Abstract

One of the lesser known learning disabilities is Dyscalculia or Arithmetic disorder. Dyscalculia is a term that refers to severe difficulties in mathematics. The authors has elucidated the problems and symptoms of Dyscalculia. He has also elucidated the three learning styles which are visual, auditory and tactile/kinesthetic. Further he has clearly elaborated on how these three learning styles can be adopted to overcome Dyscalculia.

Many children, in spite of having average or above average intelligence perform poorly in academic activities. These children may face difficulties in the basic academic skills such as reading, writing and arithmetic. These difficulties might be the result of a learning disability.

A learning disability is a kind of behavioural deficit associated with academic performance. Learning disabilities are disorders that interfere with the development of the basic academic skills. It is a condition where a child’s achievement is substantially below what one might expect for the child. Learning disability is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical disabilities. In addition to these primary characteristics of learning disabilities, there are also secondary consequences of learning disabilities such as poor motivation, self-esteem, self-efficacy and metacognition.

Children with learning disabilities face a host of academic and non-academic difficulties. Non-academic
difficulties include motor problems, perceptual problems, phonological processing difficulties and language problems. Academic difficulties include problems in reading, spelling, writing, and mathematics. Learning disabled children may have average or above average intelligence and they also have normal hearing and vision. And also they may be slow learners, average learners or even gifted children. But they apparently cannot use information transmitted by the senses to the brain as accurately as most other children. Therefore, they may do poorly in school or not as well as they can.

Learning disabilities exhibit disorders in one or more of the psychological processes involving understanding or in using spoken or written language. These disorders damage a child’s ability to learn. Most often they fall into three broad categories such as Dyslexia (Reading disorder), Dysgraphia (Writing disorder), and Dyscalculia (Arithmetic disorder).

**Dyscalculia**

Dyscalculia is a broad term that refers to severe difficulties in mathematics. It is a condition that affects the ability to acquire mathematical skills. According to Rao (2003), dyscalculia is a mathematical disability which can be defined as the inability to develop mathematical concepts, difficulty in implementing calculation procedures or to reason with numbers (Karanth & Rozario, 2005). It includes all types of mathematics problems ranging from inability to understand numbers to inability to apply mathematical principles to solve problems. Dyscalculia involves inability to understand the meaning of numbers and quantities.

Dyscalculic learners may have difficulty in understanding simple number concepts, lack of intuitive grasp of numbers, and have problems in learning number facts and procedures. Dyscalculia can be detected at a young age and measures can be taken to overcome the problems faced by younger students. However, it is a lesser known of these learning disorders and is often not recognised. A student with any degree of mathematics difficulty may be considered to have “dyscalculia” by some educational specialists. There is no single form of mathematical disability and difficulties. It varies from person to person and affect people differently in school and throughout life.

Dyscalculia can occur developmentally as a genetically linked learning disability which affects a person’s ability to understand, remember or manipulate numbers or number facts. It occurs in pupils across the whole IQ range and the sufferers often have difficulties with time, measurement or spatial reasoning. As with other types of learning disabilities, dyscalculia is said to involve the language and visual processing centers of the
brain. A difficulty in mathematics may be related to visual spatial confusion. Visual processing disorder is a condition that affects the ability to learn mathematics.

There are different symptoms of dyscalculia, the most prominent among them being the inability to visualise and identify numbers and mathematical situations. Young children with mathematics learning disabilities can have difficulty in number sense, in sorting objects by size or shape, and in comparing and contrasting certain mathematical concepts. Students with dyscalculia have a difficult time in visualising numbers and often mentally mix up the numbers, resulting in what appear to be “stupid mistakes”.

In order to do mathematics, a child has to learn the foundation skills of mathematics like visual perception and visual memory. Visual perceptual difficulties include identification of similar signs and symbols, identification of similar geometric shapes etc. Children who confuse the signs +, -, x etc., may have a problem of visual discrimination of forms or visual discrimination of position in space. A child who has a poor sense of direction (i.e. north, south, east and west) or the directional confusion such as remembering right and left may have a problem with visual discrimination of position in space. As mathematics learning continues, school children with mathematical learning disabilities may have difficulty in solving basic mathematical problems. They may struggle to remember and retain basic mathematical facts and could have trouble figuring out how to apply their knowledge and skills to solve mathematical problems. If basic mathematical skills are not mastered, many teenagers and adults with dyscalculia may have difficulty in moving on to more advanced mathematical applications.

**Learning Styles**

Learning styles are different approaches or ways of learning. There are three main types of learning styles: visual, auditory and tactile/kinesthetic. Most people learn best through a combination of the three learning styles, but everybody is different.

