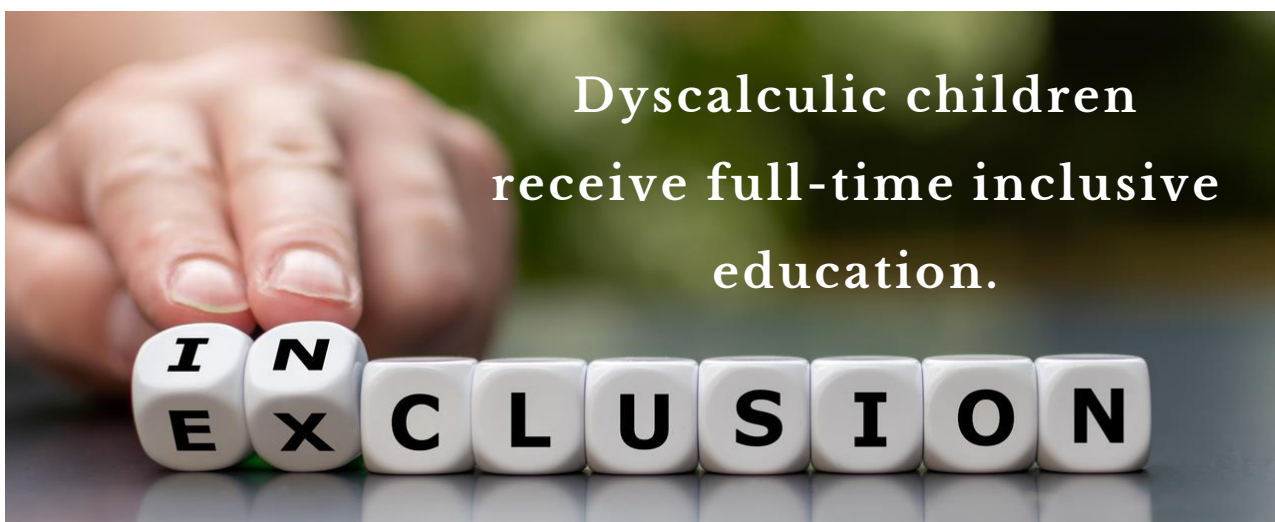
Determining the scope of instructional interventions for dyscalculic children is often a subject of complexity due to the heterogeneity of dyscalculia and generally concurrent deficiencies in children. Therefore, it is critical to evaluate children's strangenesses and weaknesses in detail for efficient instructional intervention. After a detailed determination of children's mathematical performance in an educational environment, it is mandatory to develop a research-based approach in order to help them make progress despite their challenges. In this respect, researchers offer a variety of alternative methods such as multi-sensory, over-learning, direct instructional method, computer-assisted instruction, sequential strategy, game-based mathematics learning. However, it is quite essential to consider dyscalculic children's inabilities such as anxiety, lack of self-confidence, memory deficiency for an efficient learning process (Henderson, 2012).



Dyscalculic children, who are regarded as full-time inclusive students within the framework of special education, are provided with education in ordinary classes as well as in supporting education classes, when needed for mathematics lessons, within the scope of Individualized Education Program (IEP) prepared specially to them.

The main objective of inclusive education is; to enable individuals with special education needs to interact with others at all types and levels and to have access to a high level of education.

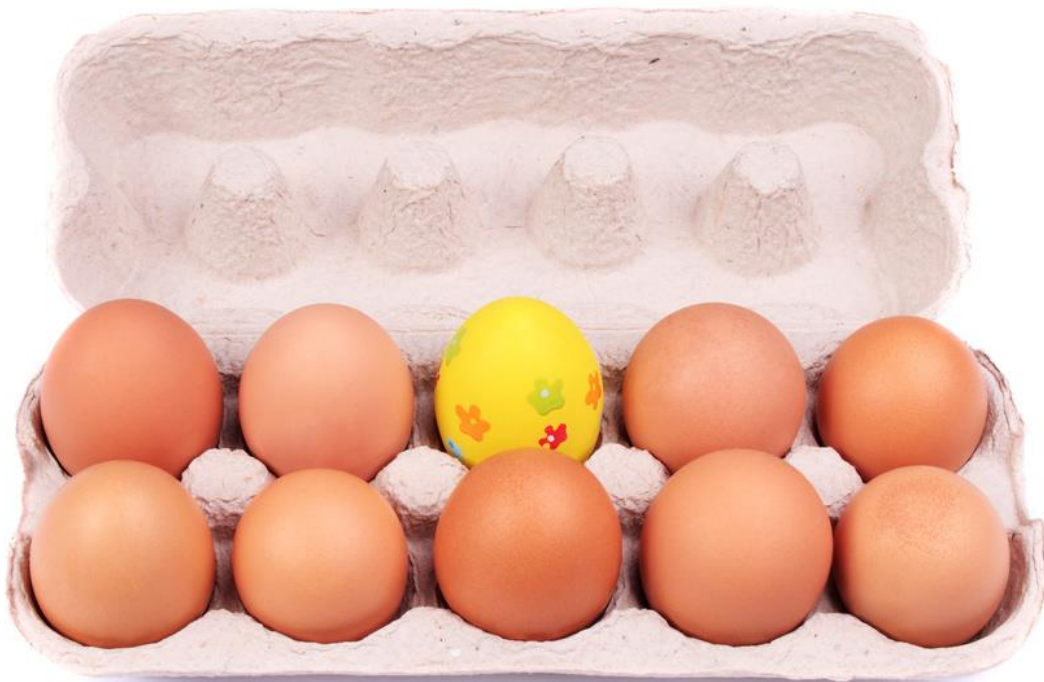
Within the scope of these implementations, individuals with special education needs are allowed to sustain their full-time education in the same class together with their peers having no deficiencies through inclusive-integrative education, and additionally they can receive part-time education in special education classes. Part-time inclusive practices are carried out by enabling students with deficiencies to receive education for some lessons in the same classes with their peers without deficiencies or to partake in extracurricular activities together.



"People with disabilities cannot be hindered from their right to education by no means. People with disabilities are enabled to benefit from the opportunity of life-long learning, without discrimination, on an equal basis, in integrated environments by taking their special needs and differences into consideration. Within the scope of the general education system, inclusive practices are implemented to allow people with disabilities to receive education at all levels."

in accordance with the provision authorized and liable persons shall act to execute their duties beyond question.

Notice on Inclusive/Integrative Education Practices



Teaching mathematics to dyscalculic students can be shaped in line with the following steps.

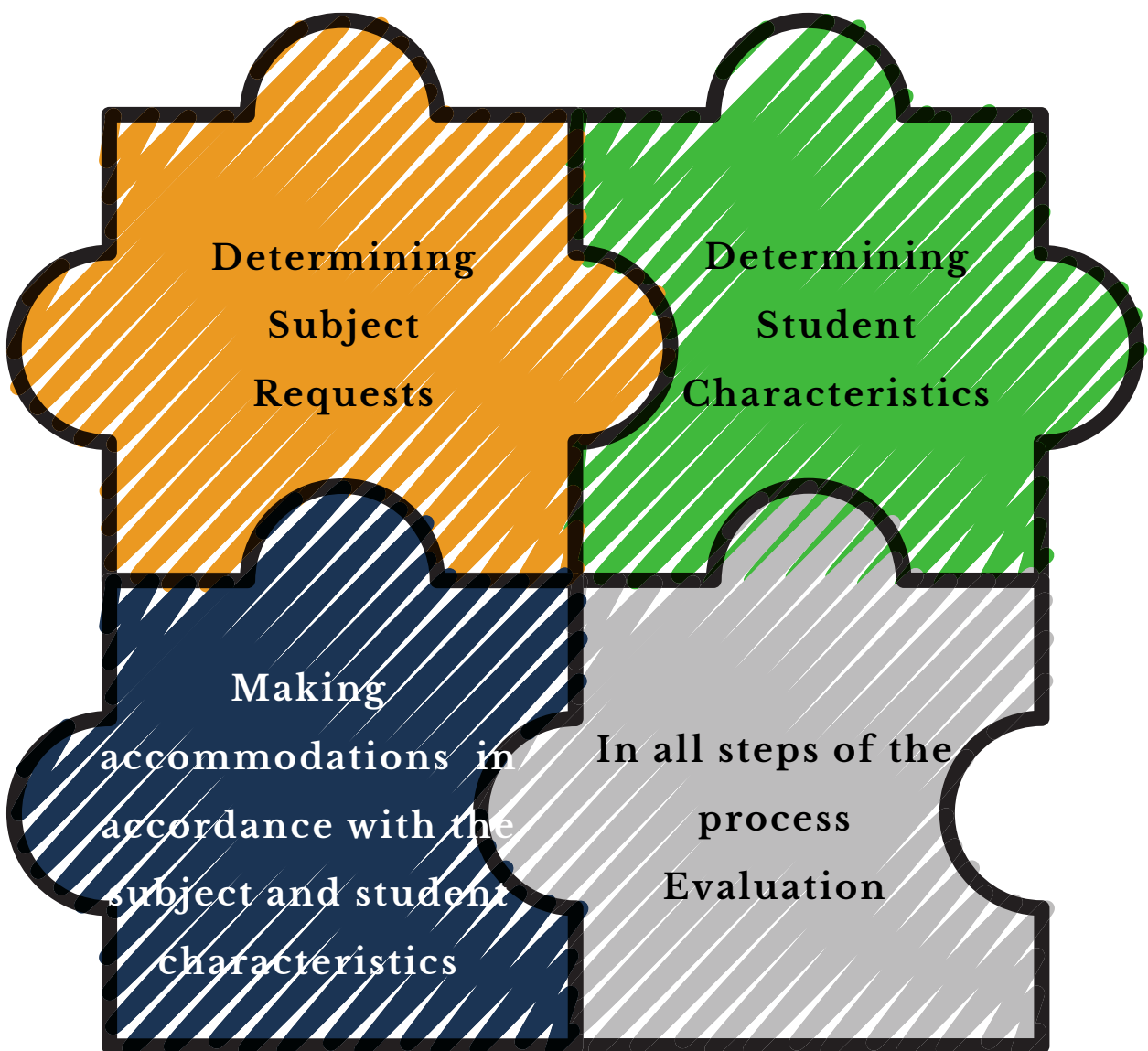
Instructional identification: it comprises instructional identification by detecting the area and level of mathematics that students have difficulty in learning by use of Guidance and Research Centers (GRC's).

