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Chapter

# Impacts of Dyscalculia in Learning Mathematics: Some Considerations for Content Delivery and Support

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## Abstract

Dyscalculia is one of the important but less prioritized areas in learning mathematics. A group of students about 3–7 percent of school-age are facing problems associated with dyscalculia. They are facing problems related to number comparison, symbols and reasoning. This paper discusses the general features of dyscalculia and ways to overcome it. This article mainly focuses on the problem related to mathematics learning due to dyscalculia. It further highlights the concept and meaning of dyscalculia, types, causes of dyscalculia, common difficulty areas in mathematics for dyscalculic children, the impact of dyscalculia in mathematics learning. Finally, it also brings out the effective ways of delivering the mathematical content in the classroom teaching and ways to support dyscalculic students.

**Keywords:** content delivery, dyscalculia, learning deficit, learning mathematics, student support

## 1. Introduction

Mathematics is measured to be a difficult subject due to its abstract nature. The difficulty of learning mathematics is a worldwide issue. It is a very important and necessary subject in school education caused by its linkage to everyday human life. Therefore it is taught as a fundamental subject in schools all over the world and positioned as an important subject in the school curriculum. Mainly in mathematics and science, many students believe that it takes inherent ability or even brilliance to achieve well, rather than perseverance, good strategies, help from others, and learning over time [1]. As a result, it has always been given special attention in school education globally. Although the expected outcomes in mathematics could not be achieved to date and the students' negative attitude towards learning mathematics also could not be reduced [2]. For many years, it was believed that the numerical cognition of the children could be developed according to the child development and the learners can be taught effectively using Piaget's child developmental stages [3]. The focus of Piaget's philosophy was that the child understands space, time and causality of number and quantity and classes and relations of invariance and change [4].

In recent times, however, the researchers are focusing increasingly on the causes of mathematical learning difficulties as the procedural as well as neurobiological foundations of the learner [5]. Mathematics is conceived as a product of human activities in the process of adapting to the external environment [4]. The precise acquisition of mathematical abilities involves a broad range of different general cognitive skills including auditory and visual working memory, pattern recognition, speed of information processing, spatial perception, and attention [6]. These skills enable students to perform different mathematical activities and performance. Among them, working memory is a strong predictor of mathematical skills across time, achievement or achievement growth in mathematics [7]. It helps to perform fast and accurate arithmetical calculations in adolescence and adulthood [8]. Researchers have generally agreed that the deficit in working memory, brain-related condition, genetic cause, environment, and brain difference is considered dyscalculia [9]. These deficits affect the learners' mathematical learning capability particularly computation and reasoning [10]. Such problems of the learner gradually tend to create frustration to learn mathematical problems regarding computation and application [11]. The objectives of this chapter are to state mathematics learning components, concepts and meaning of dyscalculia, types, causes, areas of common difficulties in mathematics for dyscalculic children, impact of dyscalculia in mathematics learning, effective ways of content delivery and student support.

## 2. Components of learning mathematics

Mathematics is a very essential and important subject that encompasses numbers, measurement, probability, and algorithms [12]. It cannot be separated from the particular cognitive processes in operation whenever we apply our minds to a mathematical task [5]. It is sometimes expressed as a difficult subject that is inaccessible, boring, particularly for cool and engaged people and girls [13]. Mathematics is considered an integral part of our everyday life. It is used in daily activities such as cooking, shopping, playing, arranging something, etc. Ziegler and Loos [14] stated that mathematics was developed from counting, calculation, measurement and the systematic study of the shapes and motions of physical objects. Historically, it was regarded as the science of quantity, or numbers. Thus, mathematics learning is essential for each person to continue their daily life too. Mathematics learning requires three equally important hierarchical components that can help to transform the mathematical concepts, ideas and knowledge effectively. The brief accounts of these components are as follows:

i. Language component: It is the first component in learning mathematics. Language is a key component used to describe mathematical terms, notations, concepts, ideas and procedures to develop mathematical knowledge and understanding. It is also used in conceptualizing and communicating mathematical information. Mathematics learning starts from counting physical objects and gradually forward with concepts of quantity, size and comparisons. Language continues to help students move from concrete mathematical skills based on physical objects to a more symbolic mathematics ability focused on numerals [15]. Language is useful for the teacher to address and transfer the mathematical concepts, problems and procedures to the learner more clearly.

