Unit 10: Identification of learning difficulties

Identification of Learning difficulties - Slow Learners in Mathematics – Meaning, Characteristics, Reasons for Slow Learning and learning difficulties: dyslexia, dysgraphia and dyscalculia - remedial measures.

7.3 Causes for Slow Learning in Mathematics and Remedial Measures for the Backward

There are certain distinguishing characteristics which should be helpful in recognising the slow learners and low achievers in mathematics. National Council of Teachers of Mathematics, Washington (NCTM, 1967) defined low achievers as the child ranking the 30th percentile of the students' population in achievements in mathematics. Although there are many possible exceptions to any given pattern, the following might be safely listed as the characteristics of the slow learners.

7.3.1 Identification of Slow Learners

- Intelligence quotient below 90
- Has little drive
- Has short span of attention
- Has weak association memory
- Is a poor reader
- Has difficulty with abstractions
- Is not logical in thinking
- Lacks imaginations
- Is unable to detect his own errors
- Has little power to transfer training
- Is not creative in his thinking.

Once the slow learners are identified, the next task is to find out the causes for the mathematical backwardness and planning for appropriate remedial programmes.

7.3.2 Causes and Remedies

- *Physical Causes*

Backwardness may be due to some physical causes such as poor eyesight, hearing defect or any other physical ailment which do not allow the child to concentrate on studies. Remedy of all these causes lies with the physician or doctor but some sort of physical exercise may also help the child.

- *Lack of Interest*

The backwardness may be due to distaste for the subject which may be natural or acquired. This could lead to an unfavourable disposition towards

learning mathematics. The distaste may be due to harsh and disinterested teachers, too much pressure by parents, faulty methods of teaching and learning etc.

The teacher has to develop in the learner a positive attitude towards the subject through patience and persistence. This is possible by using illustrative aids. The well graded exercises given to suit their abilities will also go a long way in improving their achievement in mathematics.

- *Mental Disability*

The mental disability may be inborn or caused by environmental factors. The child may have low IQ, mental conflict, inferiority complex, feeling of insecurity, anxiety, tension, fear, nervousness, maladjustment etc. Many of these mental disorders can be successfully tackled by a competent teacher with a conscious effort. Attitude of affection, sympathy and kindness can go a long way in this regard.

- *Lack of Mathematical Abilities*

Certain abilities like abstract reasoning, numerical ability, spatial ability, arithmetic reasoning, computational ability are prerequisites for success in mathematics. Slow learners may lack proficiency in one or more of these abilities. The teachers will have to test proficiency of the slow learners on these abilities and necessary training programmes should be implemented to improve the skills and abilities

- *Inappropriate Learning Experiences*

The inappropriate learning experiences provided in the mathematics class could lead to confusion resulting in misconception of the basic mathematical concepts. The teachers should plan the learning experiences which are simple and relevant for the slow learners to achieve the objectives and get the concepts clear and clarified. Remedial teaching has to be done in such cases where the slow learners need them. Remedial teaching has to be planned in such a way that the learning experiences provided would be different and would meet the special needs of the slow learners.

- *Irregular Study Habits*

Mathematics is a subject of logical sequence. Higher order concepts depend upon low order concepts. Rules and formulae are statements of relationship among these concepts. Therefore a student with irregular study habits will find it hard to understand and apply the mathematical laws and principles. The teacher should help such students to plan their study time

properly and make them more regular and systematic. Drill and review also could help them in improving their performance.

- *Teacher's Indifference*

Many a time the mathematics teachers become impatient and show indifference to the slow learners who are slow in grasping mathematical ideas and concepts. Moreover slow learners may not be able to perform the mathematical tasks at the same rate as their counterparts in the class. This could result in frustration among the slow learners leading to low achievement.

A teacher could take more interest in the slow learners and understand their levels of learning. This will definitely boost up the self-confidence of the slow learners.

- *Ineffective Methods of Teaching*

The group methods of teaching are not very effective for the slow learners because their rate of learning, level of achievement and level of understanding are not the same as the other students in the class. The teacher has to give special attention to the needs of the slow learners. In the case of slow learners, methods of individualised instruction like Programmed Instruction, Computer Aided Instruction (CAI) and use of learning packages and modules could yield better result and facilitate effective learning. The teacher should also give individual attention to the slow learners in clarifying their doubts, in stimulating and in directing their thinking. This will enthuse in them a sense of well being, trust and confidence in the teacher.

- *Practice and Drill*

The slow learners need more concrete experiences for effective learning and more drill and practice for longer retention. The teacher has to provide them with such opportunities which would result in meaningful learning.