Preparation of IEP's within the framework of the instructional identification: it includes the preparation of an instructional plan composed of the information on what (determination of long and short-term targets), where, how, and with supports of whom the student shall be provided with education within that year during which time the IEP is effective.

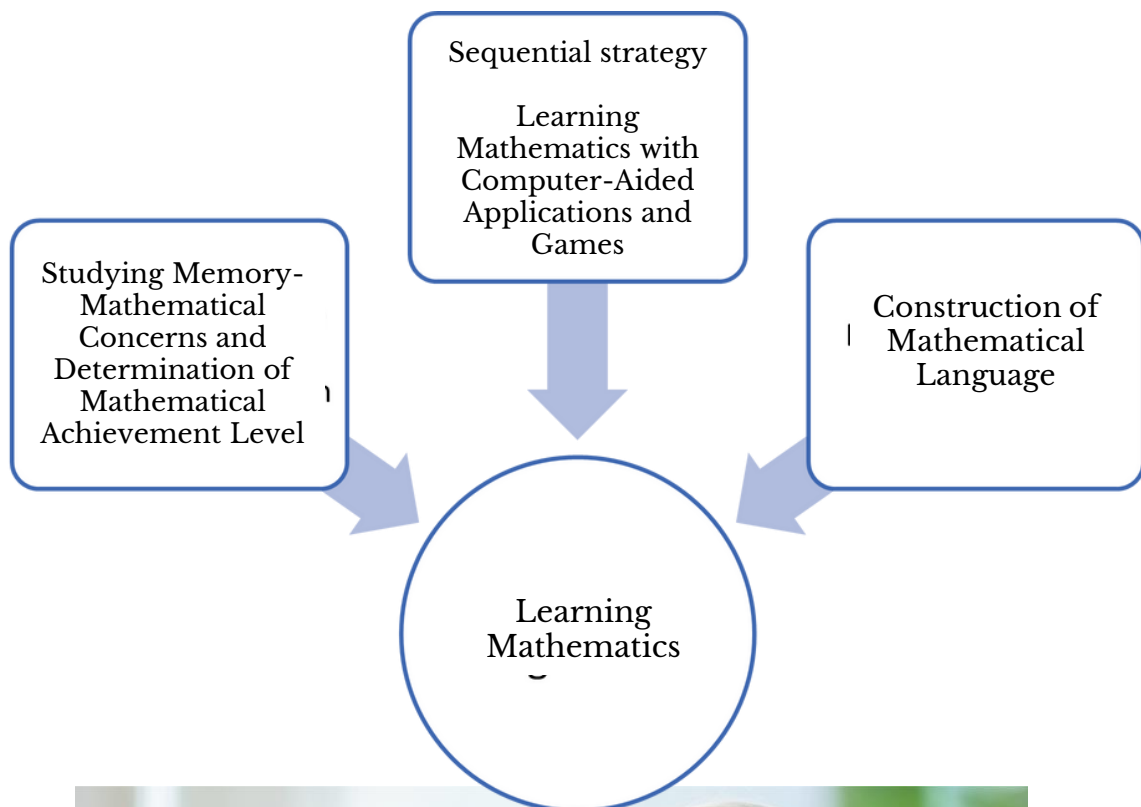
Preparation of Individualized Learning Plans (ILP's) within the framework of long and short-term targets stated in IEP's: It is essential to analyze mathematical concepts and abilities to be taught in daily plans to be prepared in line with short-term targets and to implement suitable instructional adaptations for individuals with learning disabilities. The adaptation starting with IEP's reaches its final target with ILP's (Mutlu, 2016).



Acommodation framework to form for ILP's consists of four components (Bryant ve Bryant, 1998). These include determining requests peculiar to the subject, characteristics peculiar to the student, proposed adaptations, and evaluations, as being detailed below.

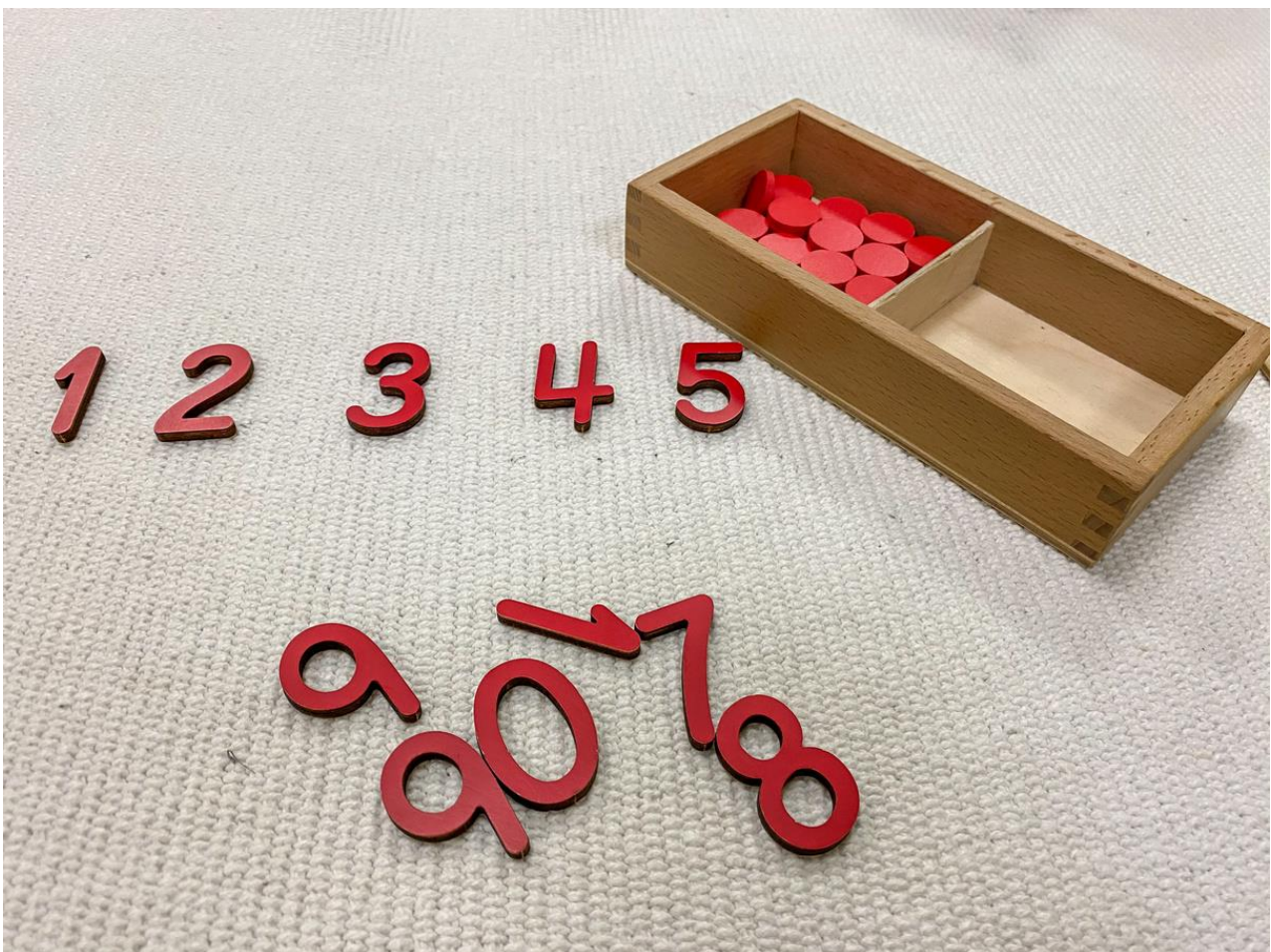


In teaching mathematics for dyscalculic children, a framework of instructional intervention can be formed, which consists of the steps of firstly evaluating the student's studying memory, mathematical concerns, and mathematical performance in detail, secondly preferring sequential strategies, technology-aided applications, and games by making necessary adaptations based on the data obtained from the step of evaluation, and finally learning concepts in building mathematical language. See these sources (Mutlu, Olkun, Akgün ve Sarı, 2020; Mutlu, Olkun, Akgün ve Sarı, 2021) for more detail.



Sources and Materials on Dyscalculia

When considering the academic background and the number of studies conducted on dyscalculia in our country, it can be clearly seen that these studies are yet in babyhood. Likewise, it can be said that when it comes to tangible materials, the number of materials directly aimed at dyscalculic children is quite limited. However, it should be noted that the materials used for ordinary children can also be used for dyscalculic children along with several adapted activities by considering the characteristics of children with dyscalculia. In this part, the sources and materials that have been reached by us and directly aimed at dyscalculic children are discussed.