ii. Conceptual component: The second component of learning mathematics is the conceptual component. It refers to an understanding of the actual

meaning and intends to increase literacy in mathematics rather than stepwise teaching to find the solutions. It focuses on explaining the processes (why) rather than performing the process (how). Conceptual learning begins in early childhood by using different effective methods, modern tools and techniques. Conceptual learning makes the students able to transfer their knowledge to new situations and contexts effectively. Thus it is essential for success not only in mathematics but in all disciplines and in the workplace.

iii. Procedural component: This component refers to the ability to apply procedures accurately, efficiently and flexibly; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more appropriate to apply than another [16]. It is more than memorizing facts or procedures. The procedural component can be used effectively when the conceptual proficiency is high. Fluency of the procedural component builds on a foundation of conceptual understanding, strategic reasoning, and problem-solving [16].

## 3. Concept and meaning of dyscalculia

Dyscalculia is a specific learning difficulty that affects the learner's ability to retain mathematics skills related to calculating numbers, not with every branch of mathematics [2]. Dyscalculia is an umbrella term used to represent diverse conditions that cause specific difficulties with mathematics such as developmental dyscalculia, mathematical disability, numerical learning disability, and number fact disorder among other terms [17]. Thus developmental dyscalculia is an inborn condition that affects the ability of the learner to acquire arithmetical skills. However, dyscalculia may be caused by accidental brain damage (acquired dyscalculia).

The word 'dyscalculia' has both Greek and Latin origins. The Greek prefix 'dys' means 'badly', while 'calculia', from the Latin 'calculare', means to count [10]. The term dyscalculia or developmental dyscalculia was first defined by the Czechoslovakian researcher Kosc in 1974 [18], as difficulty in mathematics as a result of impairment to particular parts of the brain involved in mathematical cognition, but without a general difficulty in cognitive function. In other words, dyscalculia is also known as 'difficulty with numbers', 'being bad at mathematics', or 'number blindness'. It is not the only difficulty with numbers but a more deeply-rooted problem than just being bad at mathematics [9]. As stated by Hornigold [9], the dyscalculic learner always struggles with the common difficulties in mathematics such as remembering number facts and time tables, counting backward in steps, learning to tell the time, calculations involving money and fractions, decimals and percentages. Dyscalculic learners may have difficulty in understanding numbers, number facts, numerical operations place value, the principle of exchange and their mathematical procedures. However, mostly, these difficulties can be overcome with extra support and intensive intervention.

The specific learning difficulty or disorder affects the learners' ability to memorize number-based facts understanding the logical steps needed for solving a mathematical problem and performing daily numerical tasks. Dyscalculia refers to the inability or disorder in basic numerical processes in mathematics [19]. Such learning disorder affects the learner in numerical processing and computation throughout their life. It is the result of specific disabilities in basic numerical processing, rather than the consequence of deficits in other cognitive abilities [20]. According to Grant [21], the specific learning deficits in mathematics have number

sense, memorization of arithmetic facts, accurate or fluent calculation and accurate mathematical reasoning. Among them, number sense can be classified as dyscalculia and the core deficit of dyscalculia is the lack of numerosity or the inability to understand the concept of more than/less than [21]. The term specific learning difficulties or deficits describe a range of disorders in which dyscalculia is one. Therefore, dyscalculia is also considered as the lack of numerosity or an inability to understand the concept of more than/less than.

Dyscalculia is a neurological disorder about learning abilities in mathematics. It has a strong correlation between neurobiology and dyscalculia [22, 23]. Dyscalculia is a brain-based disorder as indicated by genetic, neurobiological, and epidemiologic evidence [24]. The common range of dyscalculia lies between 3 and 6% of school-age children [22]. Similarly, Hornigold [9] states around 6% of the children have dyscalculia and are being equally affected regarding both girls and boys. However, Sharma [5], claimed that the occurrence of dyscalculia is about 6 to 8 percent of the school-age population. As affirmed by Khing [10], children with dyscalculia consist of two types of problems-mathematical computation and reasoning. The problem related to mathematical computation affects an individual to solve mathematical calculations like addition, subtraction, multiplication, and division. Similarly, mathematical reasoning affects the learner in the case of analyzing and way of thinking [19]. Such mathematical problems usually begin at the elementary level and generally continue throughout their lifespan [9].