- *Lack of Facilities at Home*

When the child does not have adequate time and facilities for learning at home, it may lead to backwardness. The teacher can help such students by arranging supervised study, where the child can learn under the supervision of the teacher. In this connection the teacher can seek the help of the gifted children.

- *Family Background and Home Environment*

The uncongenial atmosphere at home, the negative attitude of the parents towards the subject, the pressure of the parents and so on could

adversely influence the students' performance in mathematics. A teacher could deal with such children with patience and sympathy. The teacher has to change the attitude of the parents and students by interacting with them in a more meaningful manner.

- *Irregular School Attendance*

The irregularity in attendance causes a serious problem for mathematics learning as it creates a wide gap in the student's understanding of mathematical concepts. Mathematics being a sequential subject, the understanding of a concept depends upon an earlier concept. Once the link is lost, the learning becomes more complex and difficult.The teacher has to look into the causes of irregularity in attendance and help the students in the best possible ways.

- *Lack of Proficiency in Fundamental Skills and Lack of Understanding in Basic Mathematical Concepts*

Proficiency in mathematical operations and understanding in basic mathematical concepts are two factors that could contribute towards better achievement. The slow learners may lack in these two fundamental aspects. Adequate drill and practice can enhance the proficiency in fundamental skills while review and more relevant learning experiences can make the basic concepts clear for the students. Moreover the teacher has to insist on neatness in work, legibility in handwriting, accuracy in copying the numbers and placing the number digits, neatness and accuracy in drawing geometrical figures, etc. so as to improve their speed and accuracy in doing mathematical work.

7.3.3 Some Useful Classroom Techniques for Slow Learners

- Provide opportunities for the class to learn through several senses at a time such as seeing, hearing, manipulating dramatising and doing.
- Have daily routine, with surprises, as routine gives them a feeling of security.
- Frequent changes of activity are necessary because slow learners have a short span of interest. Provide variety within a period.
- Never put a child on the spot for an answer if he is dull.
- Give these pupils immediate satisfaction by checking their work as they do it.
- Make each daily lesson complete in itself so that the slow learners can learn it easily.

- Never penalise a slow child by forcing him to work longer at mathematics than his brighter peers.
- Always prepare pupils for verbal problems. One or two thought problems each day are more effective than a long test at one time.
- Always make directions clear by writing them on the blackboard.
- Do not try to force the slow learners to do mathematics when they are not really interested.
- Try to think of new ways to review concepts.
- Break content into small repetitive steps and give easy exercises for immediate reinforcement.
- When a question is asked, break the questions into a number of simpler questions.
- Do not insist on verbal definitions and statement of rules if there are evidences that the child has understood the idea.
- Always introduce a new relationship with the simplest arithmetic or algebra possible so that the pupil can concentrate on concept itself and not get frustrated by tedious computation.
- If there are several approaches to a new concept, use one per lesson to avoid confusion.

LEARNING DIFFICULTIES IN MATHEMATICS

Mathematics disabilities can arise at nearly any stage of a child's scholastic development. While very little is known about the neurobiological or environmental causes of these problems, many experts attribute them to deficits in one or more of five different skill types. These deficits can independently of one another or can occur in combination. All can impact a child's ability to progress in mathematics.

1. Incomplete Mastery of Number Facts.
2. Computational Weakness.
3. Difficulty Transferring Knowledge.
4. Making Connections.
5. Incomplete Understanding of the Language of Mathematics.
6. Difficulty Comprehending the Visual Spatial Aspects and Perceptual Difficulties.

DYSCALCULIA

Dyscalculia is a specific learning disability in mathematics. Kids with dyscalculia may have difficulty understanding number related concepts or using symbols or functions needed for success in mathematics.

Dyscalculia is a common learning issue that impacts kind's ability to do mathematics. It doesn't just affect them at school, however. The challenges can also create difficulties in daily life. The good news is there are various supports and strategies that can help kids gain the skills they need. The more you know about your child's challenges, the better able you will be to get her the help she needs.

Kids with this learning issue have trouble with many aspects of mathematics. They often don't understand quantities or concepts like biggest vs. smallest. They may not understand that the numeral 5 is the same as the word five. (This skills are sometimes called number sense.).

Kids with dyscalculia also have trouble with the mechanics of doing mathematics, such as being able to recall mathematics facts. They may understand the logic behind mathematics, but not how or when to apply what they know to solve mathematics problems. They also often struggle with working memory. For example, they may have a hard time holding numbers in mind while doing mathematics problems with multiple steps.