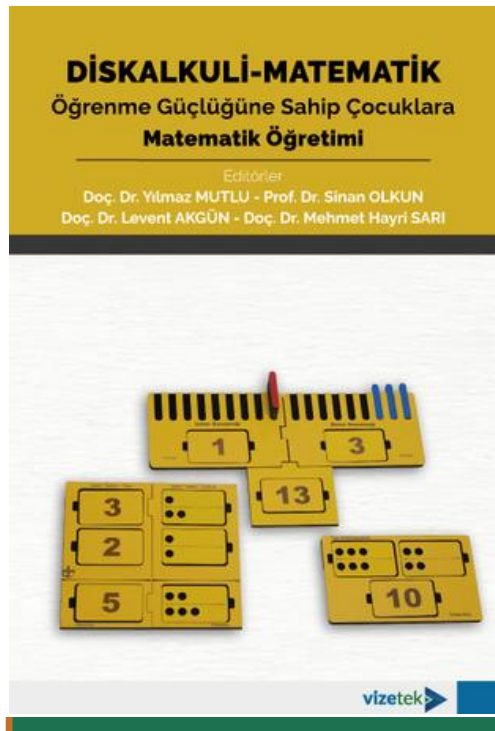


Source Books

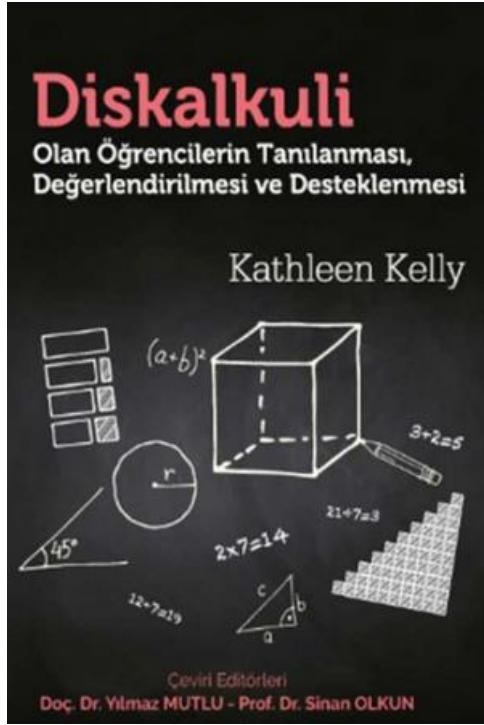


This source drafted by the researchers within the Dyscalculia Association contains the definition of dyscalculia, the characteristics of dyscalculic children, the reason, and the identification methods for dyscalculia.

The book rather presents a theoretical frame. It can be said that it is a study aimed at the specialists in the related field.



It can be said that this book is the most comprehensive study that has ever been drafted in Turkey for mathematics teaching to dyscalculic children. In this book, the way of teaching a great variety of topics ranging from counting and four arithmetical operations to problem solving, hour reading, and money recognition is addressed.



This book helps the reader to acquire an overview of the current researches explaining the nature and causes of dyscalculia, the examples of how to perform formal and informal evaluations, an explanation of the principles of mathematics learning with multi-sensory methods, and the outline of a program structured with lesson planning and exemplary activities.



This book provides the parent of dyscalculic children with a wide range of information on from identification to instructional interventions. Moreover, the materials suitable to use in mathematic learning are included in the book.



This book covers exemplary games to build up basic arithmetical abilities of children. The goal of these games, how to play them, and what types of materials are planned to be used in the game are explained in the book.

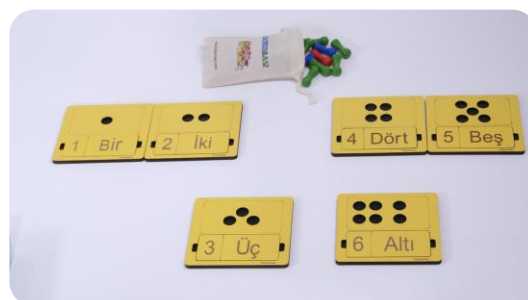


The book on mathematics with finger-counting give an explanation for the children's tendency to finger-counting. Various strategies, songs, and games for finger-counting are covered in this book.

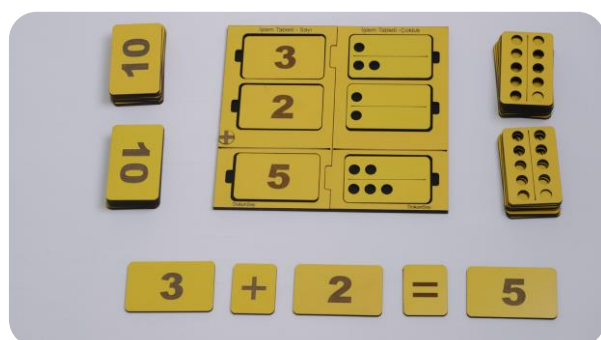
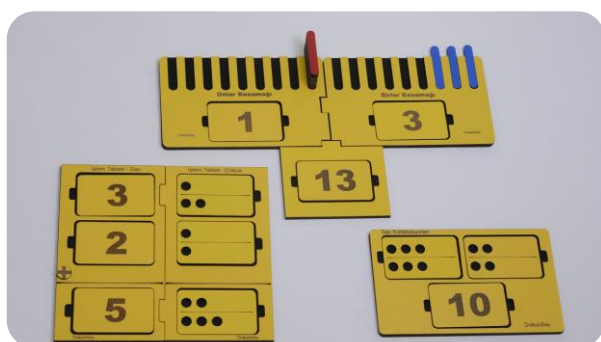
Materials

Touch to Count Tablets

These materials have been designed for students with dyscalculia, in line with visual, tactile, and kinesthetic principles, for developing number intuition/perception and teaching counting and four operations.



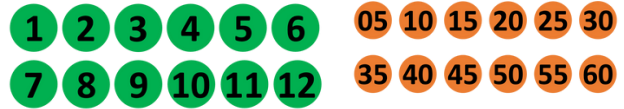
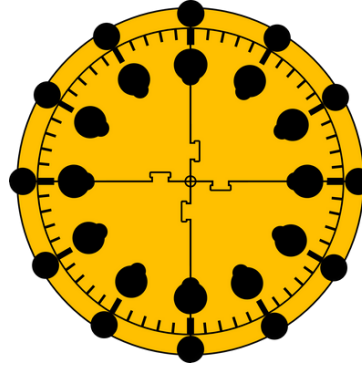
Touch to Count Tablets



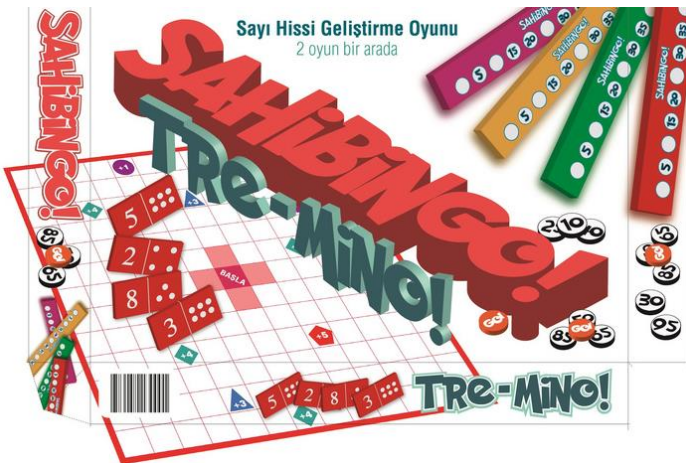
The set of arithmetic tablets consists of number sequences tablets, addition-subtraction tablets, and place value and multiplication-division tablets. The set is specially designed for teaching basic arithmetic concepts and skills to children with learning difficulties or low achievement in mathematics.

Clock Teaching Material

These materials can be used for teaching dyscalculic children hours, which is one of the most challenging subjects for those children. The materials for teaching hours are completely formed of detachable parts.



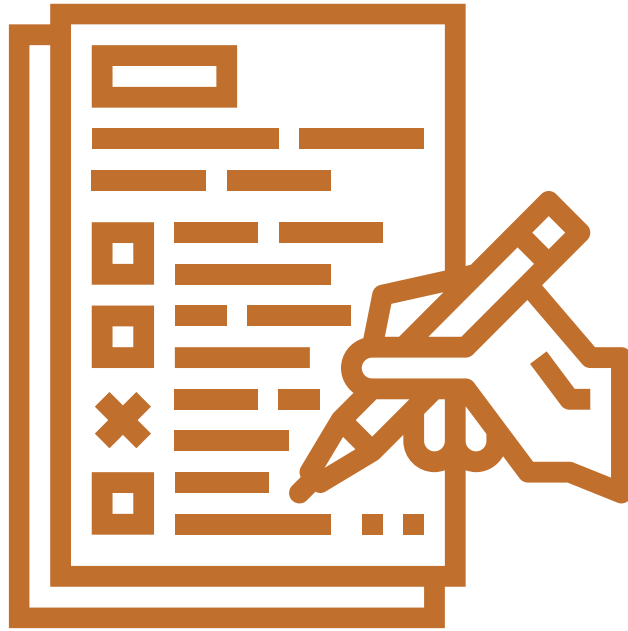
Sahibingo-Tremino Games



The aim of the game is to put a counterpart of multiplicity (dot) on the symbol section printed on the pieces and a counterpart of the symbol across the multiplicity. These games aim to ensure children with the development of the Integer System (IS) and Symbol Access System (SAS), which are the 3 pillars of the sense of number. With these games, children are ensured with the development of IS and SAS, and thus with easier and more meaningful learning.