Visual learners are those who learn through seeing things. They learn best by looking at graphics, watching a demonstration or reading. These learners need to see the teacher’s body language and facial expression to fully understand the content of a lesson. They tend to sit at the front of the classroom to avoid visual obstructions. They may think in terms of pictures and learn best from visual displays such as diagrams, illustrated textbooks, overhead transparencies, videos, flipcharts and handouts. For them, it is easy to look at charts and graphs, but they may have difficulty focussing while listening to
an explanation.

Auditory learners are those who learn through hearing things. They learn best through lectures, discussions, talking things through and listening to what others have to say. These learners often benefit from reading text aloud and using a tape recorder. They would rather listen to things being explained than read about them. They interpret the underlying meanings of speech through listening to tone of voice, pitch and speed. For them, written information may have little meaning until it is heard.

Tactile or kinesthetic learners are those who learn through experiencing or doing things. They learn best through a hands-on approach. These learners learn through moving, doing and touching. They process information through experience by actively exploring the physical world around them. They easily learn through doing an activity. For them, writing things down makes it easier to understand but sitting still while studying may be difficult.

A well balanced intelligent child is able to develop all the three types of learning styles. There are many ways to train the different types of learning styles, but training the cognitive skills is found to be more important. Cognitive skills are the foundational building blocks of each learning style. Only with properly trained cognitive skills, a child is able to use the learning styles effectively.

Even though most learners use a combination of the three learning styles, they usually have a clear preference for one. Knowing and understanding the types of learning styles is important for students of any age. The students have to understand their type of learning style earlier so that learning becomes easier and less stressful in the future. But it is important to train and practice the other types of learning styles so that the children can utilise them as effectively as possible.

**Visual Learning for Dyscalculic Learners**

Visual learning is that type of learning which involves learning through seeing things. It involves the use of charts, graphs, pictures, diagrams, videos, transparencies, flipcharts, hand-outs etc., in the learning process. Visual learning fosters better understanding, organisation and imagination. A student when given visual scope for learning remembers pictures, diagrams, symbols, formulas etc.

Data handling, graphical representation and visualisation are important mathematical skills which can be taught productively to children with learning disabilities like dyscalculia. Data handling can be suitably introduced as tools to understand the process and represent and interpret day-to-day data. Use of graphical representations of data can be encouraged among students for effective learning. Activities in
practical Mathematics help students immensely in visualisation. The spatial reasoning and visualisation skills of students should be enhanced.

Innovative use of technology may help dyscalculic learners to overcome their disability to a large extent. A study conducted by Lugo (2004) explores how multimedia computer technology could be a potential supplemental teaching aid that teachers use in addition to traditional classroom instruction. Technology can greatly aid the process of mathematical exploration and clever use of such technology can help engage such students with learning disorders. Calculators are typically seen as an aid for the calculations regarding arithmetical operations. If ordinary calculators can offer such possibilities such as doing arithmetical operations, calculating squares, square root etc., the potential of using computers for mathematical exploration is far higher. (NCERT, 2005).

It must be understood that there is a spectrum of technology used in mathematics education and calculators or computers are at one end of the spectrum. The use of pictures, blackboards etc., are at the other end and the use of graph paper, geo boards, abacus, geometry boxes etc is crucial. Innovations in the design and use of such material must be encouraged so that their use makes school mathematics enjoyable and meaningful. Michaelson & Thomas (2007) suggests that certain practical methods and instructional designs can be implemented in the classroom to address the specific learning needs of dyscalculic learners.

**Conclusion**

Dyscalculia is thus seen to be a specific learning disability and requires diagnosis as well as support apart from classroom teaching. However, only a very few studies have been focussed on dyscalculia and ways to overcome it. It is very essential for school teachers to adopt innovative methods of teaching to meet the needs of dyscalculic learners. The use of technology like multimedia instructional strategy or computer assisted instruction may facilitate the process of mathematical exploration in dyscalculic learners. By these specialised approaches of teaching, most dyscalculic learners can be helped to learn normally. It is therefore, imperative for dyscalculic learners to receive the highest quality of Mathematics education possible.

Research has shown that visual perception, visual memory and logical thinking are the most important foundational skills of mathematics. These fundamental skills have to be mastered by means of adequate training and practice. Visual perception and visual memory are important mathematical skills to master visual spatial relationships. Logical thinking alone makes problem solving possible. To be really successful in mathematics, one needs to visualise clearly numbers and mathematical situations.
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