## 4. Types of dyscalculia

In the field of mathematical learning disability, different researchers have explored their ideas to categorize the major types of dyscalculia concerning the different dimensions of acquiring mathematical ability. In this context, Kosc [25], the researcher, who proposes dyscalculia into six uniform categories particularly focusing on the characteristics of knowledge deficits are as follows:

i. Verbal dyscalculia: It denotes the disturbing ability to designate verbally mathematical terms and relations, such as naming amounts and numbers of things, digits, numbers, operational symbols and mathematical performances [25]. In this dyscalculia, children can read or write numbers, but feel difficult to recognize them when presented verbally.

ii. Prognostic dyscalculia: This type of dyscalculia denotes the trouble or difficulty to manipulate mathematical real or pictured objects. Such mathematical manipulations consist of enumerations and comparisons of estimates of quantity. Children with this type of dyscalculia can understand mathematical concepts however they have trouble in listening, comparing, and manipulating mathematical equations.

iii. Lexical dyscalculia: It is a reading disability of mathematical symbols (digits, numbers, operational signs, and written mathematical operations). In this sort of disability, children may have trouble in reading and understanding mathematical symbols, numbers, mathematical expressions, and/or equations.

iv. Graphical dyscalculia: It is a disability in manipulating mathematical symbols in writing. Children can understand; however, they feel trouble while writing or using the correct corresponding symbols. They may also be unable to copy them if written.

v. Ideognostical dyscalculia: It is difficult to carry out mental calculations and understanding mathematical ideas and relations. Children having Ideognostical dyscalculia feel difficulty with completing mental operations and remembering mathematical concepts after learning them.

vi. Operational dyscalculia: It is the inability to carry out mathematical operations or calculations due to the typical occurrence by an interchange of operations, e.g., doing addition instead of multiplication; subtraction instead of division; or substitution of more complicated operations by simpler ones.

Geary [26] has divided dyscalculia into three types particularly focusing on the way of knowledge processing and procedures. The brief descriptions of the type are as follows:

i. Semantic memory: It is concerned with the deficits in the retrieval of basic arithmetic facts. When the children retrieve the facts, there is a chance of a higher error rate and when facts are retrieved correctly, they are often unsystematic. It is also known as arithmetic retrieval deficits and is caused due to working memory deficits. It does not affect reading difficulties however learning arithmetic facts and the process of retrieving them is more complicated [27].

ii. Procedural memory: It includes developmentally immature procedures, frequent errors while executing procedures. It also comprises of poor understanding of the concepts underlying procedural use and difficulties sequencing the multiple steps in complex procedures. It is due to the dysfunction of the left hemisphere pre-frontal brain and improves with age.

iii. Visuospatial memory: It denotes the difficulty with spatially representing numerical and other forms of mathematical information and relationships. It comprises difficulties with recognizing and understanding mathematical relations, interpreting visual representations of mathematical objects, placing numbers on a number line, visualizing geometric figures and interpreting graphs and tables [9].

Karagiannakis and Cooreman [28] have categorized dyscalculia into four ways based on different aspects of mathematical ability or areas of mathematics that affect the learner. The brief accounts of the types are as follows:

i. Core number: This type of dyscalculia consists of the difficulties related to basic number sense or the ability to use and understand the number and our number system, estimating, assessing numerical differences in quantity, understanding and the use of mathematical symbols, place value and placing numbers on a number line.

ii. Reasoning: Reasoning comprises the difficulties related to understanding mathematical concepts and relationships, generalizing and transferring mathematical information, understanding complex procedures including problem-solving and decision making.

iii. Memory: This type of dyscalculia encompasses the difficulties associated with remembering and retrieving numerical facts, understanding and

recalling mathematical terminology, word problems, performing accurate mental calculations, remembering and carrying out procedures, rules and formulae, performing problem-solving steps.

iv. Visual–spatial: This way includes the difficulties concerning recognizing and understanding mathematical symbols, interpreting visual representations of mathematical objects, representing numbers on a number line, visualizing geometrical figures, interpreting graphs and tables.

## 5. Causes of dyscalculia

There are different views about the causes of dyscalculia. However, researchers are generally agreed about dyscalculia as a brain-based condition. Arguably, the specific mathematics learning difficulty (dyscalculia) can be categorized within the cognitive, behavioral and biological aspects and contextualize in teaching and learning mathematics. It can also be considered as the fundamental cause of dyscalculia or the factors affecting dyscalculic learners. The category of the fundamental causes of dyscalculia is presented in **Figure 1**.