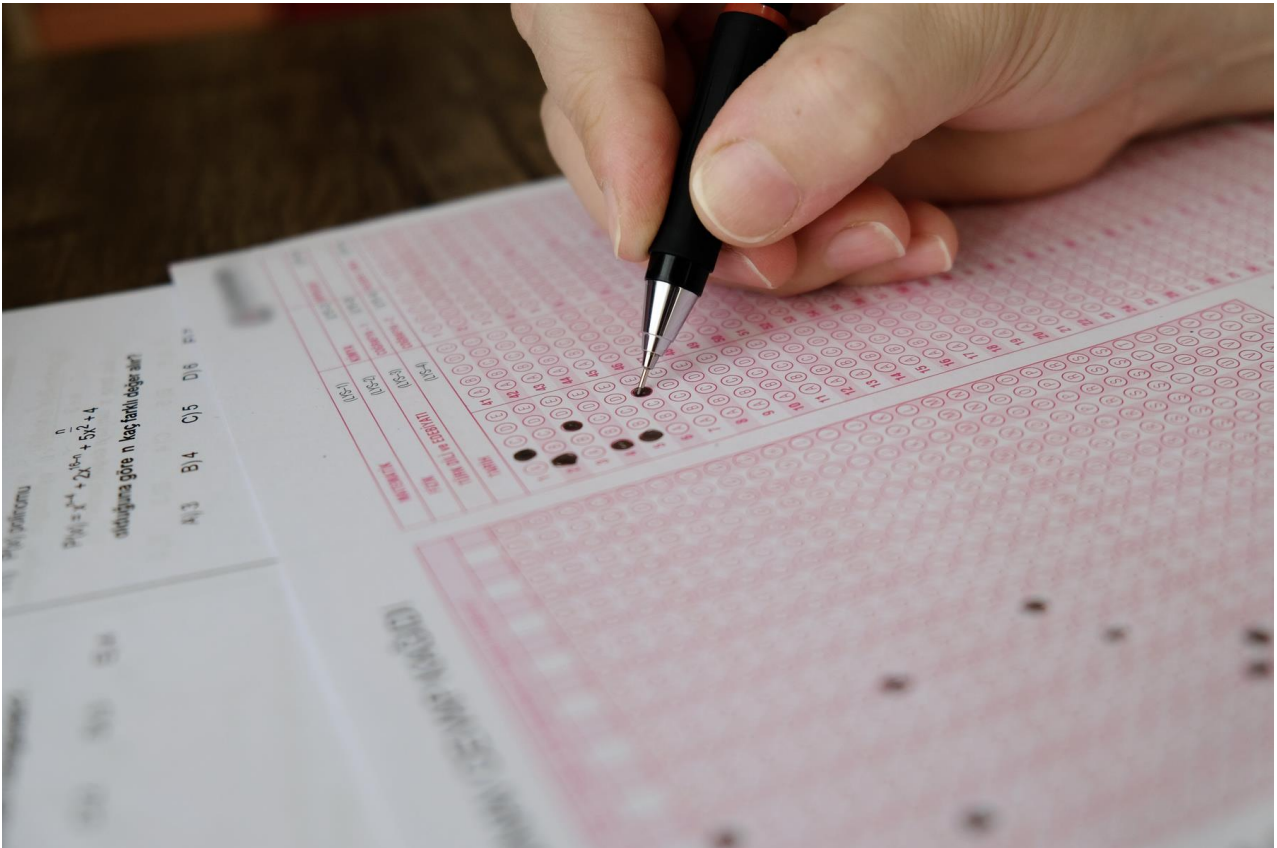
The cards used in the Sahibingo game are linearly and equally spaced as on the mental number line and are given in order of magnitude from left to right. Thus, children can learn the relative magnitude of any number along with its positional relationship to other numbers. For children, the number becomes not just a symbol, but a concept with size. Such a perception helps them learn mathematics better and more meaningfully.





THE PROBLEMS IN THE
EVALUATION OF EXAMS AND
PROPOSED SOLUTIONS

Exams are a well-known fact in the educational system in Turkey. Passing on from basic education to secondary education, from secondary education to higher education, and to graduate education levels are all based on exams. After the completion of all these education, people must take the exam again for employment. However, preparing for the exam and demonstrating an effective performance in the exams is not at the same level of difficulty for every individual. Children with special needs have a huge challenge with exams and performing effectively in them. Based on this difficulty, additional time is given for students with special needs in large-scale national exams such as LGS (High-School Entrance Exam) applied in passing on to secondary education and YKS (Higher Education Entrance Exam) applied in passing on to higher education. However, although this is a step taken for equal opportunity in education, it has been observed that children with special needs have difficulties in the questions that require the use of reasoning skills, which are called "next-generation questions" by students and teachers in both LGS and YKS in recent years.



For example, in a mathematic question, if a student is requested first to interpret the problem in detail, and then give a proposed solution, the student needs to have the ability to understand and develop a higher level of thinking on what they read as well as their mathematical skills. Children's problems in this respect are stated by their parents as below.



"Next-generation questions that particularly require long reading are not suitable for children with dyscalculia. Even if they know what type of mathematical operation is to be done, they can have difficulty interpreting and performing this operation. I also think that the content of questions for those children are required to be prepared differently."

"The structure of their questions should be different. To force the children, who can understand clearer and shorter explanations more easily, to understand more complicated sentences formed of three- or four-lines blinds children's self-belief and suppress their possible contributions to us.

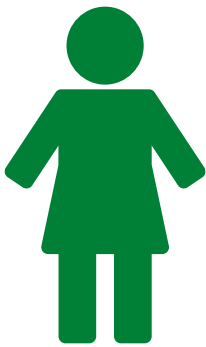
"I think next-generation questions are not suitable for these children."

"Two dyslexic children take education in the same class with my child. Unfortunately, teachers neglect the fact that those children are dyslexic, and they ask the children next-generation questions in lessons and when they fail to answer these questions, teachers accuse the children of not listening to the lesson, the school that I'm talking about is a private school."

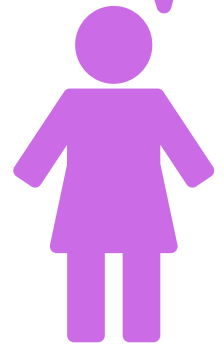
When the opinions expressed by the parents about their children's exams are examined, it can be seen that the length of the questions asked in the exams, the fact that they require more than one skill at the same time, and that they aim to measure high-level cognitive capabilities may cause these children, who feature different levels of development in terms of mathematical skills, to fall into a disadvantageous situation. **To this end, it is suggested by families to ask different questions in large-scale exams held at schools and across the country for their children with dyscalculia.** As a matter of fact, it is possible to see similar practices abroad. There are educational practices (tracking in education) that are implemented on the basis of dividing into groups based on abilities or levels. In such a school system, children follow a curriculum according to their academic abilities. In other words, each child follows curriculums whose difficulty level is adjusted according to their own abilities.



My child is having difficulty with understanding the questions.



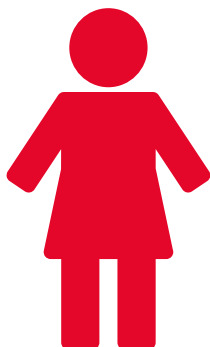
My child is being accused of not listening to the lesson when not being able to answer the question.



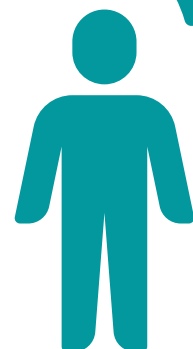
My child is having difficulty in understanding the text. When failing to understand, my child no longer handles the question.



My child is capable of performing mathematical operations, but sometimes fails to read the text.



In exams the given time is not enough for these children. Additional time should be



Examination Practices

Services for exam precautions are determined by the MEB to be taken in centralized examinations for individuals that need special education. It has been decided to provide 20 minutes of additional time in single-person classes and, if requested, reader and encoder support providing that the content and questions of the exam are the same for individuals with learning disabilities.

ÖZEL EĞİTİM İHTİYACI OLAN ÖĞRENCİLER İÇİN ÖNERİLECEK SINAV TEDBİR HİZMETLERİ		
Öğrencinin Eğitsel Tanısı (Yetersizlik Alanı)	Sınav Tedbir Hizmetleri *	
1. Görme Yetersizliği Olan Öğrenciler	1.1 Az Gören Öğrenciler	20 dk. Ek Süre, Tek Kişilik Salon, Okuyucu Kodlayıcı 20 dk. Ek Süre, Tek Kişilik Salon, 18 Punto Büyüklüğünde Soru Kitapçığı ve Normal Puntolu Cevap Kâğıdı ve Kodlayıcı.
	1.2 Total Düzeyde Görme Yetersizliği Olan Öğrenciler	20 dk. Ek Süre, Tek Kişilik Salon ve Okuyucu ve Kodlayıcı
2. İşitme Yetersizliği Olan Öğrenciler		20 dk. Ek Süre, Tek Kişilik Salon 20 dk. Ek Süre, Tek Kişilik Salon Yabancı Dil Dersinin Testinde Muaf Olması
3. Ruhsal ve Duygusal Bozukluğu Olan Öğrenciler	3.1 Dikkat Eksikliği ve Hiperaktivite Bozukluğu Olan Öğrenciler	20 dk. Ek Süre, Tek Kişilik Salon
	3.2 Özel Öğrenme Güçlüğü Olan Öğrenciler	20 dk. Ek Süre, Tek Kişilik Salon 20 dk. Ek Süre, Tek Kişilik Salon, Okuyucu ve Kodlayıcı
4. Otizm Spektrum Bozukluğu Olan Öğrenciler		20 dk. Ek Süre, Tek Kişilik Salon 20 dk. Ek Süre, Tek Kişilik Salon, Yabancı Dil Dersinin Testinde Muaf Olması 20 dk. Ek Süre, Tek Kişilik Salon, Okuyucu ve Kodlayıcı 20 dk. Ek Süre, Tek Kişilik Salon, Okuyucu ve Kodlayıcı Yabancı Dil Dersinin Testinde Muaf Olması
5. Bedensel Yetersizliği Olan Öğrenciler	5.1 Bedensel Yetersizliği Olan Öğrenciler (İnce Motor Beceriler)	20 dk. Ek Süre, Tek Kişilik Salon 20 dk. Ek Süre, Tek Kişilik Salon, Kodlayıcı
	5.2 Bedensel Yetersizliği Olan Öğrenciler (Kaba Motor Beceriler)	Giriş Katta Sınava Alınması.
6. Zihinsel Yetersizliği Olan Öğrenciler		20 dk. Ek Süre, Tek Kişilik Salon ve Okuyucu ve Kodlayıcı 20 dk. Ek Süre, Tek Kişilik Salon ve Okuyucu ve Kodlayıcı Yabancı Dil Dersinin Testinde Muaf Olması 20 dk. Ek Süre, Tek Kişilik Salon 20 dk. Ek Süre, Tek Kişilik Salon Yabancı Dil Dersinin Testinde Muaf Olması
7. Süreğen Hastalığı Olan Öğrenciler		Bu Kılavuzun 7.7. Maddesinin a. Bendinde Belirtilen Öğrenciler İçin-Tek Kişilik Salon
8. Evde veya Hastanede Eğitim Hizmeti Alan Öğrenciler		Evde Sınav Hizmeti Sağlık Merkezinde Sınav Hizmeti