Dyscalculia Signs and Symptoms

Dyscalculia can cause different types of mathematics difficulties. So symptoms may vary from child to child. Dyscalculia often looks different at different ages. It tends to become more apparent as kinds get older. But symptoms can appear as early as preschool.

Pre-school:

1. Has trouble learning to count and skips over numbers long after kinds the same age can remember numbers in the right order.
2. Struggles to recognize patterns, such as smallest to largest or tallest to shortest.
3. Has trouble recognizing number symbols (knowing that "7" means seven).
4. Doesn't seem to understand the meaning of counting. For example, when asked for five blocks, she just hands you an armful, rather than counting them out.

Grade School:

1. Has difficulty learning and recalling basic mathematics facts, such as 2+4=6.
2. Struggles to identify +, - and other signs, and to use them correctly.
3. May still use fingers to count instead of using more advanced strategies, like mental mathematics.
4. Struggle to understand words related to mathematics, such as greater than and less than.
5. Has trouble with visual-spatial representations of numbers, such as number lines.

Middle School:

1. Has difficulty understanding place value.
2. Has trouble writing numerals clearly or putting them in the correct column.

3. Has trouble with fractions and with measuring things, like ingredients in a simple recipe.
4. Struggles to keep score in sports games.

High School:

1. Struggles to apply mathematics concepts to money, including estimating the total cost, making exact change and figuring out a tip.
2. Has a hard time grasping information shown on graphs or charts.
3. Has difficulty measuring things like ingredients in a simple recipe or liquids in a bottle.
4. Has trouble finding different approaches to the same mathematics problem.

Possible Causes of Dyscalculia

Researchers don't know exactly what causes dyscalculia. But they have identified certain factors that indicate it's related to how the brain is structured and functions.

Here are some of the possible Causes of dyscalculia:

1. Genes. 2. Brain development. 3. Environment. 4. Brain injury.

How can we help our child with Dyscalculia?

Our role is unique in giving the support and encouragement to our child which he/she needs.

Here are some of the things we can do:

1. Explore multisensory techniques for teaching mathematics we can use at home.
2. Discover software, apps and Chrome tools to help the child with mathematics.
3. Look into free online assistive technology tools for mathematics on the web.
4. Find board games to the child can play to build mathematics skills.
5. Learn ways to help build the child's self-esteem.
6. See what the child can say to self-advocate in grade school and middle school.
7. Get tips on how to be an advocate for our child at school.
8. Discover our child's strength.
9. Explore the collection of strategies to help with dyscalculia to get even more ideas. And be sure to visit parenting Coach, where we will find hundreds of age-specific, practical tips to work through social, emotional and behavioral challenges.
10. Connecting and trading tips with other parents in our online community.
11. Reach out to experts through our free Experts live events.
12. Learn about Parent Training and information centers a free local resource.

DYSGRAPHIA AND MATHEMATICS

Dysgraphia is a learning disorder that affects a person's ability to write. Dysgraphia is not identified as a disability or disorder in the Diagnostic and Statistical Manual of Mental Disorders, but it falls under the manual's specific learning disorder category as impairment in written expression.

This condition is generally caused by disease of or damage to the brain and it can reveal itself in different ways. Some common traits of people with dysgraphia include poor handwriting and

spelling skills, difficulty putting thoughts into words on paper, and difficulty taking notes during lecture.

Dysgraphia doesn't limit itself to words, it also affects a students' ability to learn and apply mathematics skills. For instance, students with dysgraphia may,

- Have inconsistent spacing between numbers and symbols.
- Omit numbers, letters, and words in writing.
- Have difficulty copying numbers from the board.
- Avoid tasks involving drawing or writing.
- Have unusual posture or a strained pencil/pen grip when writing.
- Have illegible handwriting.
- Have difficulty organizing thoughts and working through steps in writing.

Accommodating Students with Dysgraphia

It's important to remember that students with dysgraphia have a learning disorder, they are not lazy. So, avoid using negative reinforcement and avoid placing students in situations that make them feel uncomfortable. For instance, don't force students with dysgraphia to solve problems on the board in front of the class. Understand that students with dysgraphia can become frustrated easily and let them know you are available as an educationally.

The aim of such accommodations in to provide students with dysgraphia what they need to be just as successful as their peers. Such accommodations should help level the playing field, not provide an academic advantage. Also keep in mind that, by law, accommodations listed on the student's individualized Education Plan or Section 504 plan must be provided.