The causes of the dyscalculia as presented in **Figure 1**, in the cognitive factor, the acquisition of number concepts and the ability to acquire arithmetical skills and understanding, some huddles during the development stages of Piaget's child development theory can the cause of dyscalculia. Similarly, the information processing theories can also be the cause to accommodate the number concept and difficulty with numbers [29]. In behavioral factors, learning environment, various aspects related to effective teaching and learning such as teaching methods, materials, motivation, classroom environment, socio-cultural factors, stress, anxiety, etc. can also be the causes to acquire the number concept and arithmetic skills [30]. Frequent learning activities or drills and practice can also help to attain the learning problem related to numbers. The biological factor comprises brain structure and genetics. In brain structure, the cause of dyscalculia depends on the differences in the surface area, thickness and volume of the different parts of the brain that are used in memory and keeping track of a task [31]. The development of brain structure may depend upon prematurity and low weight birth. It can be identified by MRI scans. In the same way, dyscalculia can be transformed from the heredity too [32]. Thus, all the aspects can cause dyscalculia in a learner.

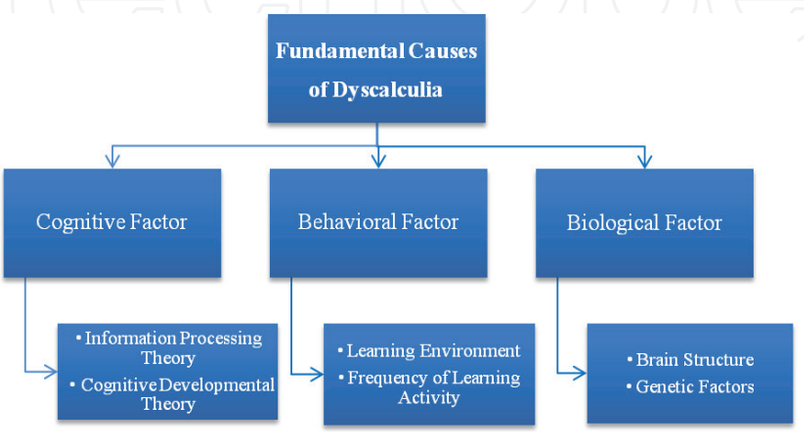



**Figure 1.**
*Fundamental causes of dyscalculia.*

## 6. Areas of common difficulties in mathematics for dyscalculic children

As already discussed above, dyscalculic children often struggle with number and number concepts that can lead to a diverse range of difficulties related to numbers in mathematics. Jacobson [33] stated that dyscalculic children have difficulties related to recognizing and remembering numbers, counting, associate number symbol with the number value, identifying patterns and placing things in the right order. Some common areas of difficulty in mathematics for dyscalculic children are stated below in brief:

i. Counting backward and counting in steps: Counting backward and stepwise.

ii. Sequencing and recognizing patterns: Troubles with recognizing patterns and sequencing numbers.

iii. Calculations: Choosing the correct numerical operation and applying it correctly.

iv. Direction/orientation: Difficulty immediately sorting out direction, spatial orientation, confusion over left, right, high, low and depth.

v. Estimation: Understanding place value, problem-related to estimating quantities from the given numbers or numeric values, mathematical concepts, rules and formulae.

vi. Time: Problem-related to tell the time on an analog clock.

vii. Assessing numerical quantity: Identify the number numerically larger or smaller.

viii. Money: Making sense of money and estimating quantities.

ix. Mental mathematics: Difficulty remembering procedures in mathematics recognize quantities without counting, recalling basic math facts, linking numbers and symbols and problem-solving.

x. Fraction: Poor visual and spatial orientation in fraction diagram.

## 7. Impact of dyscalculia in learning mathematics

Dyscalculia impacts children from the early age of schooling onwards. It affects learning mathematics as well as in daily life activities due to the inability of basic arithmetic concepts like poor number sense and reasoning. Dyscalculia can also impact children in the varied areas of mathematics. The major impacts of dyscalculia in mathematics learning in everyday activities of the children are as follows:

i. Develop a negative attitude and avoid the tasks like judging distances, direction, depth and distinguish between left and right; larger and smaller numbers.

ii. De-motivate and make it difficult to learn mathematics because of poor understanding of mathematical concepts, rules, formulae, and proper sequencing.

iii. Unable to concentrate a long time continuously on mentally concentrated tasks.

iv. Makes challenges in daily life due to their poor number sense and other mathematics skills.

v. Reduce self-efficacy of the learner about learning mathematics due to the constant difficulty on the problem related to amounts, time, distance, speed, counting, mental mathematics, and remembering numbers.

vi. Develop low self-esteem and always hesitate to argue or express the views related to mental arithmetic and numeric calculation such as addition, subtraction, multiplication and division.

vii. Makes unhappy and unenthusiastic constantly in mathematics classroom activity due to the lack of common mathematics abilities like remembering number facts, times tables, counting backward, telling the time, calculations involving money, fractions, decimals and percentages.