Application and Implementation Guideline for Centralized Examinations - 2021

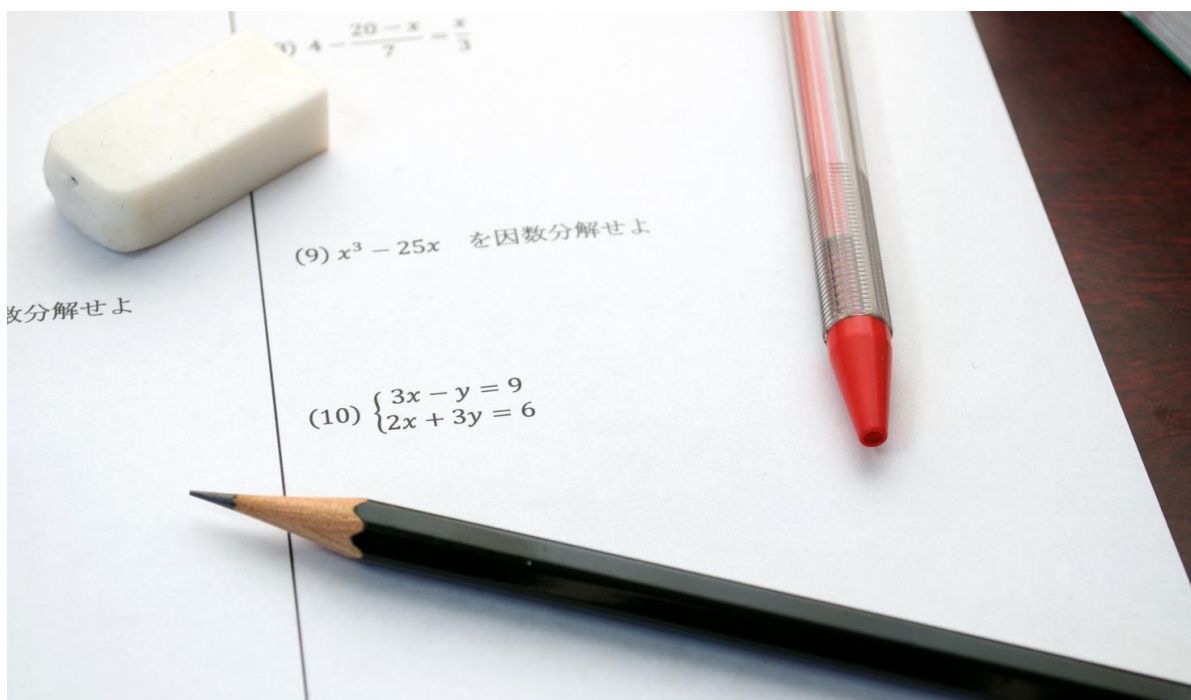
OSYM (Student Selection and Placement Center) decides that providing that the candidates with disabilities/health problems make an application along with the following documents that they can obtain from a university or a state hospital, which are;

- 1) Medical Board Report for Disability / a certified copy of Medical Reports
 - 2) Information Form on Medical Condition/Disability
 - 3) Petitions on Medical Condition/Disability
 - 4) A soft copy of Candidate's Application Registry Information
- they are allowed to benefit from the following exam precaution services.

In Medical Board Reports for People with Disabilities;

- In the group which cannot be classified with MR (mental retardation)
- people determined to have pervasive developmental disorders (autism spectrum disorders (ASD), Asperger's syndrome, RETT syndrome, disintegrative disorder, etc.), **specific/special learning disabilities** (dyslexia, attention deficit, hyperactivity, etc.) are provided with additional time and reader and/or marker assistance in accordance with their requests.

These candidates are responsible for answering all questions. The candidates provided with reader assistance, if demanded, are allowed to read the questions during the exam on their own. Those who do not request reader and/or marker assistance can take the exam in single exam halls if they wish.



**‘No individual
can be deprived of the
right to
education
and training’**

The right to education and training is regulated under the section of social and economic rights and duties in Article 42 of the Turkish Constitution, 1982.
The paragraph 1 of the Article 42 of Turkish Constitution, 1982





**THE PROBLEMS IN LEGAL
REGULATIONS
AND PROPOSED SOLUTIONS**

There are legal regulations regarding the identification and education of children with special needs in Turkey. When these regulations are examined, the Law on the People with Disabilities, the Decree on Special Education and the Regulation on Special Education Services are remarkable. In the said regulations, the regulations on how the instructional evaluation and identification of children with special needs shall be made and on the scope of inclusive/integrative education that shall be applied in schools for these children are noted. For the instructional identification and evaluation of a student, an application is made to the Guidance and Research Center with an official letter in cooperation with the school and family. In addition to the written request of the parents and the school, a Medical Board Report for Disability is also requested, when needed. Considering these explanations with their details stated in the relevant regulation, it can be said that children with special needs have rights arising from laws and regulations and important steps have been taken in this regard in Turkey. In particular, it can be inferred that the regulations in favor of students were made from 1997, during which time this motion of legislation was initiated, to 2018.



However, although the rights of the students are protected by legal regulations, it can be said that there are some problems in the implementation of the legislation. This was expressed by the parents in many ways. The problems faced by dyscalculic children of the parent regarding the legal regulations and proposed solutions are presented in the quotations below.

"I listed what came to my mind first.

- First, as a part of the courses in education faculties, all candidate teachers should be told that this is not a disease but a diversity.
- Children with this challenge should be identified by establishing commissions within the National Education Directorates.
- In schools with a huge population of students, some teachers should be trained on learning what is diversity.
- Education on how to train trainers should be given to those working in Guidance and Research Centers, and it should be ensured that all the teachers in the provinces receive training in time.
- But most importantly, children with dyscalculia should be provided with psychological support to accept their situation and their classmates are alike not to make fun of the situation of their peers and to bully them.
- These children should be granted additional quotas or scores for schools that accept students by exam.
- In provinces where special education centers are located, educational support should be provided for families whose financial situation is not satisfactory.

“First, the definition of Specific Learning Disorder (SLD) should be replaced with Specific Learning Difference (SLD). Our teachers in schools should be subjected to more elaborated training on the subject. Additional points should be given in addition to the additional time in high school transition and university exams.”

It appears to be very difficult for these children to enter a good high school if the schools that accept students by exam are instructed to spare additional quotas for them.

The lack of classes for these children in education faculties worsens teachers' mission in the field.

If the exams of dyscalculic children (LGS, YKS) are not evaluated differently, they cannot pass on to high school.



There is no legislation for the integration of these children into society.

Everything seems to be defined in the legislation, but none of them exist in practice.

There are no commissions in the National Education Directorates to identify children with dyscalculia.

RIGHT TO EDUCATION IN INTERNATIONAL LEGAL REGULATIONS

The right to education is a fundamental right granted to every individual, which is guaranteed under national and international legal regulations. With the Universal Declaration of Human Rights (1948), the United Nations (UN) Convention on the Rights of the Child (1989), the UN European Social Charter (1961; 1996), and the UN Convention on the Rights of Persons with Disabilities (2006), it has been put forward that all children's rights to education should be guaranteed without discrimination on the basis of gender, language, religion and race. Equality here does not mean that every student receives exactly the same instruction; instead, it requires reasonable and appropriate adaptations necessary to ensure the success and accessibility of all students (NCTM National Council of Teachers of Mathematics, 2000). However, despite the current legal regulations, it is known that children with disabilities under the age of 18 cannot fully benefit from their right to education and have problems in accessing education of good quality. The infrastructure of necessary legislation has been established in order to guarantee the rights of individuals with disabilities in Turkey. In spite of this, studies and practices aimed at ensuring the full and effective participation of individuals with disabilities in community life have not reached the desired level (ERG, 2017).

The right to education is a fundamental right for every individual, which is guaranteed under national and international legal regulations.