Tips for Teaching Students with Dysgraphia

When teaching Mathematics to students with dysgraphia, consider some of these suggestions,

1. Model and encourage appropriate pencil grip and posture. Try different pencils, pens, and pencil grips with the student until the student finds a comfortable tool, and speak with the school occupational therapist for suggestions.
2. Have the student complete repetitive handwriting exercise starting with numbers, then equations, and finally mathematical word problems, if appropriate.
3. Teach information in small chunks followed immediately with opportunities to solve, apply and independently practice the mathematics concept. Provide opportunities for hands on practice.
4. Have students use interactive notebooks for mathematics, as they can help with organization. Inside the front cover of students' notebooks. Provide a quick reference sheet.

Allow the student to use a word processor or assistive technology device to reduce or eliminate handwriting tasks. An Alpha Smart, for example, is an assistive technology device that allows the student to type rather than write and the teacher can connect it to a computer to print the document.

Dyslexia

Definition of Dyslexia

The World Federation of Neurology defines Dyslexia as —A disorder manifested by difficulties in learning to read, despite conventional instructions, adequate, intelligence and socio-cultural opportunities.

Signs of dyslexia

The following are some common signs of dyslexia:

- The dyslexic reader is more often a boy than a girl. The ratio is 4:1
- Dyslexic readers tend to be spatially disoriented, with pronounced left / right confusion. This affects the way they perceive words.
  - There is frequent reversal of letters [b-d, flim-film]; words [saw- was], and sometimes entire sentence.
  - Sounds are confused [empty- entry].
  - Concepts are reversed [floor for ceiling; cake for bread]
- There may be poor figure ground discrimination visual-motor difficulties. He may have untidy writing. The letters are poorly formed, irregular and uneven in formation.
- Reading rate is low
- Tends to make mistakes in loud reading, laborious reading, reads word by word mispronunciation occurs often.
- Poor reading comprehension
- Omission of letters, syllables, words or word endings, (calls for called / call, sed / said)
- Addition of sounds or words in sentences (ischool / school)
- Substitution of words / letter (home / house, ise cream / ice cream Mispronouncing words / letter (joo / zoo)
- Transposing of order of words in a sentence (I like to dance / dance like I to)

Types of Dyslexia

Visual Dyslexia: It is marked by:

- Reversal of whole word / syllable / letters (now / won, was / saw, b / d).
- Substitution (house / home)

- Addition of sounds (ischool / school)
- Omission of letters, syllables, words or word endings (sed / said). It arises due to child's short memory span and difficulty in interpreting and recalling visual images.

Auditory Dyslexia: It is characterized by the child

- having difficulty in processing and understanding what has been said to him.
- not being able to distinguish subtle differences in sound (bit/bet, pig/peg).
- having difficulty in filtering out the extraneous sound. It is quite likely that a child with auditory dyslexia becomes very tense or hyper-active in a noisy room.

Deep Dyslexia: It is a combination of the above two

Important components for successful reading

Phonological Awareness: Phonological Awareness or phoneme awareness means understanding that speech is made up of individual sounds - Phonemes – arranged in a particular sequence and the ability to manipulate the smallest units of sound (phonemes) that make up spoken words. There are forty-four different phonemes in the English language which are represented by one or more of the 26 letters in the English alphabet.

Phonemic Awareness

- It is not phonics. It is strictly oral; knowing how to manipulate the sounds in spoken words.
- It requires focusing on the sounds of speech, not the meaning.

Understanding that words can be segmented into syllables and speech sounds. e.g. car / pen / _cat' /c/ -/a/ -/t/

Alphabet knowledge: The ability to recognize and name the letters of the alphabet, symbols of a letter, sound of a letter appears to be the second most important

instructional factor in learning to read. It is highly co-related with later reading successes.

Basic Sight Words: A child can make little progress in reading without a basic sight vocabulary. This becomes especially important for the disabled reader. The Dolch basic sight vocabulary of 220 words contains about 65 % of all the words in the reading material of primary and secondary grades. If the child does not have these words in his sight vocabulary or cannot recognize them instantly, he cannot become a fluent reader. There are several lists of these common or basic sight words.

Spelling: Spelling is the forming of words from letters according to accepted usage; a sequence of letters composing a word; a statement of rules on how words are to be written. Spelling strengthens the skills needed for reading.

Fluency: The ability to read, speaks, or write isolated words, phrases and text accurately and quickly.

Substitution: The child substitutes words, which look and almost mean the same (home / house, jungle / forest). Sometimes there are bizarre insertions (bus / baking). The child focuses only on the initial part of the word and ignores the rest. The problem of substitution signifies that either the child has poor decoding ability or poor fluency skills. If the minor mistakes appear rarely, it is best to ignore the problem.

Repetition: The child re-reads words or phrases. This difficulty occurs because the child is either not able to make sense of the meaning or is anxious and nervous while reading or lack of confidence.