## 8. Effective ways of content delivery

Content delivery describes the process of conveying subject matter to the learner through either the physical or virtual medium. There are a large number of ways to deliver the content. Effective content delivery depends upon how clearly the learner has internalized or understood the subject matter. The effective way of content delivery for dyscalculic learners also depends upon the students' background, interest, level and capability. However, the multi-sensory techniques incorporating best suited modern tools and techniques with the need and interest of the learner can make the content delivery more effective. Some major ways for effective content delivery are accounted in brief:

i. Make it real: While teaching number and concept, use varied concrete materials available around the locality and also use readymade or prepared materials such as Cuisenaire rods, Base ten-block, Numicon, Addacus, Ten-frames, etc. so that multi-sensory approach can be used to make real learning. Such manipulative materials can help the dyscalculic learner develop number concepts, place value and mathematical reasoning.

ii. Provide sufficient time: The use of concrete materials in teaching helps to develop a clear concept about mathematical terms and understand the relationship between numbers and number systems through manipulating the materials. It further helps to develop mental arithmetic skills effectively. The learner should be provided sufficient time to manipulate a variety of concrete materials to explore the meaning, concepts, mathematical facts, patterns and understanding of the subject matter. Such activity helps the learner broaden their reasoning power and learning about them permanently.

iii. Make learning fun: The subject matter can be delivered effectively by making learning fun. Poor understanding of mathematics produces fears

and unpleasant consequences [34]. Therefore, playing games with Dice, Dominoes, Ten-frames, etc. make learning fun and can also familiarize with the face of Dice, dot patterns of Dominoes and counting and number relations in Ten-frames, etc. By using such concrete materials help the learner to be familiar with dot patterns, counting and number relations.

iv. Visualize more: While teaching in the classroom, visualize the mathematics subject matter by using concrete materials if possible; otherwise, visualize by drawing diagrams to model the subject matter. The process of visualization in teaching mathematics helps the learner to grasp the subject matter effectively and is also helps to develop the learners' self-efficacy about the subject matter.

v. Make learning multi-sensory: Multi-sensory learning helps the learner to concentrate or involve more and actively in the learning process that makes learning more effective and practical. When the learners are involved actively in learning, they learn sincerely and more. Such learning retains for a long time. Thus multi-sensory learning helps the dyscalculic learner to learn difficult subject matter easily.

vi. Use collaborative learning: This learning approach can be implemented in different groups of students working together to solve the given problem or the task. In this approach, the students are given certain clues and encourage them collaboratively solving the problem. In this type of learning, the learners are actively engaged to learn and develop their understanding. It helps to motivate the learner and inspires them to engage and enjoy learning mathematics. Such learning also makes the learner positive in mathematics learning.

vii. Use modern technology: The use of Information Communication Technology (ICT) makes learning more effective as well as interactive. It can be employed to accelerate, enrich and deepen basic skills in reading, writing and arithmetic [34]. It enables the student to learn better by increasing their engagement in educational activities. It is used in the learning process which makes learning faster, easier and fun. It provides better opportunities for special needs children to play, enjoy and learn mathematics as fun. The use of technology helps the dyscalculic learner to learn mathematics in a fun and in interactive way and also motivates them for mathematics learning.

viii. Rapport building: The close relationship between students and the teacher is expected to develop a positive learning environment. It also helps the students to motivate in learning mathematics. The close relationship between students and teachers makes it easy for the students to ask questions to their teacher frequently whenever they feel difficulty in learning. These two ways of communication certainly help the students reduce their learning difficulty. In the same way, it can also help the teacher to address the students' difficulties instantly then and there.

ix. Use satellite learning approach: In this approach, the selected smart students who are good at mathematics are assigned to teach the other poor students in mathematics. Then those selected smart students are separately taught by the teacher in a small group and they are asked to teach the rest of the weak students in the class. The smart students teach their friends best to

make them know/solve the given task. In this teaching approach, those poor students can be benefitted who could not ask questions to their teacher due to hesitation. It also inspires the weak students to learn mathematics and get more practiced and may feel relaxed learning with their friends.

x. Teach less but regular: In this teaching style, the subject matter is divided into small separable parts. Then the small part is taught regularly using different effective techniques. The learner feels more comfortable to learn the small part because the small part takes less time to teach and also easy to understand for students. When the students are taught a long lesson, it takes more time and the learners also feel bored and tired. Such a method can be used effectively in the lower classes and also used to teach the weak students. Similarly, most dyscalculic learners do not prefer to carry on the lengthy way of teaching or calculating strategies. In this context, shortcut ways can be used more effectively than others.