The first and most important work of the United Nations on education is the Universal Declaration of Human Rights. Article 26 of the Universal Declaration of Human Rights is about the right to education. Apart from this declaration, many declarations and conventions prepared by the United Nations are related to the right to education; Convention on the Rights of the Child, Convention Against Discrimination in Education, International Convention on Economic, Social and Cultural Rights are the most important documents that can be regarded here.

The Universal Declaration of Human Rights is the first international regulation that covers the right to education. The provisions regarding the right to education regulated in article 26 of the declaration are as follows;

1. Every individual has the right to education. Education is free of charge at least at the first and fundamental stage. Primary education is necessary. Technical and vocational education is open to everyone. Higher education should be open to all, according to their abilities, with full equality.

2. Education should be aimed at the full development of the human personality and strengthening the respect for human rights and fundamental freedoms. Education should promote understanding, tolerance, and friendship among all nations, races, and religious communities and should advance the United Nations' work in maintaining peace.

3. To choose the type of education to be given to children is a primary right of the parent.



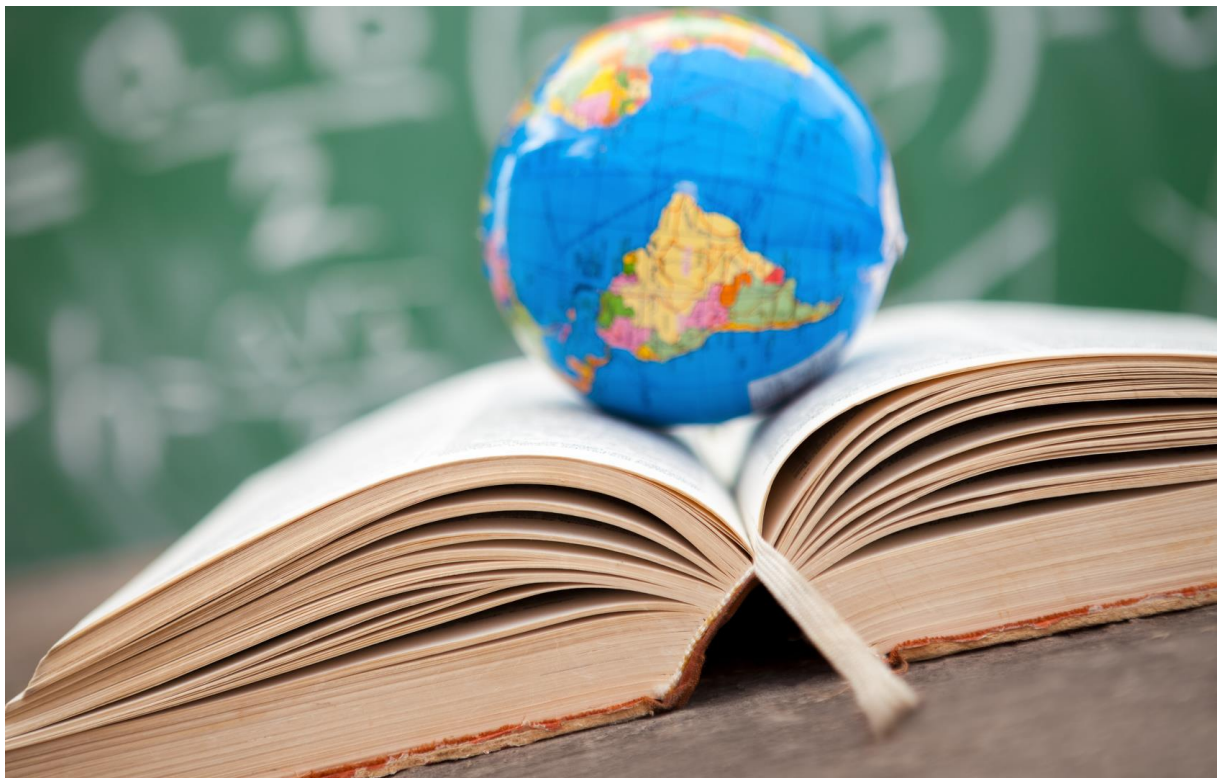
Every individual has the right to education. Education is free of charge at least at the first and fundamental stage. Primary education is necessary. Technical and vocational education is open to everyone. Higher education should be open to all, according to their abilities, with full equality.

Universal Declaration of
Human Rights
Article 26



In Article 2 of the Additional 1 Protocol of the European Convention on Human Rights, the right to education and training is regulated. The Protocol was signed in Paris immediately after the preparation of the European Convention on Human Rights. Article 2 of the protocol:

"No one can be deprived of the right for education. The State, in the performance of its duties in the field of education and training, respects the right of the parents to ensure that this education is carried out in accordance with their own religious and philosophical beliefs."



This situation can be clearly observed when the education rights of children with disabilities are taken into account. Even if the policies created by the state particularly in the last ten years for individuals with disabilities to fully and effectively benefit from education life were established in a comprehensive framework, they have not been fully implemented. Standards have been set within the framework of legislation on special education; however, the deficiencies seen in implementation indicate that these standards should be structured in cooperation with experts, practitioners, families, and non-governmental organizations (NGOs) working in this area (ERG, 2017).



LEGAL REGULATIONS IN TURKEY

Article 42 of the Turkish Constitution states that following the statement that no one can be deprived of the right to education and training and that everyone is equal before the law, the statement 'The State shall take measures to make those who need special education because of their situation useful to the society' takes place. These articles of the constitution shed light on the regulations that should be created for individuals with disabilities.

The provisions and laws in the constitution point out that the state is liable to provide all individuals with the most appropriate education within the scope of special education freely. However, it should be noted that having sufficient knowledge of the rights provided by the laws and the way of use will contribute to the development of the interaction between the beneficiaries and the implementers on a more sound ground. In the following sections, legal regulations peculiar to children with dyscalculia are discussed.

Legal Regulations

The laws and regulations regarding general and special education are listed below for parents who want to get more detailed information.

- **Decree Law No. 573 on Special Education (1997)**
- **Law No. 5378 on the Disabled,**
- **Circular on Education Practices through Inclusion (2017)**
- **Regulation on Special Needs Assessment for Children (2019)**
- **Special Education Services Regulation (2020)**





**The government takes
measures to make
those in need of special
education beneficial to the
society
due to their situation.**

Special Education Services Regulation (2020)

It aims to ensure that individuals with special education necessities use their capacities at the highest level in line with their educational needs, qualifications, interests, and abilities, and prepare them for higher education, professional life, and social life based on the general-purpose and basic principles of Turkish National Education.

Special Education Services Regulation consists of four parts. The subheadings in the Special Education Services section are given below.

- 1- Monitoring Process with Evaluation and Identification
- 2- Special Education Services in Education Types and Levels
- 3- Early Childhood Education, Education of Individuals with Multiple Disabilities, Education at Home or Hospital, Preparation for Group Education, Family Education
- 4- Education Programs
- 5- Notice on Inclusive/Integrative
- 6- Special Education Schools and Institutions
- 7- Student Affairs Registrar, Transfer and Evaluation of Success
- 8- Special Education Services Committee and Duties, Operation Procedures and Principles of Special Education Evaluation Committee
- 9- Committees in Schools and Institutions, Commissions, Units

Main Principles of Special Education

In accordance with the general purpose and basic principles of Turkish National Education,

a) Providing training services by taking into account individual differences, developmental characteristics and training requirements,

b) Availing individuals with special education needs of special education services in line with their interests, desires, qualifications and abilities,

c) Starting special education services in the early period,

ç) Planning and conducting special education services in a way that includes the process of interaction and mutual adaptation with the society, without separating individuals with special education needs from their social and physical environments as much as possible,

d) Prioritizing individuals with special education needs to be educated together with other individuals by making adaptations in purpose, content and teaching processes in accordance with their educational performance,



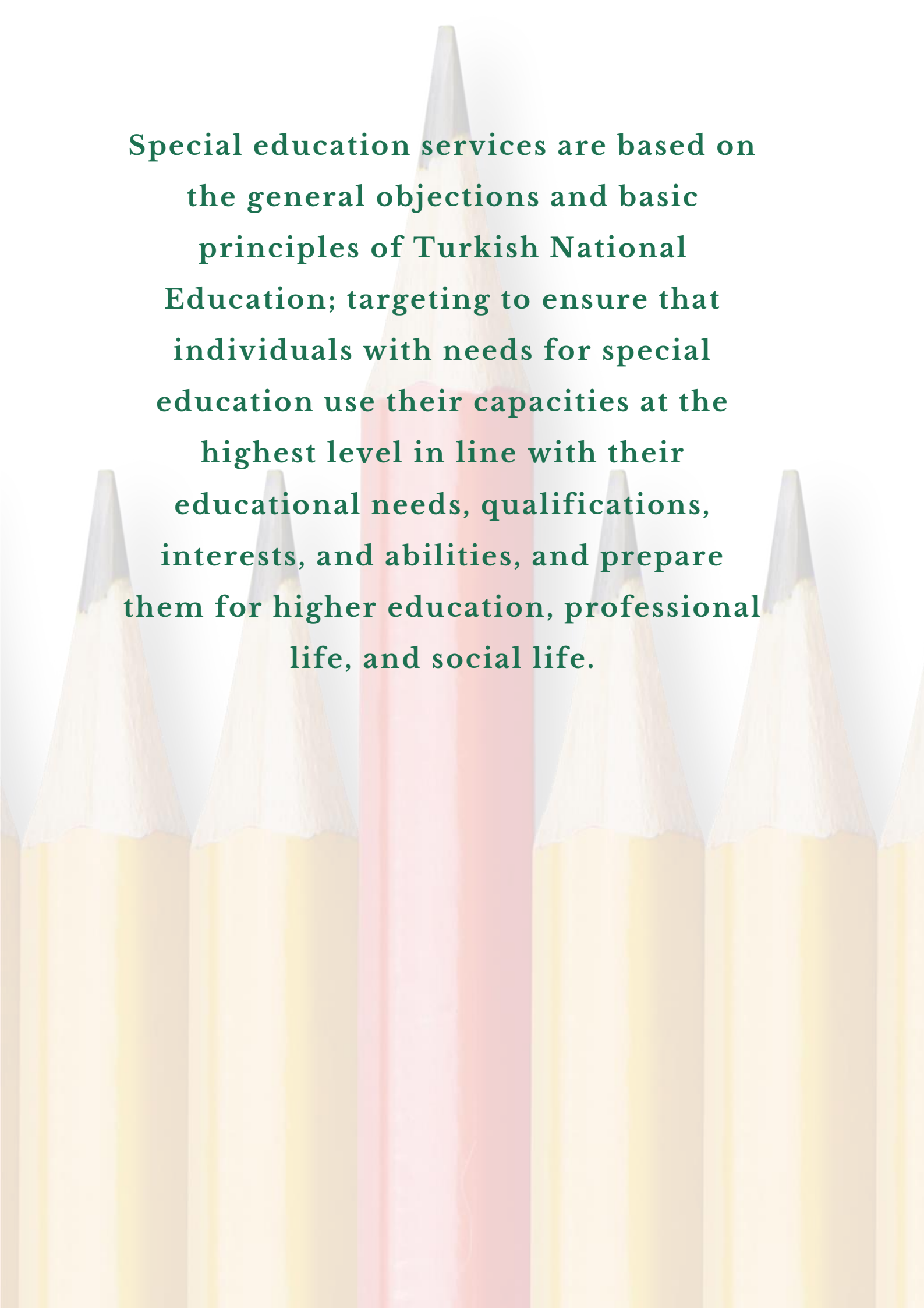
a) Cooperating with institutions and organizations so that individuals with special educational needs can continue their education at all types and levels,

f) Developing IEPs for individuals with special education needs and implementing individualized education programs,

g) Ensuring the active participation of families at every stage of the special education process,

ğ) It is essential to work in cooperation with the relevant departments of universities and non-governmental organizations operating for individuals with special education needs in the development of special education policies.





Special education services are based on the general objections and basic principles of Turkish National Education; targeting to ensure that individuals with needs for special education use their capacities at the highest level in line with their educational needs, qualifications, interests, and abilities, and prepare them for higher education, professional life, and social life.



**OTHER CHALLENGES FACED
BY THE PARENTS OF
DYSCALCULIC CHILDREN
AND PROPOSED SOLUTIONS**

In this section, problems such as peer bullying, alienation, and labeling that their children are exposed to, as well as the proficiency of families in mathematics, are discussed and solution suggestions are presented.

One of the important problems perceived by families with dyscalculic child is the feeling of being incompetent in mathematics. In this context, it can be said that similar problems children encounter are experienced by their families. The fact that the family's opinion on incompetence in mathematics is a situation that also affects the children. This phenomenon, called the spillover effect, is widely used in psychology. Accordingly, a perceived problem or distress in the family is passed on to the child in the same way. This can be thought of as a kind of contagiousness of emotions. For example, it is known that families of children with intense math anxiety have a similar anxiety. This situation also has an impact on the problem of adequacy in math. Some of the opinions received from the families on this issue are listed below.

" Since its such a special education that I don't think I am competent on it."

"I can teach him/her under normal conditions, but the fact that he is dyscalculic and has lack of attention changes things and makes it very difficult, and he hates it because he can't do it."

" I never think I am competent enough. Neither I catch up with the current curriculum nor I know how to train my daughter regarding the identification my daughter got.

" I don't perceive myself sufficient enough. I feel like I am clutching at straws. Nobody is aware of the seriousness of this situation; it is mentally consuming.

"I had the training but s/he doesn't want me to teach him/her, s/he rejects me as an instructor. We get more efficiency from special education."

"Especially, I don't think I have the competency. Because I am an instructor too. Even though I think that I explain it very well and even if I solve the same type of question many times, s/he can't do anything when s/he is alone. S/he says s/he understood but s/he can't solve it on her/his own. S/he doesn't keep it in his/her memory in any way, let's say s/he understood what to use, s/he definitely makes a calculation error."

"Because I am her mother, I do not want to take on the role of a teacher, and we cannot find the time and environment to work regularly and systematically."



When the opinions expressed by the parents about their proficiency in mathematics are examined, it is understood that they do not consider themselves sufficient in this regard. How to teach mathematics to these children with special needs in mathematics is not fully known by the families. When the views of the parents are examined, it is understood that the problems arising from competence also lead to a sense of desperation. While a parent likens the process of teaching mathematics to their child to “swimming in the sand”, it can be said that the mother expresses her despair in this matter. Besides, it is observed that both parents and children experience problems at home due to the role of parents and teachers. The parents' unwillingness to take on the role of teacher or the child's unwillingness to learn from the parent draws attention as a factor that prevents children from becoming competent in mathematics. In this regard, it is understood that there is a need for an education and practice guide that will enable parents to gain mathematical skills for their children.



Parents of children struggling with dyscalculia were also asked about their feelings/perceived needs regarding their children within the scope of this research and their opinions were received. In this regard, as in many other areas, it has been observed that families feel an intense need to provide additional support to the child, increase their interest and motivation in school, self-confidence and resist peer bullying. Low self-esteem, low academic self-concept, and accordingly low self-efficacy perception may occur in many students with special needs due to failure at school. Students who have proficiency and competence problems in these subjects are also exposed to peer bullying in schools.



Students who think they are incompetent in resisting the bully, may be exposed to peer bullying in schools due to this situation arising from the balance of power. Parents' views on this issue are listed below.

"I'd like to learn games that will be useful for his training so we can spend some quality time with her."

"I'd like her to be enthusiastic about school and to communicate with her peers in a proper way."

"How should we behave? How effective is the support we receive? My child has been described as a lazy person; how can I wipe this idea from her mind?"

" I want to learn how to help my child gain confidence in front of their friends and not become a victim of peer bullying."



When the opinions received from the families are examined, it is seen that their children's motivation towards school is low, they do not know how to have a pleasant time together, how to annihilate the labelling they were exposed, they demand attention in situations such as self-confidence, self-esteem and being exposed to peer bullying. As seen in other opinions, it can be said that families feel the absence of spending enough time and in the matter of play with their children. It is known that games have a positive effect on children in many areas of development, from social development to emotional and mental development. Especially, if it is observed that the child has behavioral problems besides having special needs, it is easier for the family to alleviate these behaviors by spending quality time with the child through play. Games can also contribute to children's mathematical knowledge and skills.



I'd like my child to be labeled "lazy"...

I'd like to have enough information about dyscalculia...

I'd like a curriculum suitable for my child to be developed...

I'd like the experts working on this area to be high in number...

I don't want her to compete with her friends...

I'd like to know how to address her...

I don't want him to be bullied by peers...

I don't want people to put pressure on my child...

I'd like to learn games that would be helpful in terms of education...



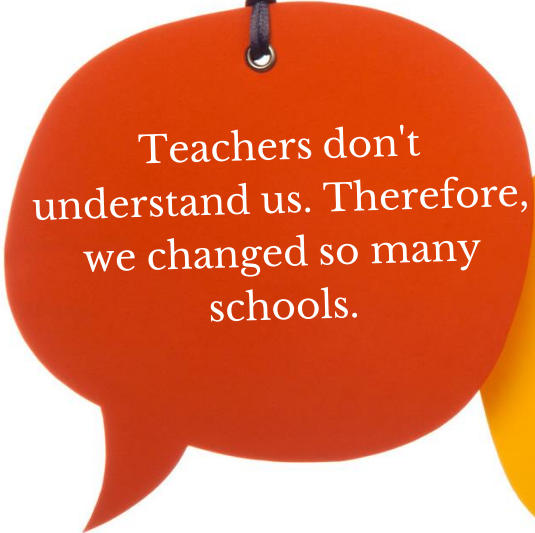
Self-confidence-based problems faced by children with dyscalculia, lead to being exposed to peer bullying in schools. In this case, it is the duty of school counselors to carry out empowerment activities in order to prevent children with special needs from being exposed to peer bullying. Individual psychological counseling or group psychoeducation programs may be beneficial in order to prevent the victimization of these children due to peer bullying. Because, most of the time, victims of peer bullying can hide this situation they experience due to the fear of being mocked. This situation causes these children, who are victimized, to experience peer bullying in schools once more every day. Therefore, it is important to support both the child and the family in these matters.

It can be said that there is a similarity in the opinions received, as has been revealed in many studies on the issues that families of children with special needs have the most problems / difficulties with. In more concrete terms, it is seen that the families of the students who have dyscalculia problems also experience problems such as the alienation of children, the labeling of the child, and the fact that the people in the immediate surroundings (such as the teacher, other students' parents and school administrators) do not have enough information about the subject. The opinions received by the families are listed below.

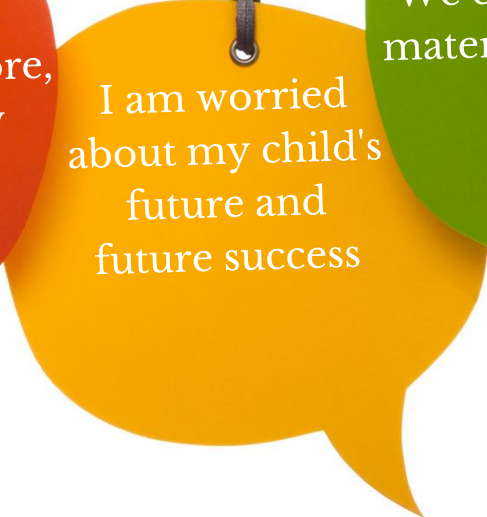
" We had to change schools multiple times... Teachers don't understand us, unfortunately." Sometimes I feel desperate. I worry about my child's future. Noone has an idea of discalculia. Including us. Including the math teachers. Dyslexia is known more than dyscalculia. They are labelled as lazy and stupid, immediately.