## 9. Student support

The student's support can help to promote their ability to process and understand information regarding mathematics for struggling children with dyscalculia. It can also assist them in conceptualizing and performing mathematical difficulties. It is essential to work with dyscalculic children both at home and at school to develop a positive attitude towards learning mathematics and provide additional support for learning mathematics effectively. Thus, the parents, as well as the teacher, should support the dyscalculic children to motivate them and overcome the particular difficult area of mathematics. The students supported by parents and teachers are accounted briefly as.

## 10. Student support from parent

The children spend comparatively more time at home than school and they feel closer to their parents than others at the age of primary stage. So every parent can help their children effectively in several ways who struggle with dyscalculia. Some of the supports that can be provided by the parents to their children are as follows:

i. Motivate your child about learning and learning mathematics by telling stories of success or myths.

ii. Provide plenty of time to your child for talking, playing and other funny works that the child likes to do.

iii. Provide counseling if the child is feeling depressed, anxious or discouraged. It helps to understand each other's feelings and needs.

iv. Listen to the child's interests and feeling serious and try to address them as far as possible.

v. Help your child with homework, other learning problems and timely manage the learning materials like bags, books, stationery and other materials.

vi. Help to manage the timetable for the child such as playing time, homework time, reading and writing, etc.

vii. Always acknowledge the child's struggles and praise their hard work and every success.

## 11. Student support from teacher

Children with dyscalculia need additional support and instruction at school and home due to poor working memory. The teacher can support the dyscalculic learner at school in the real classroom environment that is also the best place for children to deal with some of their difficulties. Such support can help the stressed children to make it easier and less stressful by creating a fun indoor and outdoor learning environment. The strategies and support in either way to help the children with dyscalculia will work well and also make them self-motivated and encourage. Some strategies to support the dyscalculic learner by the teacher are as follows:

i. Address child anxiety because the child struggling with mathematics often becomes anxious which makes them unable to concentrate on learning.

ii. Provide sufficient supportive tools for teaching and learning mathematics that can help the child to navigate difficult problems.

iii. Focus on mathematical games, puzzles and activities that can help to erase the particular misconceptions like mathematics is a difficult subject and help to revisit important topics regularly and develop interest and enjoyment in learning mathematics.

iv. Develop a positive mindset for the learner by providing encouragement, praise, and support to their every successful activity in the classroom.

v. Frequently revise the lesson and use real-life examples to make them easier to understand and more familiar.

vi. Use the technology to make teaching fun and interactive too. Use different applications, games and puzzles related to mathematics and get them to play.

vii. Use a step-by-step teaching approach so that the weak students in mathematics can understand easily. Provide continuous and extra support to the dyscalculic students.

viii. Provide maximum time for practicing the difficult areas of mathematics.

ix. Reduce homework; be realistic and do not overload the young child. Reduce homework-related tensions for both parent and child.

x. Always be cautious that learning disabilities affect families and vice-versa. So the students struggling with dyscalculia may affect themselves from their parents. Parental attitudes and parenting styles affect the children and their attitude towards learning. So the parents should be timely informed about their child's condition and progress and their responsibilities towards their child.

## 12. Conclusions

Dyscalculia is a specific learning disorder that influences the arithmetical abilities of children. Generally, dyscalculic children struggle to memorize number facts, understanding the logical steps needed to solve the mathematical problem. They also have difficulties in numerical calculations related to daily life. Thus the arithmetical deficits not only impact their achievement but also on other related fields beyond the class. Generally, mathematics is considered a difficult subject due to its abstract nature to all learners. Then the dyscalculic student should face more difficulty due to their weak number sense and poor reasoning towards mathematics. There are certain areas of difficulty in learning mathematics for the dyscalculic learner. In these areas, they cannot attempt in time due to the low basic mathematics fluency and reasoning. Teaching in such difficult areas of mathematics, the dyscalculic students should be provided with specialized instructions and dedicated time. Similarly, they should be cared for and well treated at school through providing classroom outside and inside learning environment. Likewise, the parents should also provide sufficient time at their home for doing homework, playing, or doing something. Thus, the efficiency of the dyscalculic students can be uplifted through utilizing effective pedagogical intervention strategies and creating a collaborative working environment.

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