"I couldn't convince anyone about my daughter's problems. They discriminated us as paranoids. I couldn't make them believe."

"I used to think that my daughter was acting this way as a reaction to me, and this caused arguments between us. Because it doesn't make any sense, it is too much. After researching on the internet, I realized that many situations matched us and talked to an academician. There is no such thing as teacher support, she has been studying at a private school since she started school and neither the teacher nor anyone else warned me about it. It was the time when we started to do homework together, I knew something was wrong. Because Turkish, Science, Revolution, Religion, English are all good, but we can't make any progress in mathematics. The child is the same child, the same person narrating it, then I said there is a problem."



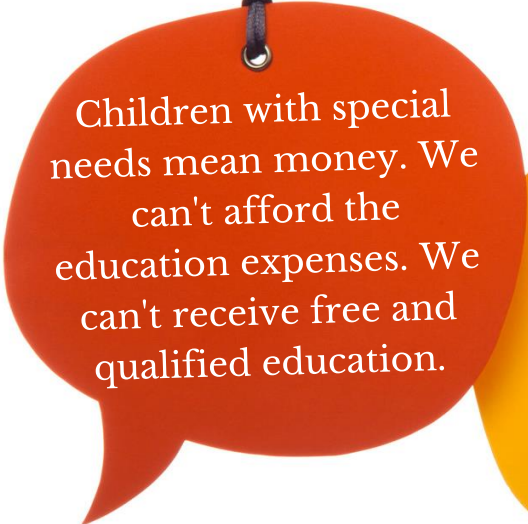
Teachers don't understand us. Therefore, we changed so many schools.




I am worried about my child's future and future success



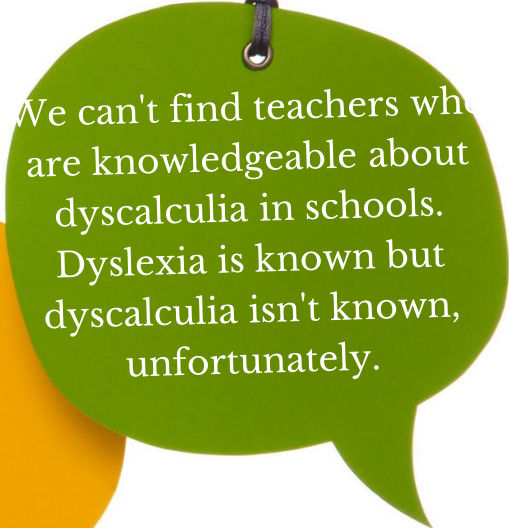
We can't find enough materials for our child.



Children with special needs mean money. We can't afford the education expenses. We can't receive free and qualified education.



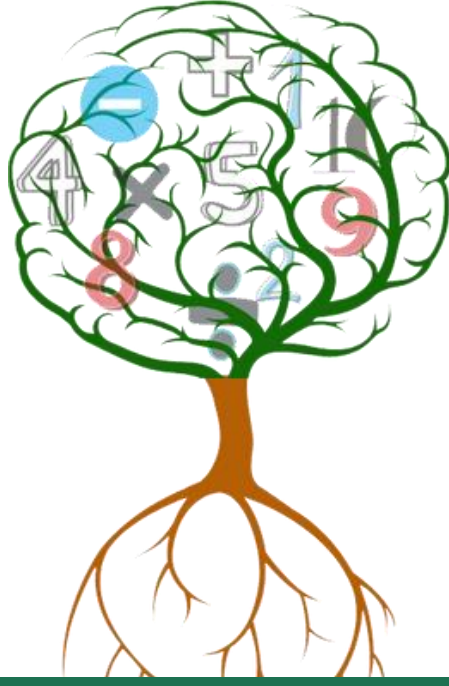
My child is labeled lazy at school despite trying hard.



We can't find teachers who are knowledgeable about dyscalculia in schools. Dyslexia is known but dyscalculia isn't known, unfortunately.



When the issues that parents have the most difficulty with due to their children's situations, the fact that the child is described with various negative adjectives (such as lazy or unsuccessful), teachers do not have sufficient knowledge about the subject, permanent and unchangeable labels are attached to children, and families' economic difficulties in accessing quality special education stand out. As mentioned before, this situation has also been demonstrated in other studies conducted with families of children with special needs. This situation can be interpreted as an indication that a positive and common understanding of children with special needs hasn't yet developed in Turkey. Recently, efforts have been made to increase the inclusive education capacities of schools in various dimensions (such as teachers, administrators, curriculum, psychological counseling, and guidance) in cooperation with the Ministry of National Education and UNICEF. However, despite these efforts, the use of stigmatizing expressions towards children with special needs in schools may be a sign that there is more work to be done on this issue. As a conclusion, families stated that they had serious problems especially in understanding the situation of their children better and labelling permanent/immutable labels on these children.



EVERYONE CAN LEARN MATHEMATICS!



REFERENCES

Büttner, G., & Hasselhorn, M. (2011). Learning disabilities: Debates on definitions, causes, subtypes, and responses. *International Journal of Disability, Development and Education*, 58(1), 75-87.

Can, D. (2020). Gelişimsel Diskalkulinin Nedenleri. Edt. Mutlu, Y., Olkun, S., Akgün, L. & Sarı, M.H. (2020). Diskalkuli Matematik Öğrenme Güçlüğü. Ankara: Pegem Akademi Yayıncılık.

Geary, D. C. (2011). Consequences, characteristics, and causes of poor mathematics achievement and mathematical learning disabilities. *J. Dev. Behav. Pediatr*, 32, 250-263.

Hannell, G. (2005). Dyscalculia action plans for successful learning in mathematics. New York: David Fulton Publishers.

Haberstroh, S., & Schulte-Körne, G. (2019). The diagnosis and treatment of dyscalculia. *Deutsches Ärzteblatt International*, 116(7), 107.

Henderson, A. (2013). *Dyslexia, Dyscalculia and Mathematics: A practical guide*. Routledge.

Karadeniz, M. H. (2013). Diskalkuli yaşayan öğrencilere ilişkin öğretmen görüşlerinin değerlendirilmesi. *E-Journal of New World Sciences Academy Social Sciences*.

Kuruyer, H. G., Çakıroğlu, A., & Özsoy, G.(2019). Sınıf Öğretmeni Adaylarının Okuma ve Matematik Güçlüklerine İlişkin Pedagojik Farkındalıklarının ve Öğretimsel Bakış Açılarının Belirlenmesi. *Kastamonu Eğitim Dergisi*, 27(4), 1659-1678.

Kaufmann, L., Mazzocco, M. M., Dowker, A., von Aster, M., Goebel, S., Grabner, R., & Rubinsten, O. (2013). Dyscalculia from a developmental and differential perspective. *Frontiers in psychology*, 4, 516.

Mutlu, Y. (2016). Matematik öğrenme güçlüğü (gelişimsel diskalkuli). *Matematik Eğitiminde Teoriler*. Ankara: Pegem Akademi Yayıncılık.

Mutlu, Y., & Akgün, L. (2017). Matematik Öğrenme Güçlüğü Tanılamada Yeni Bir Model Önerisi: Çoklu Süzgeç Modeli. *Ilkogretim Online*, 16(3).

Mutlu, Y., Olkun, S., Akgün, L. & Sarı, M.H. (2020). *Diskalkuli Matematik Öğrenme Güçlüğü*. Ankara: Pegem Akademi Yayıncılık.

Mutlu, Y., Olkun, S., Akgün, L. & Sarı, M.H. (2021). *Diskalkuli / Matematik Öğrenme Güçlüğüne Sahip Çocuklara Matematik Öğretimi*. Ankara: Vize Yayıncılık.

Passolunghi, M. C., ve Lanfranchi, S. (2012). Domain-specific and domain-general precursors of mathematical achievement: A longitudinal study from kindergarten to first grade. *British Journal of Educational Psychology*, 82(1), 42-63.

Sezer, S., & Akın, A. (2011). 6-14 yaş arası öğrencilerde görülen matematik öğrenme bozukluğuna ilişkin öğretmen görüşleri. *İlköğretim Online*, 10(2), 757-775.

Thomas, M. S. (2012). Brain plasticity and education. *British Journal of Educational Psychology-Monograph Series II: Educational Neuroscience*, 8, 142-156.

WHO. (2018). International classification of diseases for mortality and morbidity statistics (ICD-11). Retrieved from <https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/771231188>

"This situation in our country is such a vague issue that there is so much to write about. My son, who is in the 7th grade this year and has been studying online for 1.5 years due to the pandemic, can't do 4 operations. Besides, the Councelling and Research Center in the city we live in is unaware of the situation. When we say dyscalculia, they are shocked and say get well soon. All of the employees in special education centers are people who have received training on autism, cerebral palsy and the mentally handicapped. There is not a single person trained in dyscalculia. The nearest city is 4 hours away. And we, being healthcare professional parents, don't have the chance to take our children to the training in this city 3-4 days a week. Teachers in schools are unaware of the situation. My child has to learn enough mathematics to survive."

From a mother with a dyscalculic child...

